DISCRIMINATION, CULTURAL CONSONANCE, AND CELL-MEDIATED IMMUNITY AMONG COLLEGE STUDENTS AT THE UNIVERSITY OF ALABAMA

by

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ABSTRACT

Racial-ethnic inequalities in health are a major public health concern in the United States. Biocultural anthropologists approach the question of health using culture theory and are informed by expertise in human biology. The mechanisms by which social inequalities "get under the skin" and are transduced into health inequalities are of interest to both biocultural anthropologists and those directing efforts to reduce health inequalities. Recent evidence showing racial-ethnic differences in cell-mediated immunity was elaborated upon through research conducted with 71 young college students at the University of Alabama. Drawing on prior ethnographic work on understandings of life trajectory among youth, and on the extensive literature demonstrating associations between perceived discrimination and health outcomes, this study tested two mechanisms for the observed racial-ethnic differences in cell-mediated immunity. Cultural consonance, or the degree to which an individual is congruent with locally valued ways of thinking and behaving, and perceived discrimination were tested for associations with cytomegalovirus (CMV). CMV was used as a proxy measure of cell-mediated immune status. Differences by race-ethnicity in CMV were found. Non-White students had higher levels of CMV than White students. No main effects of cultural consonance or perceived discrimination predicted CMV, but an interaction between these two variables did predict CMV. Future research efforts in racial-ethnic health disparities will consider social address and culture as important factors in population health.

DEDICATION

This is for Jessica Thill and Dr. Roger Haro of the University of Wisconsin – La Crosse McNair Scholars Program. The people in this program were instrumental in putting me on a path to a good graduate program. Thanks for believing in me.

LIST OF ABBREVIATIONS AND SYMBOLS

n	Frequency
p	The probability of obtaining a given test statistic when the null hypothesis is true.
r	Pearson correlation coefficient (unless otherwise specified)
<	Less than
>	Greater than
CC-barriers	Cultural consonance in the domain of barriers
CC-material goods	Cultural consonance in the domain of material goods
LTI-Y	Life Trajectory Interview for Youth
s.d.	Standard deviation
CDC	The Centers for Disease Control and Prevention
CMV	Cytomegalovirus
EBV	Epstein-Barr Virus
EDS	Everyday Discrimination Scale

MEDS	Major Experiences of Discrimination Scale
OMB	Office of Management and Budget
SPSS	Statistical Package for the Social Sciences

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CHAPTER 1

INTRODUCTION

Racial-ethnic disparities in cell-mediated function have been demonstrated in a nationally representative sample (Dowd *et al.* 2014). Race and ethnicity refer to arbitrary sociocultural systems of categorization often based on a random assortment of phenotypic characteristics, with no meaningful relationship to genotype (Brown & Armelagos 2001). A reduced ability to control intracellular herpesviruses (a function of cell-mediated immunity) patterned by race-ethnicity thus requires explanation. This study tests two possible mechanisms of racial-ethnic disparities in immunity. Specifically, cultural consonance and perceived discrimination are proposed and tested as mediators of racial-ethnic differences in immunity among students at the University of Alabama (UA).

The observed racial-ethnic differences in cell-mediated immunity are part of a broader pattern of racial-ethnic health disparities. Across many different health outcomes, minority racial-ethnic populations in the United States (U.S.) bear a disproportionate burden of disease. Socioeconomic differences between racial-ethnic groups are important in explaining health disparities, but they cannot account for all of the variation in health by race and ethnicity (Williams *et al.* 2010). An anthropological perspective on this issue recognizes culture as an important factor for understanding patterns in health, but culture is rarely incorporated into studies of population health. The current study will expand on previous research by incorporating culture as an important independent variable in formulating explanations for racial-ethnic health disparities.

Drawing on a psychosocial explanatory model that privileges stress as a mediator of health disparities, Dowd *et al.* (2014) investigated possible links between socioeconomic status (SES), race-ethnicity, perceived stress, and cell-mediated immunity. They found racial-ethnic differences in cell-mediated immunity that could not be explained by their measures of stress or by SES. In their discussion, Dowd *et al.* (2014) suggested using measures of more specific types of stress, such as discrimination, to investigate racial-ethnic and socioeconomic health disparities. Indeed, researchers have shown that perceived discrimination is associated with cell-mediated immunity (Christian *et al.* 2012; McClure *et al.* 2010). The current study will contribute to this budding literature and a psychosocial model of health disparities by measuring perceived discrimination and testing for associations with cell-mediated immunity in college students.

Cultural consonance is a second mechanism of racial-ethnic disparities in immune function being tested in the current study. Cultural consonance is the degree to which individuals are congruent with cultural models of thought and behavior (Dressler 2007). Cultural consonance builds on a cognitive anthropological theory of culture to examine associations between culture and health, and has been associated with health outcomes such as blood pressure (Dressler, Balieiro, *et al.* 2005). The current study expands on previous work done using the methods and theory of cognitive anthropology by testing for an association between cultural consonance in salient domains (defined as broad areas of conceptualization – see D'Andrade 1995:54) of the life trajectory and cell-mediated immunity. The life trajectory refers to the understanding of how one's life will unfold, including the barriers and resources relevant to realizing this vision. Additionally, tests for interactions between cultural consonance and perceived discrimination

contribute to a broader model of health disparities that incorporates the effects of both racially stratified power structures and cultural meaning systems.

Whereas many studies assume culture, its content, and the extent to which it is shared, the current study incorporates a preliminary phase (Phase I) of research that verifies the presence of cultural models of the life trajectory among students at UA. This work builds directly upon ethnographic work published by Brown *et al.* (2006), which found four salient cultural domains of the life trajectory among youth aged 19-25 in western North Carolina. The four domains were: milestones, barriers, socioemotional resources, and material goods. The milestones domain described important achievements over the life-course. The barriers domain was composed of events or personal characteristics that might delay life-course achievement. The socioemotional resources referred to community, family, and individual characteristics necessary for happiness. The material goods domain was made up of items that mark social and economic success.

Brown *et al.* (2006) collected their data roughly ten years ago, so the current study represents a test of their findings through time (early 2000s compared to 2015), space (western North Carolina compared to Tuscaloosa), and cultural context (rural/marginalized young adults compared to students at a selective university). This preliminary research lays the empirical foundation for the creation of the cultural consonance instrument used in the second phase (Phase II) of the current study.

Both phases of the current study were conducted at UA. The Phase I sample consisted of 26 students at UA between 19-25 years of age. These students completed a ranking task of the items associated with the life trajectory domains found by Brown *et al.* (2006). These rankings were then analyzed using cultural consensus analysis (CCA) (Romney *et al.* 1986) to test for the presence of cultural models in several of the life trajectory domains. The Phase II sample

consisted of 71 students at UA between 18-25 years of age. Data on demographics, perceived discrimination, and cultural consonance were obtained from this sample, as well as several drops of blood for quantification of cytomegalovirus (CMV). CMV is the dependent variable in this study and is used as a proxy measure of cell-mediated immunity.

A structural-constructivist approach (see Dressler *et al.* 2005) is utilized in the current study. This approach recognizes the effects of racially stratified power structures, as well as the role of culture in determining what is locally meaningful and relevant to health in everyday situations. These power structures and shared meanings get "under the skin" and affect human biology in ways that may not be accessible to conscious thought and reflection. The integration of sophisticated conceptualizations of culture and expertise in human biology place biocultural anthropologists in an excellent position to contribute a unique understanding of the problem of racial-ethnic health disparities.

Outline

Chapter two is a review of several different models purporting to explain racial-ethnic health disparities. The psychosocial model of health disparities is given special attention because it is being tested in the current study. Utilizing the psychosocial model of health disparities, it is predicted that perceived discrimination will be associated with higher CMV antibody titers. The use of herpesviruses (e.g., CMV) as a marker of cell-mediated immune function is also elaborated upon in this chapter.

Chapter three is a discussion of cognitive anthropology and its bearing on the current study. Prior work using a cognitive approach to relate culture to health is selectively reviewed. This is followed by a discussion of how the current study will expand on prior work.

Chapter four describes the methods used in this study. There is a discussion of ethnographic context, sampling, and the discrimination instruments utilized. The development of the cultural consonance instrument from the data collected in Phase I is described in detail. Laboratory procedures for quantification of CMV are also included. A discussion of statistical analyses, which were completed using the Statistical Package for the Social Sciences (SPSS v. 23), concludes this chapter.

Chapter five describes the results of both phases of research. Descriptive data for the Phase I results are presented first. Next, descriptive data for the Phase II sample are presented. Correlations, Mann-Whitney *U* tests, and regression models are then presented to test the hypotheses of the current study.

Chapter six is a discussion of the results. Interpretations of the statistical tests are presented, along with a consideration of limitations of the current study and recommendations for future work in this research area.

A conclusion is presented in Chapter seven. The findings of this thesis are reviewed with respect to the original aims of the study. The contribution of this thesis to anthropology is also discussed.

CHAPTER 2

RACIAL-ETHNIC HEALTH DISPARITIES IN THE UNITED STATES: MODELS AND EXPLANATIONS

Introduction

The United States (U.S.) is characterized by stark income inequality (DeNavas-Walt and Proctor 2015:8) and educational inequality (Centers for Disease Control 2013:9-15). Inequalities in income and education are associated with national inequalities in health (Adler *et al.* 1993). Reports on national health, such as *Health, United States, 2013* (National Center for Health Statistics 2014), reveal that the burden of disease falls disproportionately on minority racial-ethnic populations. These disproportionate differences in health outcomes are collectively referred to as health disparities, and less commonly as health inequities. According to the World Health Organization (2016), health inequities are "…the *unfair and avoidable* differences in health status seen within and between countries" (emphasis added). These "unfair and avoidable" differences in health outcomes will hereafter be referred to as health disparities.

The current study focuses on racial-ethnic health disparities in the U.S. Racial-ethnic health disparities refer to unfair and avoidable differences in health by the racial-ethnic groups recognized by the U.S. government. The racial-ethnic categories traditionally used by the government were established in a 1977 Office of Management and Budget (OMB) directive (OMB 1995), and were updated in 1997 to include five main racial categories and two ethnic categories (OMB 1997). Black, White, American Indian or Alaskan Native, Asian, and Native Hawaiian or Other Pacific Islander are the main racial categories recognized by the U.S. government, with various racial subgroups recognized within these five racial categories.

Hispanic and Non-Hispanic are the only ethnic categories recognized. The U.S. government recognizes many different ethnicities within the Hispanic category. The five main racial groups and the Hispanic ethnic group labels are commonly used in health data collected by government agencies. The recognition of more than just five or six racial-ethnic groups will be critical in the effort to more accurately characterize the health status of population groups in the U.S., rather than collapsing across the broad categories used since the 1977 OMB directive.

Health disparities by the traditional OMB racial-ethnic categories have been documented and well substantiated. A report released in 2013 by the Centers for Disease Control and Prevention (CDC) documented disparities by a number of different health outcomes (CDC 2013). For example, prevalence of diabetes is higher in minority racial-ethnic groups than in the majority White non-Hispanic population (CDC 2013:101). Estimated rates of HIV infection are higher for Black and Hispanic populations than for the White population (CDC 2013:114). Black Americans have significantly higher rates of hypertension than any other racial-ethnic group (CDC 2013:146). Rates of homicide are higher among people identifying as Black, Hispanic, and American Indian/Alaska Native than they are among White Americans (CDC 2013:165). In general, minority racial-ethnic individuals more often report their health to be "fair" or "poor" than White individuals (CDC 2013:107). The differences in health by racial-ethnic categories established by the OMB are strong and consistent, requiring explanation.

Problematizing Race and Ethnicity

The terms "race" and "ethnicity" are often used in health research without being defined. This is true not only for fields like epidemiology, but for anthropology as well (Gravlee and Sweet 2008). These terms are treated as variables that predict health outcomes, though it is often unclear *why* race and ethnicity should predict health outcomes. Many assume underlying genetic

reasons for health differences by race and ethnicity, while others are much more explicit about this assumption (e.g., Wade 2014). Anthropologists are much more apt to attribute racial-ethnic health disparities to differences in social circumstances and their downstream physiological consequences.

Since the 1700s, scientists like Linnaeus have lent credibility to the idea humans could be separated into distinct subspecies, defined by characteristics like skin color and various other morphological traits. Advances in molecular biology in the 20th century allowed Lewontin (1972) to directly test the hypothesis that races were genetically distinct. Lewontin and many others since his landmark study have found that very little genetic variability can be accounted for by reference to racial groups (Latter 1980; Nei and Roychoudhury 1982; Barbujani *et al.* 1997). Far more genetic variability is present within supposed racial groups than between these groups (Brown and Armelagos 2001). These results demonstrate that conceptions of biologically distinct races are not meaningful and provide a poor model of genetic reality.

Race as a biological construct is a myth and dismissed by anthropologists, but as Gravlee (2009) points out, this treatment of race does not account for racial-ethnic health disparities. It is not enough to simply say that race is a "myth." Racial-ethnic health disparities refer to *biological* differences between socially constructed groups. Why are there biological differences between racial-ethnic groups if they are socially constructed and genetically indistinct from one another?

Rather than flatly denying that race exists, a different conceptualization of race is needed to account for racial-ethnic health disparities. Following Smedley (2007), Gravlee (2009) defines race as a worldview. That is, racial organization schemes are culturally determined ways of organizing people. Folk models of race masquerade as "biological" and serve to naturalize the power hierarchies associated with racial-ethnic groups.

For the current study, (in the context of the U.S.) race *and* ethnicity are conceptualized as culturally determined ways of categorizing people based on phenotype, actual or assumed ancestry, and/or language. These organizational schemes have consequences for the health of the people to whom they are applied because the schemes are directly related to social inequalities. Social inequality is embodied via cultural constructions (e.g., race) and contributes to the creation of racial-ethnic health disparities (Gravlee 2009). Race and ethnicity are thus socially constructed categories with physiological consequences affecting well-being.

The phrases "racial-ethnic" and "race-ethnicity" will be used throughout the current study to refer to the OMB racial and ethnic categories and the people grouped into those categories. While there are certainly distinctions to be made between the concepts of race and ethnicity, the distinction is less important for the current study because of the cultural context. The racial classification scheme used in the U.S. recognizes relatively few racial categories, and the Non-White categories are often lumped together with various ethnic categories under the catch-all category of "minority group." Of interest here are the differences between racial-ethnic majority and minority groups. Thus, the distinction between ethnicity and race is ignored in the current study in favor of the simpler distinction between majority (White) and minority (Non-White) groups. For the current study, which takes place at UA, the Non-White category consists largely of people who identify as Black.

Competing Explanations of Racial-Ethnic Health Disparities

The evidence for racial-ethnic health disparities is undeniable, and scholars from various disciplines have attempted explanations for this intractable problem. Dressler *et al.* (2005) summarize several models used in research to explain racial-ethnic health disparities, and their work is the basis for the discussion that follows. They describe five models that have been used

in public health research to explain racial-ethnic health disparities: the racial-genetic model, the health behaviors model, the socioeconomic model, the structural constructivist model, and the psychosocial model.

The racial-genetic model posits racial group differences in genetics that give particular susceptibility profiles. In this model, racial-ethnic differences in high blood pressure, for example, are attributed to supposed racial genetic differences (e.g., Grim and Robinson 1996). As mentioned earlier, many studies have found that the proportion of genetic variability that can be accounted for by racial groups is 5-10% (Brown and Armelagos 2001), and these may or may not refer to coding regions of DNA. An additional difficulty is that even if the 5-10% of genetic variability that can be accounted for by "race" is in coding regions of the DNA, we cannot assume that the proteins produced from this DNA are related to susceptibility to particular diseases. In order for the racial-genetic model to be substantiated, relationships between susceptibility to disease and differences in alleles need to be demonstrated, not assumed. Empirical demonstration of these links are conveniently bypassed, and this may be because the racial-genetic model fits into a racist world view. This explanatory model relies more on an ideology of supremacy than it does on empirical evidence.

The health behaviors model suggests that racial-ethnic health disparities in outcomes like obesity are due to differences in voluntary individual behaviors such as smoking and engagement in social and physical activity. One weakness of this model is that not all behaviors labeled as unhealthy have a higher prevalence among minority groups. For example, the prevalence of binge drinking is higher among White Americans than it is among other racial-ethnic groups (CDC 2013:79). Another weakness of this model is the lack of attention to upstream social determinants of health, such as neighborhood conditions. For example, engagement in physical

activity is not only affected by individual motivation to exercise, but also by the availability of facilities to safely engage in physical activity. Lower availability of facilities for physical activity has been shown to be related to a decrease in physical activity and increased risk of being overweight (Gordon-Larsen 2006).

The socioeconomic model of racial-ethnic health disparities uses differences in socioeconomic status to explain racial-ethnic differences in health. Since people classified in racial-ethnic minority groups are more likely to have lower socioeconomic status than people in the White majority, their poorer health can be interpreted as a result of lower class status and reduced opportunities for good education, high income, and better health. Williams *et al.* (2010) acknowledge that socioeconomic differences contribute to racial-ethnic health disparities, but they argue that differences in SES do not account for the entirety of racial-ethnic health disparities. They cite evidence comparing life expectancy between upper class White people, lower class White people, and lower class Black people. Under the SES model of health disparities, the gap in life expectancy between upper class White people and lower class White people should equal the gap between upper class White people and lower class Black people, when in fact the gap is larger in the latter comparison of life expectancy. Data like these suggest that socioeconomic inequalities play a role in the production of racial-ethnic health disparities, but they are only part of the story. Other experiences (e.g., racial discrimination) are at play in the production of racial-ethnic differences in health.

A fourth model described by Dressler *et al.* (2005) is the structural constructivist model. This model conceives of racial-ethnic health disparities as occurring within a particular set of cultural understandings of the world in interaction with social power structures. This model is elaborated upon in the next chapter, and will not be a point of focus here. For now, it will suffice

to say that this model has been used by anthropologists as a basis for investigations into how culture and social power structures affect health outcomes, such as blood pressure.

The Psychosocial Model of Racial-Ethnic Health Disparities

A final model described by Dressler *et al.* (2005) is the psychosocial model, which contains within it various hypotheses and approaches. Of central importance is the idea of stress, both psychological and physiological. Ice and James (2007:4) define stress as "...a *process by which a stimulus elicits an emotional, behavioral and/or physiological response, which is conditioned by an individual's personal, biological and cultural context"* (emphasis in original). Life in the modern U.S. may present any number of physiologically challenging stimuli, depending in large part upon social position. Racial-ethnic minority members are presented with the dual stressors of lower SES and the stress that results from their minority racial-ethnic status, such as racial discrimination. Additional dimensions of power such as gender and sexuality complicate the picture further, and sentence some to greater struggle over the life-course than others.

Psychological stress has physiological sequelae, and these have been shown to affect health. For example, landmark work by Cohen *et al.* (1991) prospectively demonstrated a relationship between psychological stress and susceptibility to the common cold. As psychological stress increased, likelihood of infection after exposure to a virus also increased. Importantly, these researchers controlled for the standard health behaviors such as smoking, alcohol consumption, etc., demonstrating the role of stress independent of health behaviors. Thus, psychosocial stress is a primary mechanism through which ecological conditions are thought to affect health (Sapolsky 2004).

Operationalizing the psychosocial model presents several problems. First, defining the central construct of stress is difficult. There may be different types of stressors with different effects. The stress of coping can sometimes be difficult to distinguish from the original stressor itself. Second, measuring psychosocial stress can be problematic. Self-report measures of stress may suffer from memory recall issues, and may be biased by what is considered an appropriate response. Social position of the participant and interviewer are also variables that may influence self-report. Lastly, the idea of "stress" is, like any concept, culture-bound. Stress in Taiwan, for example, may look very different from stress in the U.S. (McDade 2008), complicating efforts at cross-cultural investigations of social ecology and health.

McDade (2002:128-129) discusses these issues and an approach to understanding the effects of psychosocial stress on physiological systems via biomarkers. Worthman and Costello (2009:284) define a biomarker as "…a measurable feature that taps into the pathways linking a health outcome to the factors that influence it, and therefore opens a window onto the impact of such factors on that outcome…" Biomarkers can take various forms, from anthropometric measurements to antibody titers. These markers of stress (in the strictly physiological sense of the word) allow for measurements of the effect of psychosocial stress on human physiology. Biomarkers of physiological stress serve as a useful complement to self-report measures because they show how stress "gets under the skin" in a way that may not be consciously accessible.

Herpesvirus reactivation models, often using Epstein-Barr Virus (EBV), have been used successfully to document a relationship between chronic stress and cell-mediated immunity (McDade 2007). In these models, antibody titers to particular herpesviruses are used as a proxy measure of cellular immunocompetence. When a herpesvirus has been reactivated and begins proliferating, a humoral immunological response is triggered, manifested in part by the

production of herpesvirus specific antibodies. Higher antibody titers are interpreted as a greater failure of cellular immunity, the arm of the immune system responsible for maintaining intracellular herpesviruses in a latent, non-replicating state. Higher levels of EBV antibody titers have repeatedly been associated with a range of chronic stressors, from academic to interpersonal stress (McDade 2007). The herpesvirus reactivation model, which can be used with EBV or any other herpesvirus (e.g., CMV), thus provides a useful marker of the impact of psychosocial stress on cellular immunocompetence.

This herpesvirus model has been used in cultural contexts outside the U.S. to document the effect of chronic psychosocial stress on cell-mediated immunity. McDade (2002) investigated the effects of status incongruity in Samoa. A relatively isolated location, Samoa was in the midst of Westernization at the time of the study. McDade (2002) showed that those who held traditional status titles but did not possess higher status as measured by Western status (and vice versa) had higher levels of EBV antibodies, indicating that this incongruent status was chronically stressful, and that this psychosocial stress led to a reduction in cellular immunocompetence. Using the herpesvirus reactivation model, McDade was able to demonstrate the immunological effects of psychosocial stress in a cultural context that was very different from the U.S., demonstrating the cross-cultural utility of herpesvirus reactivation models.

Racial-Ethnic Disparities in Immunity

Racial-ethnic disparities in immunity have been demonstrated in large national studies in the U.S. For example, Zajacova *et al.* (2009) demonstrated racial-ethnic immune disparities in pathogen burden, as indexed by several different infectious agents. Importantly for the current study, Zajacova *et al.* (2009) demonstrate higher rates of infection (seropositivity) for all of their measures of pathogen burden, including Herpes Simplex Virus 1 and CMV, both herpesviruses.

This means that there are higher rates of lifelong herpesvirus infection among racial-ethnic minorities in the U.S. Racial-ethnic differences have also been documented in pathogen burden among U.S. children (Dowd *et al.* 2009), which may be the result of early differences in exposure between racial-ethnic groups. Studies like these demonstrate that there are overall differences in immunity between racial-ethnic groups in the U.S., with a greater burden of infection falling upon racial-ethnic minority groups.

A recent, large (n = 11,050), nationally representative study (Dowd *et al.* 2014) found differences by race-ethnicity in EBV antibody titers. Black participants had significantly higher EBV antibody titers than other racial-ethnic groups, though the association could not be explained by any of the three measures of stress that the investigators used, nor were EBV antibody levels associated with SES. These findings seem to contradict the psychosocial model of health disparities, as one would expect both SES and measures of stress to be related to measures of cellular immunity that have consistently been shown to be affected by chronic stress.

In their discussion, Dowd *et al.* (2014) suggest discrimination as a possible source of the observed racial-ethnic differences in EBV antibody titers. Indeed, discrimination has been associated with many different types of health outcomes (Williams and Mohammed 2009). Additionally, previous work has demonstrated a relationship between discrimination and cellular immunity, as measured by herpesvirus antibody titers, specifically EBV. Christian *et al.* (2012) found that Black women had higher levels of EBV antibody levels than White women at several different time points during pregnancy and several weeks after pregnancy. This effect was greatest among Black women who reported experiences of racial discrimination, and was not accounted for by other measures of stress. Similarly, McClure *et al.* (2010) found that elevated

EBV antibody levels among immigrant Latino men (not women) were associated with discrimination-related stress.

Current Study

The current study extends the psychosocial model of racial-ethnic health disparities by testing a hypothesized relationship between discrimination and herpesvirus antibody titers, specifically CMV. Using a combination of two shortened discrimination scales, following Sternthal *et al.* (2011), participants were asked about their everyday, chronic experiences with discrimination and about their major lifetime experiences with discrimination. One of the scales is a variant of the Everyday Discrimination Scale (EDS) (Williams *et al.* 1997). This scale is based on the qualitative work of Essed (1991), and was constructed to capture chronic experiences of discrimination. The EDS has been tested for validity in at least one other area in the U.S., (Taylor *et al.* 2004) and has been used in many published studies linking discriminatory experiences with health. The second scale used is an abbreviated version of a scale also published by Williams *et al.* (1997) called the Major Experiences of Discrimination scale (MEDS), which captures major instances of discriminatory experiences over a person's lifetime.

The dependent variable in this study is ELISA Units per milliliter (EU/ml) of CMV antibody activity, which is proportional to CMV concentration. CMV antibody levels were measured through collection and analysis of dried blood spot samples; procedures are explained in detail in Chapter 4. It is hypothesized that experiences of discrimination will be negatively associated with cellular immune function, as indirectly measured by CMV antibody activity.

CHAPTER 3

COGNITIVE ANTHROPOLOGY, CULTURAL CONSONANCE, AND HEALTH

Introduction

This chapter introduces cognitive anthropology and its applications for research on health. This type of research fits under a broader model of racial-ethnic health disparities that Dressler *et al.* (2005) refer to as the structural constructivist model. In this model, the construction of reality using shared knowledge (a definition of culture) is empirically investigated and attributed causal force in shaping things like health outcomes. It also acknowledges that this cultural construction of reality takes place within a societal structure. This structure interacts with shared knowledge to produce differential well-being. A combination of emic investigation of cultural constructions and a political economic consideration of social structure has led to fruitful research on cultural contributions to health.

Cognitive Anthropology

A given theoretical approach in anthropology can be understood by its definition of culture. In cognitive anthropology, the culture concept is ideational. According to Goodenough (1957), culture is the knowledge one needs in order to function adequately in a social group. Without such shared knowledge, social groups would fail to function effectively. This knowledge varies from place to place, and forms the boundaries for acceptable attitudes, values, and behaviors.

Cognitive anthropology was born out of mid-20th century cross-cultural attempts to model the way people think. At the time, this field of study was called ethnoscience. Ethnoscience was heavily influenced by structural linguists and the distinction between the emic and the etic (Pike 1954). The word “emic” describes what Malinowski (1922) called “the native’s point of view,” or the local perception of reality. The word “etic” describes an outsider’s point of view on a local cultural context.

Ethnoscientists were interested in modeling the emic point of view, using methods that were highly systematic and replicable. Attempts to do this were heavily criticized and eventually led to the dissolution of the field (Murray 1982), but ethnoscience did make some valuable, enduring contributions to cognitive anthropology. One contribution of ethnoscience was its focus on methodological rigor. It was not enough to simply talk to people for ethnoscientists. One had to do ethnography in a systematic way that led to the elicitation of salient cultural domains and the organizing principles within those domains (Tyler 1969).

A second contribution of ethnoscience to cognitive anthropology was the vocabulary created and used in the attempt to construct emic world views. Words and ideas like “domain” and “distinctive features” come out of ethnoscience, and are still central to research in cognitive anthropology. For example, a “cultural domain” is a main object of investigation for cognitive anthropologists. A cultural domain is an "...area of conceptualization like space, color, the human body, kinship, pronouns, etc" (D'Andrade 1995:34). Within cultural domains, cognitive anthropologists use the construct of “cultural models” to describe individual and group level knowledge about a given domain. Within a given cultural domain, a number of cultural models, or understandings of a particular domain, may be found. A cultural model "...consists of an interrelated set of elements which fit together to represent something" (D'Andrade 1995:151).

These models are motivating, and structure the individual's understanding of reality. Each individual has a slightly different version of the cultural model due to individual life history characteristics, and this approach aptly captures that variation.

Cognitive anthropologists conceive of group level and individual level cultural models. These models form a theoretical bridge between group level and individual level knowledge. The group level cultural model is the aggregate of individual conceptions of a particular domain, with greater weight in the construction of that aggregate model given to those individuals who are most culturally competent, or more likely to reproduce group responses to a given question or task (Weller 2007). A given individual will have a variant of the group level cultural model, never a perfect copy of the group level cultural model. The discrepancy between general models and individual level models necessarily varies by individual, and is used as a way of investigating intracultural variation. Reconciling culture (shared knowledge) with individual differences has historically been a hard problem for anthropology, but the methods of cognitive anthropology make it possible to investigate intracultural variation in a way that takes group level knowledge into account.

Elicitation of salient cultural domains and the systematic investigation of cultural models are important elements in the cognitive anthropological study of culture. These analyses are synchronic, but methods like residual agreement analysis allow for investigation of culture change over time (Dressler *et al.* 2015) and for the study of multiple cultural models within a given domain (Dengah 2013). Cognitive anthropologists do not posit one static culture; instead, they posit diverging and competing models that change over time within a given domain. Over time, this may change or expand the domain. Research in cognitive anthropology can be directed at understanding the implications of cultural models for processes of culture change.

The cognitive definition of culture also deals with several classical problems in anthropological theory. First, social ontology is effectively addressed through a structural constructivist perspective because reality is generated by shared knowledge which is used to guide behavior within a given societal structure. Second, culture is not reducible to personality, as it forms the boundaries within which attitudes towards social constructs are created, not the attitudes themselves. Lastly, the relationship between culture and behavior is effectively addressed using a theory of cultural consonance (Dressler 2007), which will be expanded upon below.

Methods in Cognitive Anthropology

The methods utilized by cognitive anthropologists in data collection are centered on the elicitation and description of salient cultural domains, and the cultural models within those domains. As discussed earlier, cognitive anthropology inherited a focus on rigorous and replicable methodology from earlier ethnoscientific attempts to build emic models of thought processes. Thus, not only do cognitive anthropologists aim to interview subjects in a way that elicits a local understanding of the world, they do so using replicable methods. Semi-structured interviewing techniques such as free listing and pile sorting are used to try to understand the content and organization of a given cultural domain (Borgatti 1999) and the cultural model(s) within it. Free listing involves asking respondents to think of all the members or items within a given cultural domain that they can think of, and does not involve the elicitation of personal preferences or beliefs. Rather, community knowledge is the focus of free listing prompts. Items elicited in this manner can be judged for importance based not only on frequency of mention by respondents, but also on how soon respondents list or mention a particular item. The first few items elicited are assumed to be more salient than those items that form the end of a free list, and

those items that are only mentioned by one respondent in a sample are assumed to be less salient than those items mentioned by a high number of respondents (Borgatti 1999).

In pile sorting, respondents are presented with the elements of a domain elicited through free listing and asked to organize them into groups (Borgatti 1999). The number of groups can be predetermined or left up to the respondent, with the goal being to extract the distinctive features of elements that are being used by respondents to split them into groups. These distinctive features form the dimensions along which domains and models may be organized. Interview data are then analyzed using techniques like multidimensional scaling, cluster analysis, and property fitting analysis in order to gain an understanding of underlying dimensions structuring cultural models. Sometimes these organizing dimensions are consciously inaccessible to a given research subject, making the use of techniques like property fitting analysis extremely useful in illuminating organization of elements within a cultural model.

Cultural consensus analysis (CCA) (Romney *et al.* 1986) is a method that builds on data collected through free listing and pile sorting by testing the idea that respondents are utilizing a shared cultural model to organize elements elicited by the researcher. Rating and/or ranking tasks can be used to elicit hierarchies of elements along particular dimensions of a cultural model. Results from these tasks can then be used to create a matrix in which the rows are the elements and the columns are individual respondents, with the individual cells containing the rank given by a respondent for a particular element (Weller 2007). A factor analysis of this matrix provides eigenvalue ratios for the first two factors, with the first factor being conceptualized as the cultural model organizing the rankings being assigned to elements. A ratio of 3:1 for the first two factors is considered sufficient evidence for the conclusion that respondents are drawing on a shared cultural model in their rankings of elements (Weller 2007).

Beyond a test of consensus, CCA also provides measurements of cultural competence. Cultural competence describes the ability of an individual to reproduce group responses on ranking and/or rating tasks. A quantitative measurement of this is provided by a given individual's loading on the first factor. Cultural competence is an important measure because it allows for a link between culture as shared knowledge and an individual's ability to reproduce and that shared knowledge.

Lastly, CCA provides a "cultural answer key" by weighting responses according to individual cultural competencies to estimate the group answers to ranking and/or rating tasks. This last step in CCA is important because it allows for a link to be made between shared knowledge and individual behavior. This idea is further explored in the next section.

The methods of cognitive anthropology allow for the empirical delineation of cultural domains and the models contained within them. Methods are explicit and replicable. Quantitative measures are made possible through these techniques, and shared cultural knowledge is related to individual beliefs in a theoretically sound manner.

Cultural Consonance and Health

As mentioned above, CCA provides a best estimate of a "cultural answer key," or the shared knowledge that is defined as culture in cognitive anthropology. Once the cultural answer key is obtained, it is then possible to compare an individual's behaviors and beliefs to the cultural answer key, or the culturally "correct" behaviors and beliefs. The degree to which an individual matches the beliefs and behaviors encoded in a cultural model is referred to as cultural consonance (Dressler 2007). Cultural consonance forms a theoretical bridge between shared (group level) knowledge and individual behavior.

Cultural consonance has been investigated in relation to health outcomes in a number of different cultural contexts including Bolivia, the U.S., and Brazil (Reyes-Garcia *et al.* 2010; Dressler and Bindon 2000; Sweet 2010; Dressler, Balieiro *et al.* 2005). Both physical and mental health have been investigated using cultural consonance. In urban Brazil, for example, Dressler and colleagues showed that generalized cultural consonance is negatively associated with depressive symptoms, independent of stressful life events in a prospective study (Dressler, Balieiro, *et al.* 2007). Cultural consonance has also been associated with physical health in urban Brazil, including measures like waist circumference and body mass index (Dressler, Oths, *et al.* 2008, 2012). Importantly for the current study, an association between cultural consonance in social support and immune system challenge (indexed by C-reactive protein) has also been demonstrated (Dressler *et al.* 2015).

Cultural consonance has been used elsewhere in South America to investigate the link between culture and health. In the Bolivian Amazon, Reyes-Garcia *et al.* (2010) showed a positive association between cultural consonance and psychological well-being and a negative association between cultural consonance and psychological distress. This study was carried out among the ‘Tsimane, an indigenous group experiencing rapid integration into the market economy. Such studies demonstrate the utility of an anthropological perspective in investigations of health outcomes across the globe.

Cultural consonance has also been used in the U.S. to investigate the relationship between culture and health. Working in an African American community in the South, Dressler and Bindon (2000) showed that cultural consonance in lifestyle interacted with level of kin support to produce an effect on blood pressure. Those with high kin support showed lower blood pressure as cultural consonance in lifestyle increased. Sweet (2010) showed an interactive effect

of cultural consonance and parental SES on resting blood pressure of adolescents in Chicago. In this sample, those adolescents with low parental SES showed a positive association between cultural consonance and blood pressure, while those adolescents with high parental SES showed a negative association between blood pressure and cultural consonance. In other words, those with the family means to consume symbolically important material goods benefitted from this consumption, while those without appropriate economic resources were stressed by the consumption of these goods.

The utility of cultural consonance has been demonstrated in very different cultural contexts. From Brazil to Chicago, cultural consonance has been used effectively to measure the impact of locally shared knowledge on physical and mental health. Cultural domain analyses allow for an emic understanding of the local culture and for empirical investigations of how that locally shared knowledge impacts on health. This type of research is made possible through the development of instruments that have emic validity.

A lack of cultural consonance is understood to be stressful, with downstream physiological sequelae that have consequences for health (Dressler *et al.* 2014). Perceived stress has been shown to be a mediator of the effect of cultural consonance in family life and lifestyle on depressive symptoms (Balieiro *et al.* 2011), but perceived stress does not explain everything. Other factors like greater reactivity to distressing circumstances or unsatisfying everyday social interactions may also contribute to the association between cultural consonance and health outcomes (Dressler and Bindon 2000:257). Regardless of the exact mechanisms, cultural consonance is robustly linked to multiple measures of health in vastly different cultural contexts.

The Great Smoky Mountain Study

The Great Smoky Mountain Study (GSMS) is a longitudinal epidemiological survey focusing on mental health among rural youth in western North Carolina (Costello *et al.* 1996). Three cohorts, each one starting at ages 9, 11, and 13 respectively, have been followed for over 16 years. Between the ages of 9 and 16, household level predictors were assessed yearly in order to better assess the relationship between individual life circumstances and the development of mental health service needs. The GSMS includes 1,420 total participants, which includes a saturation sample (n = 350) of local youth from the Eastern Band of the Cherokee Nation. The rest of the participants were representative of an 11 county area in western North Carolina, though they were screened and oversampled for potential mental health risk (Brown *et al.* 2006:194).

A subset of this sample was used to investigate cultural models of the life trajectory among youth aged 19-24 (Brown *et al.* 2006). This research was done in order to create an instrument that was sensitive to the local cultural environment in its assessment of salient domains for local inhabitants. The hope was that this instrument would explain unique variance independent of conventional measures of risk for depression, for example (Brown *et al.* 2009).

Ethnographic life history interviews, focus groups, and pile sort interviews were conducted with over 200 people to refine a locally sensitive life trajectory interview for youth (LTI-Y) (Brown *et al.* 2006). In their pilot work, Brown *et al.* (2006) found the models of the life course organized around four major domains: life-course milestones, life-course barriers, socioemotional resources, and material goods. The cultural models within each of these domains, including the elements in each model, are described by Brown *et al.* (2006). The domains and elements found and used in the LTI-Y by Brown *et al.* (2006) are shown in Table 3.1.

Table 3.1. Domains and Elements found by Brown et al. (2006).

Milestones (12 items)	Barriers (20 items)	Socioemotional Resources (20 items)	Material Goods (15 items)
Driver's license	Addiction (drugs, alcohol, etc.)	Being honest, responsible, polite	Four-wheelers, boats, jet-skis, bikes, etc. (recreational vehicles)
Get college, technical, vocational degree	Always going for the thrill/impulsive	Close/best friends	Big/nice house (pool, yard, deck, etc.)
Get first car or truck	Bad experiences in school (with teachers, students, counsellors, etc.)	Common sense/think for yourself	Computer with internet connection
Get permanent job/career	Being angry or overly emotional	Community connections and support	Dogs/pets
Have and raise kids	Community or family holds you back/discourages you	Determination, motivation, drive	Expensive sports/hobby equipment (athletic, music, hunting, etc.)
Have financial security (savings, investments, etc.)	Depression/anxiety	Fun/excitement	Fancy car or truck (with modifications and accessories)
High-school graduation or GED	Drop out of high school or college	Good/supportive/attractive husband/wife	Good cell phone and calling plan
Marriage or live together with someone	Fights/conflict/tension with friends, family, or community	Government (or tribal) programmes	Home entertainment center (big screen, surround sound, etc.)
Move out of parents' house	Get married or settle down too early	Hanging out with friends/partying	Investments (stocks, bonds, savings)
Settle down/be more responsible	Hang with the wrong crowd	Having a passion or focus in life	Jewellery (diamonds, gold, silver, etc.)
Start first job	Have kids too early	Health, fitness, and stress relief	Lake or beach house (vacation home)
	Jail/prison/trouble with the law	High self-esteem/secure in yourself	Nice clothes (Tommy, Aeropostale, Gap, CarHartt, etc.)
	Lack of jobs and lack of education opportunities/resources	Higher education	Own a business
	Major loss: divorce, illness, heartbreak, accident, death of friend/family	Lots of life experiences	Own property/have good land
	No motivation/lazy	Money and finances	Vacation and travel
	Overspend/go into debt	Plan ahead and have goals	
	Partying too much	Respect your elders/know your cultural and family roots	
	Pressure to help family or friends	Status and power in the community	
	Stress/time pressure	Strong family support and family time	
	Things that hold you back from college (homesick, travelling, money, stress, etc.)	Support from Church, faith, and prayer	

The interview developed with these domains and elements was used to investigate life trajectory status (with respect to the four domains) and its association with mental health for a sample of 319 youth, including 190 White and 129 Cherokee individuals. Scales developed with the ethnographically derived domains of life-course barriers and life-course milestones accounted for 11% of the variance in depressive symptoms, on top of the variance explained by prior depressive symptoms and negative life events (Brown *et al.* 2009). These results demonstrate the utility of constructing locally derived measures to investigate the relationship between local cultural models and health outcomes.

Current Study

The current study was conducted in two phases. Phase I consisted of several ranking tasks (see Appendix A for interview schedule) using the domains and elements identified by Brown *et al.* (2006). These ranking tasks were administered to college students at UA during the summer of 2015.

Phase I tests if the cultural models of the life trajectory identified by Brown *et al.* (2006) are present within the study sample, using CCA. The research conducted by Brown and colleagues is by now more than 10 years old, and was conducted in western North Carolina (Appalachia). The GSMS was oversampled for at-risk youth and contained a saturation subsample of Cherokee youth. The current study takes place at least 10 years after the initial cultural domain analysis was conducted, and in a different context. The current study takes place in Tuscaloosa, AL, among youth who are undoubtedly more privileged in their everyday lives and in their life opportunities than youth in the GSMS.

Using the cultural models found by Brown *et al.* (2006) in the GSMS represents a test of the limits of the life trajectory domains among youth, both in time and geographic and

institutional space. Consensus on the rankings of the elements within the domains found in the GSMS would demonstrate validity of the model in a different time (early 2000s vs 2015) and context (Appalachia vs UA).

Phase II of the current study builds upon the findings from Phase I by using cultural consonance theory (Dressler 2007). Domains that were found during the GSMS were tested for consensus at UA during Phase I. Those domains demonstrating consensus (via the presence of a cultural model) were then used to create a consonance instrument. Survey items were developed from each of the elements within domains demonstrating consensus. The arbitrary threshold for consensus is a 3:1 eigenvalue ratio or greater for the first two factors extracted in a factor analysis of a transposed matrix. These survey items formed the consonance instrument, which was one of several instruments within a larger survey given to research participants.

One of the goals of the current study is to contribute to an understanding of how health disparities are produced and maintained. Dressler and colleagues (Dressler *et al.* 2014) have applied cultural consonance to the study of health disparities in Brazil. They found that cultural consonance in lifestyle explained the negative association between family income and blood pressure, demonstrating a mediating role of cultural consonance in socioeconomic health disparities. The current study uses cultural consonance to illuminate the pathways mediating national disparities in cell-mediated immunity (Dowd *et al.* 2014) by hypothesizing a negative relationship between cultural consonance in models of the life trajectory and CMV. It is also hypothesized that perceived discrimination will predict cultural consonance, which will in turn predict CMV. This hypothesis utilizes a uniquely anthropological perspective and method for understanding health disparities in the U.S.

CHAPTER 4

METHODOLOGY

Introduction

The current study was carried out in two phases – Phase I and Phase II. Separate samples were recruited for each phase, but all participants were students at the University of Alabama. Phase I consisted of the administration of a ranking task to test the hypothesis that the cultural models of the life trajectory found by Brown *et al.* (2006) among 19 to 24-year-old youth in western North Carolina were also present among students aged 18-25 at the University of Alabama. This hypothesis was evaluated using CCA (Romney *et al.* 1986). Using the elements that make up the cultural models of the life trajectory, a cultural consonance instrument was made and administered as part of Phase II of the current study. In addition to the consonance instrument, Phase II included the administration of a demographic questionnaire, two discrimination instruments (following Sternthal *et al.* 2011), and the collection of blood spots to assay antibodies to CMV using the protocol described by Dowd *et al.* (2011).

Ethnographic Context

The University of Alabama (UA) is a flagship public university located in Tuscaloosa, Alabama. UA enrolls many high achieving students from a variety of backgrounds (University of Alabama 2016). Over 37,000 students are enrolled in undergraduate, graduate, and professional classes at UA. About 46% of the students come from Alabama, 51% are from another state, and 3% are international students (University of Alabama 2016). More than half of the students (55%) are women. The vast majority of students at UA are White. The University reports that

12% of enrolled students are African-American, and 2% of students are Asian-American (University of Alabama 2016). No other racial-ethnic minority groups are mentioned on the "Quick Facts" webpage. This is presumably because African-Americans and Asian-Americans are the two largest minority groups on campus, which may indicate that the numbers of students identifying as Hispanic, American Indian or Alaska Native, and Native Hawaiian or Other Pacific Islander are relatively low. This is consistent with the researcher's perception of the racial-ethnic diversity at UA over the course of 1.5 years.

The history of UA is important to the larger history of U.S. race relations. Alabama was part of the Confederate States of America, a government that seceded from the U.S. and supported the continuation of slavery. Prior to the defeat of the Confederate States of America, UA was led by presidents who lived in a mansion serviced by slaves. The slaves lived in a building that still stands on the campus today. Almost a century after the end of the Civil War, former Governor George Wallace made his infamous "Stand in the Schoolhouse Door" in an attempt to block racial integration of Alabama's educational institutions. Fifty years after Wallace's stand, UA made national headlines because of reports of racial discrimination in Greek-letter organizations. UA is a context in which race relations are especially salient.

Regardless of race-ethnicity, being a student at UA is expensive. The estimated cost of being a full-time student for an Alabama resident is $12,865 per semester (University of Alabama 2016). Tuition costs for nearly half the student body are much higher per semester because they are charged out-of-state tuition rates ($12,975 instead of $5,085). Assuming the average student (from Alabama) finishes school in eight semesters, the total cost of an undergraduate degree from UA is $12,865 x 8 semesters = $102,920. These calculations do not take scholarships into account, which can be substantial for out-of-state students in particular.

Nevertheless, going to school at UA is an opportunity only more privileged segments of the population could realistically afford.

This last point is important for the current study. Sampling from the student body at UA necessarily results in an overrepresentation of a segment of the population that is relatively well off. Significant life opportunities in education and well-being are instrumental in gaining admission to a selective university like UA. In a population based study, socioeconomic gradients in health are expected, whereby SES predicts health status in a dose response relationship. Since the current study samples from a population of UA students, reduced variance in SES is expected, and the dose response relationship between SES and health may not be replicated.

Young students at UA inhabit a world in which the history of U.S. race relations is clear and present. It might be a building next to the president's mansion, or the discriminatory practices associated with rushing for a Greek-letter organization, but UA is a place where race is especially meaningful. At the same time, young students at UA are clearly privileged. Four years of enrollment costs over $100,000 for in-state students, and much more for out-of-state students. This is a price that puts a university education out of reach for the poorest segments of society. UA students by and large occupy a privileged socioeconomic status in a place with ongoing attempts to achieve racial-ethnic inclusion.

Phase I Sample Recruitment and Method

Phase I participants were students between the ages of 19-25. All Phase I participants were recruited from summer classes at UA in May and June of 2015. I made announcements in various classes to recruit volunteers for participation in Phase I. Some professors allowed volunteers to receive extra credit for participation, while other participants did not receive extra

credit. Thus, a convenience sample was recruited for Phase I. The total sample size for Phase I was $n = 26$.

Participation in Phase I consisted of a series of ranking tasks designed to test whether or not there was consensus on the importance of the various elements in the four domains of the life trajectory found by Brown *et al.* (2006). Each participant was given an organizing prompt about a particular domain identified by Brown *et al.* (2006) and then presented with flashcards labeled with the elements of the domain in question. Each flashcard was labeled with one element. All flashcards were laid out in front of each participant in the exact same (alphabetical) order before beginning the ranking task. The organizing prompt was repeated as necessary while the participants ranked the cards in order from least important to most important for young people to reach their goals (socioemotional resources and material goods) or from most powerful to least powerful (barriers) in terms of keeping young people from reaching their goals.

The organizing prompts are presented in Appendix A. These prompts allowed for the elicitation of relative rankings associated with each element in a given domain for each participant. The rank assigned to each element in response to the interview prompts was recorded. The relative rankings associated with three of the prompts from the interview schedule were entered into SPSS (IBM v. 23) to conduct CCA: socioemotional resources, material goods, and barriers. Participants indicated some confusion regarding the difference between the two prompts about the milestones domain, as well as general confusion regarding how to answer the relative importance prompt about milestones. I therefore decided not to include the data on which there was confusion for use in Phase II of the project. Only the data gathered from the prompts about socioemotional resources, material goods, and barriers were analyzed for consensus and used to create the consonance instrument for use in Phase II of the current study.

Phase II Sample Recruitment and Method

Phase II participants were all students at UA between the ages of 18-25. Participants were recruited in several ways. I made announcements in a student organization meeting and an introductory anthropology class; however, the vast majority of participants were recruited through the University of Alabama Psychology Subject Pool website. The researcher placed an announcement on this website and students in introductory psychology classes were allowed to participate in the current study for academic credit. Additional participants were recruited through a snowball sampling strategy. This means that some participants were recruited through people who had previously participated in the study.

The current study oversampled for Non-White students. It was expected that discrimination would be more likely to occur among Non-White students, and that oversampling for this segment of the student population would allow more robust testing of the hypotheses. All participants were thanked for their time with a voucher for a free meal, and those participating through a student organization were eligible to receive service credit for participation.

Participants met me near the Developmental Ecology and Human Biology Laboratory at the University of Alabama. Participants were brought to the laboratory, where I obtained informed, written consent. Participation was completed in two steps. First, participants completed an online questionnaire consisting of demographic questions, two discrimination instruments, and a cultural consonance instrument. Once the online portion of the procedure was completed, each participant provided several blood spot samples for quantification of CMV antibody activity. Both portions of the procedure are elaborated below.

A total of 87 students met me to participate in Phase II of the current study. No blood spot data was obtainable from five of these participants, either because they provided no blood or

not enough blood for the CMV assay. Of these five participants, two were White men, one was a White woman, and two were Non-White men. Of the 82 participants that provided enough blood for quantification of CMV, 11 (13.4%) were seronegative for CMV and excluded from the final analytical sample. Of the 11 seronegative participants, one was a White man, two were White women, five were Non-White women, and three were Non-White men. The final analytical sample size for the current study was $n = 71$. These 71 participants represent 81.6% of the 87 students who participated.

Demographics and Discrimination Assessment

The online questionnaire consisted of three parts: 1) demographic questions 2) discrimination instruments, and 3) a cultural consonance instrument constructed from the data gathered and analyzed in Phase I of the current study. Demographic variables assessed in the first part of the online questionnaire included sex, age, race-ethnicity, highest level of education completed by mother and father, and name and location of high school. Two questions assessed employment status and number of hours worked per week (if employed).

The second part of the online questionnaire consisted of two discrimination scales used by Sternthal *et al.* (2011). One discrimination scale is a shortened version of the Everyday Discrimination Scale (EDS), originally published by Williams *et al.* (1997). The second discrimination scale captured lifetime instances of discriminatory experiences. Sternthal *et al.* (2011) combined both of these scales for a measure of "lifetime discrimination." In this study, both scales are analyzed separately as well as together.

In the first discrimination scale (five items), which captures everyday experiences of discrimination, participants are asked how often a specific discriminatory event happens to them. If participants answered "a few times a year" or more often on a scale of "never," "less than once

a year," "a few times a year," "a few times a month," and "almost every day," they were then presented with a follow up question asking for the perceived cause of the discriminatory treatment. In the original scale, this follow up question appears at the end of the entire scale. In the current study, this follow up question appears after each question in which the participant answered "a few times a year" or more often. Options listed for attribution of the discriminatory behavior were: ancestry or national origins, gender, race, age, religion, height, weight, some other aspect of your physical appearance, sexual orientation, and education or income level. Participants attributed the discriminatory behavior to as many causes as they perceived to be true. Answers of "a few times a year" or more often are summed for a score of everyday discrimination, with a range of zero through five.

The second discrimination instrument (five items instead of the four used by Sternthal *et al.*) assessed whether major experiences of discrimination had ever occurred in the participants' lives. Participants answered "yes" or "no" to these questions, and were then asked to attribute the discriminatory treatment to one or more of the same causes listed in the first discrimination instrument. "Yes" responses are summed to provide a score for this instrument. The two discrimination scales are summed for a score of "lifetime discrimination," following Sternthal *et al.* (2011).

Cultural Consonance Instrument and Scoring

The cultural consonance instrument was constructed using the data gathered in Phase I of the current study. Questions were composed about the elements in three domains: socioemotional resources, material goods, and barriers. Most, but not all of the elements in each of these three domains were used to create the consonance instrument. The elements that were not used in the creation of the consonance instrument were: "government (or tribal)

programmes," "jail/prison/trouble with the law," "hang with the wrong crowd," and "have kids too early."

The exclusion of the "government (or tribal) programmes" item was done because it was assumed this item would pertain to almost no one in the current study. This item came from the socioemotional resources domain. The other items excluded from the consonance instrument were all from the barriers domain. These items were excluded by researcher accident, and thus reflect no theoretical or methodological considerations.

Due to the exclusion of the three items from the barriers domain, care must be taken in interpreting the measure of cultural consonance in the domain of barriers (CC-barriers). It would be more accurate to say that the measure of CC-barriers in the current study represents *an estimate* of CC-barriers, not the definitive measurement. Hereafter, this measure will simply be referred to as CC-barriers for simplicity.

The consonance instrument administered was composed of 19 questions from the socioemotional resources domain, 15 questions from the material goods domain, and 17 questions from the barriers domain. See Appendix B for the full Phase II online survey. Based upon a second CCA and the eigenvalues obtained for the first two factors, the researcher concluded that it would only be valid to assess consonance with the material goods and barrier domains (See results of CCA in Table 5.2. in the next chapter). The socioemotional resources domain did not reach the threshold for consensus, and was thus excluded from the final consonance analysis, even though it was included in the consonance instrument administered to all participants. Final scoring for consonance was derived from the questions pertaining to only two domains: material goods (CC-material goods) and barriers (CC-barriers). Consonance for each domain was calculated separately.

As mentioned above, cultural consonance questions were administered for three domains, though cultural consonance scores were only calculated for two domains: barriers and material goods. There were 15 consonance questions pertaining to the material goods domain and 17 questions pertaining to the barriers domain, each question constructed from an item in those domains (see Table 3.1. for domains and corresponding items, and Appendix B for the consonance questions). Responses were on a Likert scale of agreement for barriers and importance for material goods. Responses were coded 0-4. A consonance score from each item was generated by multiplying the coded response (0-4) by the relative importance of that item. Relative importance of items was determined by obtaining factor scores for each item from the transposed ranking matrix and then ranking those factor scores. Thus, each item in each domain had a rank determined. Possible ranks for the material goods items were 1-15. Possible ranks for the barriers items were 1-17.

Consonance scoring was done slightly differently in each domain. To get the consonance score in the material goods domain, each coded response was multiplied by the rank of importance of the item that formed the basis of the question. To use the question of the importance of having dogs/pets as an example, a response of “Very Important” would be coded as a “4,” which would then be multiplied by the rank of “dogs/pets.” The consonance score on this item would be 4 x 8 (relative rank of the “dogs/pets” item in the question) = 32 consonance points. These products were summed for a total consonance score in the domain of material goods (CC-material goods).

To calculate consonance in the barriers domain, ranks of item were reverse coded first. That is, the most powerful barrier, with a rank of 1 out of 20, was reversed to a rank of 20. The item ranked 2 out of 20 was reversed to a rank of 19 out of 20, etc. When multiplied by the

coded response (0-4), this has the effect of giving larger scores to those with the most barriers in their lives. Thus, those with the most barriers in their lives have a higher score on the barriers scale, and can be considered *less* culturally consonant. Those with the fewer barriers in their lives will have a lower score on the barrier scale, and can be considered to be *more* culturally consonant. Put another way, cultural consonance in the barriers domain is negatively related to barriers score, so that as the CC-barriers score increases, cultural consonance decreases, and vice versa.

Blood Spot Collection and CMV Assay Procedure

After completing the demographic, discrimination, and consonance instruments, participants provided blood spot samples. Participants were asked to warm up their right index finger for several seconds by kneading their own finger. The researcher then used a sterile alcohol wipe to clean the incision area. The alcohol was allowed to dry and a single-use retractable lancet was used to prick the finger tip of participants. The first blood drop that formed was wiped away with a sterile gauze pad, and the rest of the blood drops that formed were placed on Whatman (#903, GE Healthcare, Piscataway, NJ) filter paper for drying and protein preservation. After collecting up to five blood spots, the researcher placed a bandage on the fingertip. Participants were asked to sit for five minutes before leaving the laboratory. The blood samples were allowed to dry on the filter paper overnight. Once dry, the samples were placed in an individual foil pouch with a humidity sponge and placed in a -29° Celsius freezer until analysis took place.

The CMV assay procedure was completed using a modified and validated protocol (Dowd *et al.* 2011) of a commercially available ELISA assay kit (Diamedix Corporation, No. 720-320, Miami, FL). This is a “sandwich” assay. Eluted sample blood is placed in antigen

coated wells. CMV antibodies present in the samples bind the CMV antigens in the wells. A conjugate binds the antigen-antibody complex, and a substrate solution catalyzes a color change proportional to the amount of antigen-antibody complex present in each well. This reaction is stopped and then the color change is read in order to quantify antibody activity in ELISA Units per milliliter (EU/ml). EU/ml is an arbitrary unit of antibody activity proportional to CMV concentration.

Each CMV assay was completed over the course of two days. On the first day of the assay, dried blood spot samples were pulled from the freezer and allowed to warm up to room temperature. The sample diluent was pulled from the assay kit and allowed to warm up to room temperature during the same time. Once samples reached room temperature, they were pulled from their aluminum pouches and a sterilized hole puncher was used to punch out a disk from a dried blood spot. Each disk was placed in a glass culture tube with 250 μl of sample diluent. The dried blood disk was allowed to elute in the sample diluent overnight at 4° Celsius.

On the second day of the assay, the eluted samples and the assay kit were pulled from the refrigerator and allowed to warm up to room temperature. 100 μl of samples, standards, and controls were placed in duplicate in antigen coated wells of a microtiter plate. Each sample, standard, and control was vortexed for two to three seconds and pipette tips were rinsed prior to transfer to the microtiter plate. Once all samples, standards, and controls were transferred to the plate, the plate was allowed to incubate uncovered at 37° Celsius for 60 minutes. The plate was then washed using a plate washer and the wash solution provided in the assay kit.

One hundred μl of conjugate was then placed in each well, and the plate was again allowed to incubate uncovered at 37° Celsius for 60 minutes. The plate was washed for a second time, and then 100 μl of substrate solution was placed into each well. The plate was then

incubated for a third time at 37° Celsius for 20 minutes. One hundred µl of stop solution was then added to each well to stop the color changing reaction. The plate was rotated for three minutes before being read at 450 nanometers. Samples with a coefficient of variation greater than 10% between the duplicates were rerun to ensure quality control. Participants with EU/ml values of <10 were considered seronegative for CMV and excluded from the final analytical sample.

Statistical Analyses

All statistical analyses were completed using SPSS (IBM v. 23). For Phase I, CCA was carried out as previously described. A data matrix was created in which the columns were subjects and the rows were individual items in a given domain. Each cell contained a subject's ranking of the item assigned to a given row in the matrix. This matrix was factor analyzed and eigenvalue ratios were obtained for first two factors to determine whether or not there was consensus around a cultural model in the domain being tested. Only those domains reaching a 3:1 eigenvalue ratio for the first two factors were used in the construction of the cultural consonance instrument. Factor loadings on the first factor were obtained and used as a measure of cultural competence for each individual.

For Phase II, descriptive statistics, correlations, and logistic regression analyses were run on the data collected. Non-parametric tests (e.g., Mann-Whitney *U* tests and Spearman's rho correlations) were used in analyses with CMV, because of the non-normal distribution of CMV antibody levels. Correlated independent variables used in regression analyses were standardized to prevent tolerance problems. CMV, the dependent variable, was dichotomized into high and low groups at 35 EU/ml. This point (35 EU/ml) is in an area between two clearly visible modes in the distribution of CMV.

Protection of Human Subjects

All procedures were reviewed and approved by the Institutional Review Board of the University of Alabama. Separate protocols were submitted, reviewed, and approved for Phase I and Phase II of the current study. During Phase I, verbal, informed consent was obtained prior to commencing each interview. For Phase II, written, informed consent was obtained from each participant prior to commencing participation. Anonymity was maintained for all participants using case identification numbers to label data rather than names. Participants were asked to complete all parts of the protocol they felt comfortable with, and were able to terminate participation at any time.

CHAPTER 5

RESULTS

Phase I Descriptive Characteristics

Twenty-six UA students between the ages of 19-25 participated in Phase I of the current study. Table 5.1. shows the distribution of self-identified gender and race-ethnicity in the Phase I sample. The majority of the sample (57.7%) was made up of White men. White women made up the second highest percentage (30.8%). Together, White men and women made up 88.5% of the sample. Three Non-White participants made up a total of 11.5% of the sample.

Table 5.1. Gender and Race-Ethnicity of Phase I Sample (% of total *n*)

	White	Non-White	Total
Male	15 (57.7)	1 (3.8)	16 (61.5)
Female	8 (30.8)	2 (7.7)	10 (38.5)
Total	23 (88.5)	3 (11.5)	26 (100)

The 26 Phase I participants each completed the ranking tasks described in the previous chapter. Again, only the ranking tasks in the domains of socioemotional resources, barriers, and material goods were analyzed for cultural consensus due to participant confusion regarding the ranking tasks with the milestones domain items. Results of the ranking tasks for the socioemotional resources, barriers, and material goods domains are shown in Table 5.2. Both the barriers domain and the material goods domain had eigenvalue ratios for the first two factors that surpassed the threshold for consensus, indicating the presence of cultural models in these two domains. The socioemotional resources domain had an eigenvalue ratio of 2.7, falling below the

threshold for consensus. The socioemotional resources domain was therefore not utilized in the consonance calculation in Phase II.

Table 5.2. Domains from Brown et al. (2006) and Eigenvalue Ratios.

Domain	Eigenvalue Ratio of the 1st and 2nd Factors
Socioemotional Resources	2.7
Barriers	3.9*
Material Goods	3.9*

*Above cultural consensus threshold (3:1 ratio)

Table 5.3. Cultural Competency Descriptive Statistics (n = 26).

Domain	Mean	SD	MIN	MAX
Barriers	.49	.33	-.674	.85
Material Goods	.62	.36	-.563	.91

Both the barriers and the material goods domains showed sufficient consensus to suggest the presence of a cultural model in each respective domain, and for this reason they were used in the consonance calculations in Phase II. These two domains are further analyzed below. The cultural competence of the Phase I subjects in both of these domains is shown in Table 5.3. The mean cultural competence was .49 and .62 for the barriers and material goods domains respectively. There was one negative cultural competence score in the barriers domain (-.674) and in the material goods domain (-.563). The standard deviation (s.d.) was .33 in the domain of barriers and .36 in the domain of material goods. Minimum and maximum values were comparable in both domains. The existence of negative cultural competence scores, low mean

Table 5.4. Consensus Ranks of Material Goods Items[a]

Item	Factor Scores	Consensus Rank
Four-wheelers, boats, jet-skis, bikes, etc. (recreational vehicles)	-1.44843	1
Jewellery (diamonds, gold, silver, etc.)	-1.21538	2
Home entertainment center (big screen, surround sound, etc.)	-1.12914	3
Expensive sports/hobby equipment (athletic, music, hunting, etc.)	-1.0804	4
Lake or beach house (vacation home)	-.65786	5
Fancy car or truck (with modifications and accessories)	-.45845	6
Big/nice house (pool, yard, deck, etc.)	-.25101	7
Dogs/pets	-.1654	8
Vacation and travel	-.01776	9
Own property/have good land	.69174	10
Nice clothes (Tommy, Aeropostale, Gap, CarHartt, etc.)	.82896	11
Own a business	1.0229	12
Investments (stocks, bonds, savings)	1.23766	13
Good cell phone and calling plan	1.23921	14
Computer with internet connection	1.40342	15

[a]Items ranked in order of least importance for young people to achieve their goals.

Table 5.5. Consensus Ranks of Barriers Items[a]

Item	Factor Score	Consensus Rank
Addiction (drugs, alcohol, etc.)	-2.1312	1
Jail/prison/trouble with the law	-1.7953	2
Drop out of high school	-1.46579	3
Hang with the wrong crowd	-.5721	4
Have kids too early	-.50276	5
Lack of jobs and lack of education opportunities/resources	-.41692	6
No motivation/lazy	-.37058	7
Overspend/go into debt	-.28965	8
Depression/anxiety	-.22279	9
Community or family holds you back/discourages you	-.07343	10
Major loss: divorce, illness, heartbreak, accident, death of friend/family	-.03059	11
Fights/conflict/tension with friends, family, or community	.24542	12
Partying too much	.40094	13
Get married or settle down too early	.72134	14
Things that hold you back from college (homesick, travelling, money, stress, etc.)	.80133	15
Bad experiences in school (with teachers, students, counsellors, etc.)	.87626	16
Being angry or overly emotional	1.00029	17
Pressure to help family or friends	1.1618	18
Stress/time pressure	1.27762	19
Always going for the thrill/impulsive	1.3861	20

cultural competence scores, and modest eigenvalue ratios indicate that the consensus in both domains is weak. This is especially true for the barriers domain.

Table 5.4. shows the items in the material goods domain, and each of their associated factor scores and consensus ranks. The items were ranked in order of least importance for young people to achieve their goals. Thus, a consensus rank of one for the item "Four-wheelers, boats, jet-skis, bikes, etc. (recreational vehicles)" indicates that this item was the least important of the 15 items in the domain for young people to reach their goals. The results indicate that the most important item in the material goods domain for young people to reach their goals is "Computer with internet connection," followed by "Good cell phone and calling plan" and "Investments (stocks, bonds, savings)," with consensus ranks of 15, 14, and 13 respectively.

Table 5.5. shows the items in the barriers domain, and each of their associated factor scores and consensus ranks. These items were ranked in terms of their ability to keep young people from reaching their goals, from most powerful to least powerful. Thus, the most powerful barrier in terms of its ability to keep young people from reaching their goals is "Addiction." "Jail/prison/trouble with the law" and "Drop out of high school or college" are the second and third most powerful barriers in terms of their ability to keep young people from reaching their goals. The least powerful barrier is "Always going for the thrill/impulsive."

Phase II Descriptive Characteristics

The final analytical sample size for Phase II was $n = 71$. The distribution of gender and race-ethnicity for the Phase II sample is shown in Table 5.6. Women made up 66.2% of the sample, while men made up 33.8% of the sample. The vast majority (84.5%) of the sample identified as either Black or White. There were 28 individuals who identified as Black and 32

individuals who identified as White in this sample. Of the 11 individuals who did not identify as Black or White, five (7%) identified as Hispanic, one (1.4%) identified as Native Hawaiian and

Table 5.6. Distribution of Race-Ethnicity and Gender in Phase II Sample.

Race-Ethnicity	Men (% of total *n*)	Women (% of total *n*)	Total (% of total *n*)
Black	8 (11.3)	20 (28.2)	28 (39.4)
White	14 (19.7)	18 (25.4)	32 (45.1)
American Indian or Alaskan Native	2 (2.8)	1 (1.4)	3 (4.2)
Native Hawaiian and other Pacific Islander	0 (0)	1 (1.4)	1 (1.4)
Hispanic	0 (0)	5 (7.0)	5 (7.0)
Other	0 (0)	2 (2.8)	2 (2.8)
Total	24 (33.8)	47 (66.2)	71 (100)

other Pacific Islander, three (4.2%) identified as American Indian of Alaskan Native, and two (2.8%) identified as Other. The two individuals who identified as Other wrote in their race-ethnicity as "Asian and White."

For the purposes of Phase II analyses, the sample was divided into two categories: White (n = 32, or 45.1% of the total sample) and Non-White (n = 39, or 54.9% of the total sample). Table 5.7. shows the descriptive statistics for each of these categories. All mean scores are higher for the White participants than the Non-White participants, except in the cases of CMV and cultural consonance in the domain of barriers, where a greater mean CMV indicates greater chronic stress and a greater mean CC-barriers indicates greater disadvantage. For example, mean CMV among White participants was 36.17 (s.d. 35.63), while the mean for Non-White participants was 50.81 (s.d. 39.92). Mean score on the barriers measure was 193.20 (s.d. 76.43)

for White participants and 236.45 (s.d. 86.37) for Non-White participants. Non-White subjects

Table 5.7. Descriptive Statistics of White and Non-White Participants.

	White (*n* = 32)				Non-White (*n* = 39)			
Variables	Mean	*SD*	MIN	MAX	Mean	*SD*	MIN	MAX
Age (years)	18.66	1.36	18.00	23.00	18.95	1.32	18.00	25.00
Parental Education	5.69	1.55	3.00	8.00	5.37	1.82	2.00	7.00
Everyday Discrimination Scale	1.53	1.19	.00	5.00	2.13	1.36	.00	5.00
Major Experiences of Discrimination Scale	.38	.66	.00	2.00	.69	.92	.00	3.00
Lifetime Discrimination	1.91	1.57	.00	6.00	2.82	1.82	.00	7.00
Cultural Consonance – Barriers	193.20	76.43	28.00	372.00	236.45	86.37	83.00	392.00
Cultural Consonance – Material Goods	188.38	68.48	74.00	362.00	162.25	62.54	56.00	313.00
Cytomegalovirus Antibody Activity (ELISA units/milliliter)	36.17	35.63	10.33	147.18	50.81	39.92	10.01	143.05

had higher mean scores for all three discrimination scores, including the everyday discrimination scale (2.13 vs 1.53), the major experiences of discrimination scale (.69 vs .38), and the lifetime discrimination measure (2.82 vs 1.91). White participants had higher mean CC-material goods

(188.38 vs 162.25). Statistical tests of these mean rank differences are discussed in the next section.

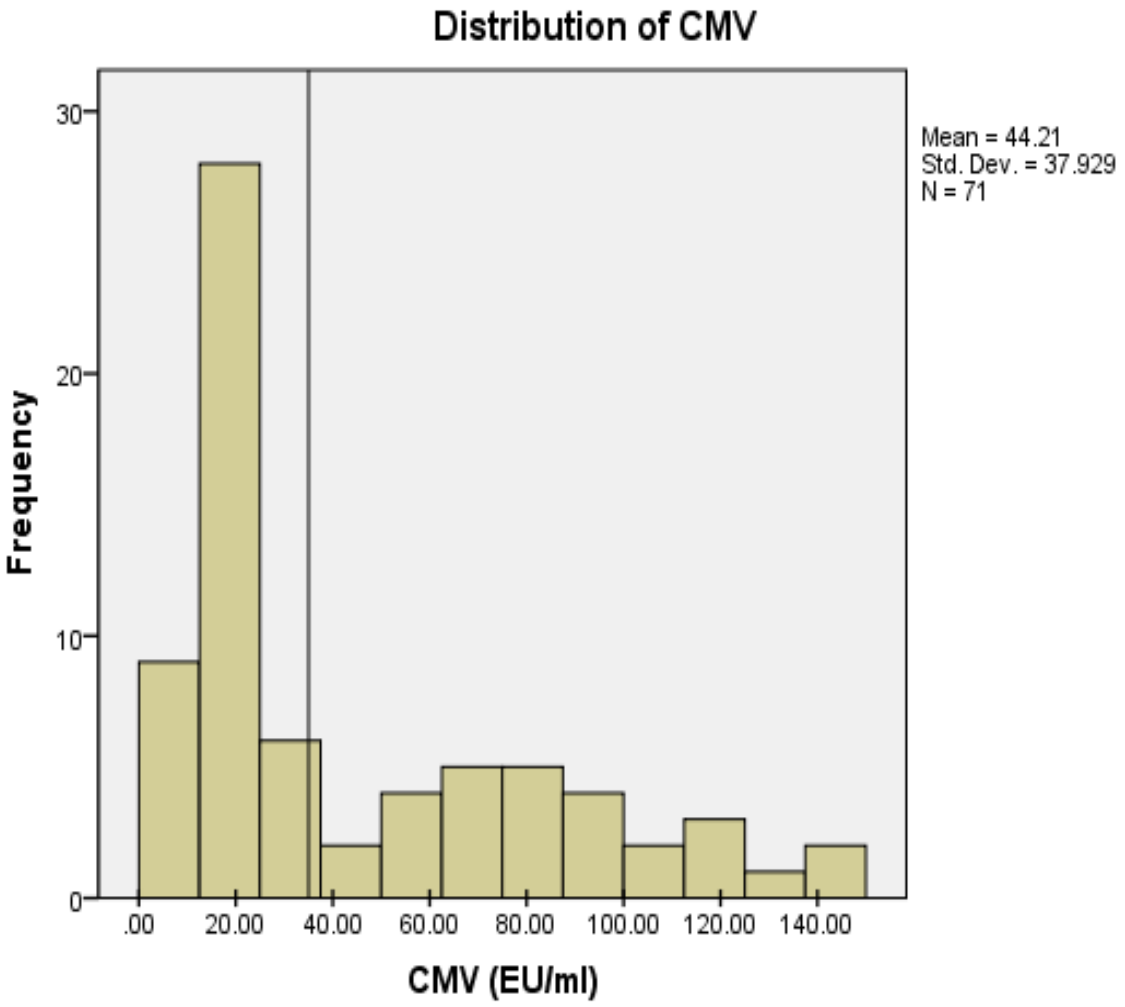

Figure 5.1. Distribution of CMV. A reference line is added at 35 EU/ml to show where CMV was dichotomized for logistic regression analyses. There appears to be two distinct groups, those above (roughly) 35 EU/ml and those below this cutoff. The overall distribution is bimodal. No outliers were detected.

The distribution of CMV was bimodal, which was made even clearer after several different logarithmic transformations (analyses not shown). Figure 5.1. illustrates the bimodal distribution of CMV. There is a large cluster of subjects just above the seropositivity threshold of 10 EU/ml. There is another rise in frequency of participants between 60 and 90 EU/ml. Mean CMV for the sample was 44.21 EU/ml (s.d. 37.93). Median CMV was 23.99. Values ranged from a minimum of 10.01 to a maximum of 147.18.

The distribution of lifetime discrimination scores is shown in Figure 5.2. Mean lifetime discrimination score was 2.41 (s.d. 1.76). This distribution is positively skewed, with many people reporting little to no discrimination and a much smaller number of people scoring in the upper range of lifetime discrimination.

Table 5.8. shows the number of subjects responding affirmatively to each item on the two discrimination scales. Reported frequency for an item on the EDS greater than or equal to a few times a year for the EDS is considered an affirmative response on this scale. Williams *et al.* (1997) draw a distinction at this frequency of perceived discrimination, in which they ask participants to attribute the perceived discrimination to a particular cause. Participants in the current study were asked to attribute perceived discrimination at a frequency equal to or greater than a few times a year, but Table 5.8. shows that there is a lot of missing data for this attribution question. For example, 39 subjects reported being treated with less courtesy and/or respect than others in everyday situations, but only 14 of these 39 subjects (35.9%) attributed this perceived discrimination to one or more of the ten causes for discrimination listed in the attribution follow-up question. The third item on the everyday discrimination scale shows the same problem. Thirty-two subjects reported being treated as if they were not smart a few times a year or more

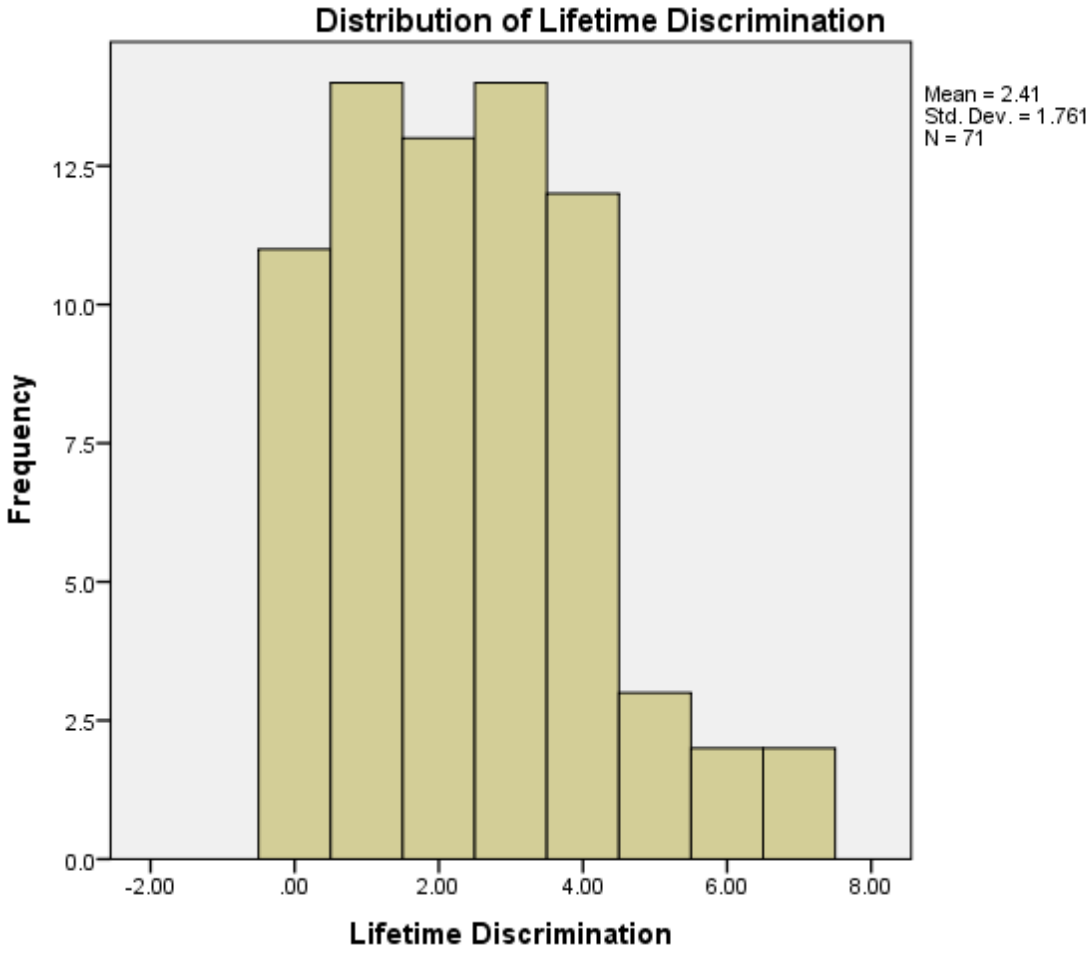

Figure 5.2. Distribution of lifetime discrimination scores. The distribution is positively skewed, with very few scores of 6 or 7, and no one scoring 8, 9, or 10. Mean score for lifetime discrimination was 2.41 with a standard deviation of 1.761.

often, but only 12 of these 32 (37.5%) attributed this perceived discrimination to one or more of the ten causes listed in the attribution follow-up question.

The item with the highest rate of affirmative response across both the EDS and the MEDS was the item that asked participants about the frequency with which they were treated with less courtesy and respect than others. Over half of the sample (54.9%) reported being discriminated against in this way. The item with the lowest rate of affirmative response was the

Table 5.8. Frequency of Discrimination and Attribution.

Items	Perceived Discrimination a few times a year or more often (% of *n*)	Subjects who attributed perceived discrimination (% of subjects attributing discrimination to at least one cause)
Everyday Discrimination		
Less courtesy and or respect	39 (54.9)	14 (35.9)
Poorer service	25 (35.2)	10 (40.0)
Treated as if you are not smart	32 (45.1)	12 (37.5)
People act as if they are afraid of you	25 (35.2)	12 (48.0)
Threatened or harassed	11 (15.5)	4 (36.4)
Major Experiences of Discrimination	Responded "Yes"	Subjects who attributed perceived discrimination (% of subjects attributing discrimination to at least one cause)
Unfairly fired or denied promotion	5 (7.0)	3 (60.0)
Not hired for a job for unfair reasons	5 (7.0)	3 (60.0)
Unfair treatment by police	9 (12.7)	8 (88.9)
Discouraged by teacher or advisor	19 (26.8)	3 (15.8)
Prevented from moving into a neighborhood	1 (1.4)	0 (0.0)

item in the MEDS that asks participants about being prevented from moving into a neighborhood. Only one respondent (1.4%) responded affirmatively to this item. Overall, there were much higher rates of affirmative responses in the EDS than in the MEDS.

The most common attributions for discriminatory experiences are shown in Figure 5.3. These attributions are summed across both discrimination scales. "Race" was the most commonly attributed cause for perceived discrimination, and was attributed as a cause of perceived discrimination 20 times. "Age" and "Some other Aspect of Your Physical

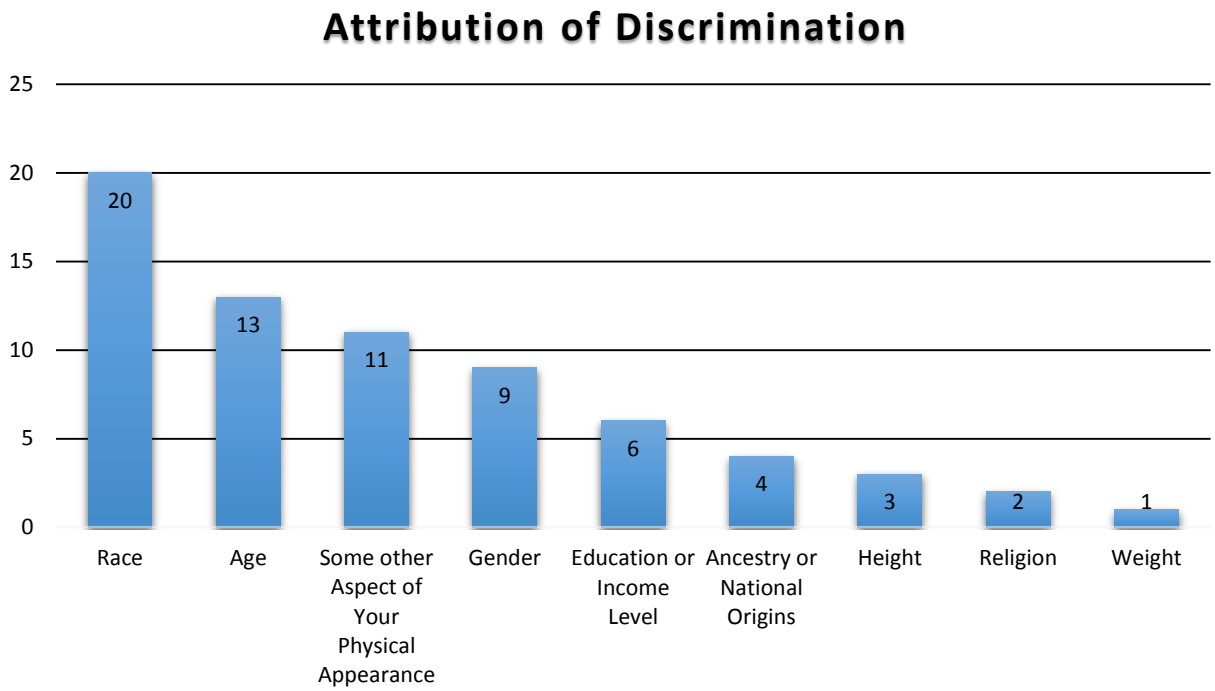

Figure 5.3. Attribution of discrimination across the everyday discrimination scale and the major experiences of discrimination scale. Participants were able to attribute perceived discrimination to more than one cause. Therefore, the total number of attributions (69) is not equal to the total number of people reporting frequent discrimination (for the everyday discrimination scale) or responding affirmatively to items on the major experiences of discrimination scale.

Appearance," were the second and third most commonly attributed causes of discrimination, cited 13 and 11 times respectively. "Some other Aspect of Your Physical Appearance" is differentiated from "Height" and "Weight." "Weight" was the least commonly attributed cause of discrimination, and was reported only one time.

Correlational Data and Null Hypothesis Tests

Bivariate correlations are shown in Table 5.9. among all participants, only White participants, and only Non-White participants. All *r* values shown are Pearson *r*'s, except for the CMV data, for which Spearman *r*'s are shown. The only correlate of CMV among the whole sample is race-ethnicity ($r = .25$, $p < .05$). Among Non-White participants, CMV is correlated

Table 5.9. Bivariate Correlations for Major Variables.

All Participants (n = 71)	1	2	3	4	5	6	7	8	9
1 CMV	-								
2 Everyday Discrimination	-.13	-							
3 Major Experiences of Discrimination	-.08	.32**	-						
4 Lifetime Discrimination	-.12	.90**	.71**	-					
5 CC-Barriers	-.10	.37**	.42**	.47**	-				
6 CC-Material Goods	-.18	-.02	-.13	-.07	.06	-			
7 Parental Education	-.10	-.03	-.16	-.10	-.14	.05	.14	-	
8 Race-Ethnicity	.25*	.23	.19	.26*	.26*	-.20	-.33**	-.09	-
White Participants (n = 32)	1	2	3	4	5	6	7	8	9
1 CMV	-								
2 Everyday Discrimination	-.08	-							
3 Major Experiences of Discrimination	-.11	.40*	-						
4 Lifetime Discrimination	-.08	.92**	.72**	-					
5 CC-Barriers	-.02	.36*	.25	.38*	-				
6 CC-Material Goods	.12	.05	.02	.05	.27	-			
7 Parental Education	-.14	-.12	-.07	-.12	-.06	.06	.10	-	
8 Race-Ethnicity	-	-	-	-	-	-	-	-	-
Non-White Participants (n = 39)	1	2	3	4	5	6	7	8	9
1 CMV	-								
2 Everyday Discrimination	-.28	-							
3 Major Experiences of Discrimination	-.13	.24	-						
4 Lifetime Discrimination	-.28	.87**	.69**	-					
5 CC-Barriers	-.27	.31	.47**	.47**	-				
6 CC-Material Goods	-.32*	.01	-.17	-.08	-.01	-			
7 Parental Education	-.03	.07	-.19	-.05	-.16	.02	.12	-	
8 Race-Ethnicity	-	-	-	-	-	-	-	-	-

All r values are Pearson r's except for CMV, which are Spearman's r's.

*Significant at $p < .05$

**Significant at $p < .01$

with CC-material goods (r = -.32, p < .05). Interestingly, this was the only significant bivariate correlation for the CC-material goods measure. The multiple measures of discrimination are significantly correlated with each other, as expected. CC-barriers was positively correlated with lifetime discrimination in the whole sample (r = .47, p < .01), indicating an association between experiencing life-course barriers and experiences of discrimination. The correlation between CC-barriers and lifetime discrimination was also significant among the subsample of White participants (r = .38, p < .05), demonstrating the strength of this relationship across race-ethnicity.

Apart from CMV, race-ethnicity was also significantly correlated with lifetime discrimination (r = .26, p < .05) and CC-barriers (r = .26, p < .05). For the race-ethnicity variable, White participants were coded as 0 and Non-White participants were coded as 1. This helps to explain the direction of the correlations between race-ethnicity, discrimination, and cultural consonance. Parental education, which is used here as a proxy for SES, was not significantly correlated to any other variable. This finding is a contrast to the typical pattern in the literature associating SES with health outcomes.

To accommodate the irregular distribution of the data, independent samples Mann-Whitney U tests of mean ranks were used to test the null hypotheses listed in Table 5.10. Statistically significant differences in mean ranks for several different variables were found between White and Non-White participants. Non-White participants had higher CMV than White participants (U = 802.0, p = .04), indicating a greater burden of chronic stress for Non-White participants. Non-White participants reported more experiences of everyday discrimination (U = 787.0, p = .05), and significantly higher lifetime discrimination scores (U = 809.5, p = .03). Non-White participants had significantly higher CC-barriers scores than White participants (U =

804.5, $p = .04$). Again, higher scores on this measure indicates greater numbers of life-course barriers.

Table 5.10. Mann-Whitney *U* Tests of Distribution Hypotheses Across Race-Ethnicity.

Null Hypothesis	White Mean Rank ($n = 32$)	Non-White Mean Rank ($n = 39$)	Independent Samples Mann-Whitney *U*	*p*-value
1 The distribution of CMV is the same across categories of White vs Non-White.	30.44	40.56	802.00	.04*
2 The distribution of Everyday Discrimination is the same across categories of White vs Non-White.	30.91	40.18	787.00	.05
3 The distribution of Major Discriminatory Events is the same across categories of White vs Non-White.	32.34	39.00	741.00	.12
4 The distribution of Lifetime Discrimination is the same across categories of White vs Non-White.	30.20	40.76	809.50	.03*
5 The distribution of Parental Education is the same across categories of White vs Non-White.	37.19	34.08	554.00	.52
6 The distribution of CC-Barriers is the same across categories of White vs Non-White.	30.36	40.63	804.500	.04*
7 The distribution of CC-Material Goods is the same across categories of White vs Non-White.	40.27	32.50	487.50	.12

*$p < .05$; Null Hypothesis Rejected

Table 5.11. shows the results of null hypothesis tests of CMV distribution across categories of discrimination and cultural consonance. No significant differences in mean rank of CMV were found between low and high (median split) categories of lifetime discrimination (U = 500.5, p = .27), CC-barriers (U = 557.5, p = .40), and CC-material goods (U = 528.5, p = .25). These results do not support cultural consonance and lifetime discrimination as predictors of CMV.

Table 5.11. Mann-Whitney *U* Tests of CMV Distribution Hypotheses across Categories of Discrimination and Cultural Consonance.

Null Hypothesis	"Low" Group CMV Mean Rank (*n*)	"High" Group CMV Mean Rank (*n*)	Independent Samples Mann-Whitney *U*	*p*-value
1 The distribution of CMV is the same across categories of Low vs High Lifetime Discrimination.	38.12	32.54	500.50	.27
2 The distribution of CMV is the same across categories of Low vs High CC-Barriers.	33.93	38.01	557.50	.40
3 The distribution of CMV is the same across categories of Low vs High CC-Material Goods.	38.72	33.04	528.500	.25

Regression Analyses

In preliminary linear regression analyses, race-ethnicity, lifetime discrimination, and cultural consonance did not emerge as significant predictors. Next, interaction effects were tested

between lifetime discrimination and cultural consonance variables. A logistic regression model was used in tests for interactions to account for the bimodal distribution of CMV. CMV was dichotomized into “low” and “high” groups at 35 EU/ml, a point in the distribution of CMV

Table 5.12. Interaction of CC-barriers and Lifetime Discrimination in Predicting High CMV.

Term	Unstandardized Logistic Regression Coefficient	95% CI
standardized CC-barriers	-.33	[-.96, .30]
standardized lifetime discrimination	-.74	[-1.45, -.03]
Interaction of CC-barriers and lifetime discrimination	-.72	[-1.45, .02]
race-ethnicity	1.54	[.38, 2.70]
constant	-1.12	[-2.01, -.23]

between the two modes. An interaction between lifetime discrimination and CC-barriers (p = .06) was found in a model predicting odds of having high (>35 EU/ml) CMV. Table 5.12. lists the regression coefficients for the logistic regression model tested.

Figure 5.4. illustrates the interaction of CC-barriers and lifetime discrimination in the logistic regression analysis. For those subjects at one s.d. above the mean of lifetime discrimination scores, an increasing number of life-course barriers is associated with a protective effect on log odds of high CMV. At average levels of lifetime discrimination, increasing life-course barriers appears to also have a protective effect on log odds of high CMV. For those subjects one s.d. below the mean of lifetime discrimination scores, increasing life-course barriers

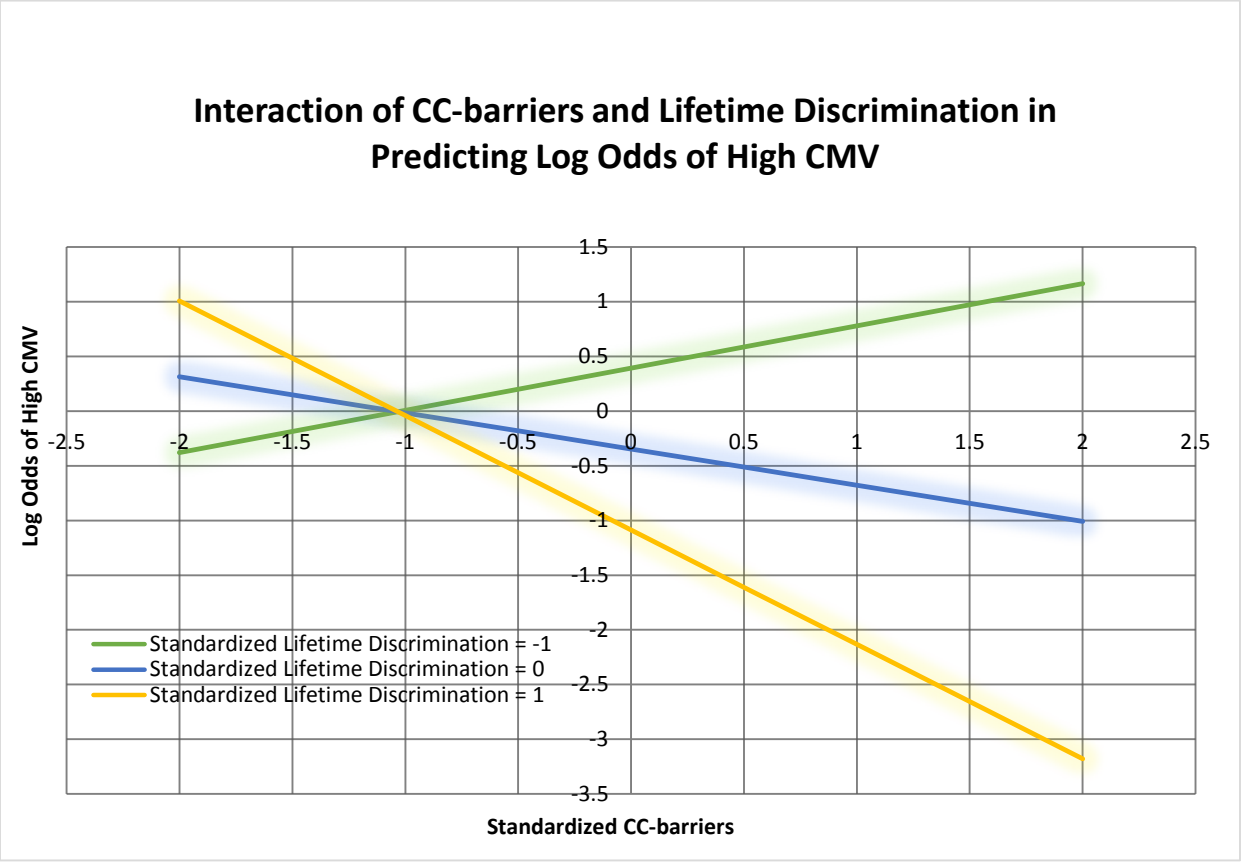

Figure 5.4. This graph illustrates the interaction of CC-barriers and lifetime discrimination in a logistic regression analysis. The impact of CC-barriers on log odds of high CMV varies by level of lifetime discrimination.

is associated with increasing log odds of having high CMV. These results are discussed in the next chapter.

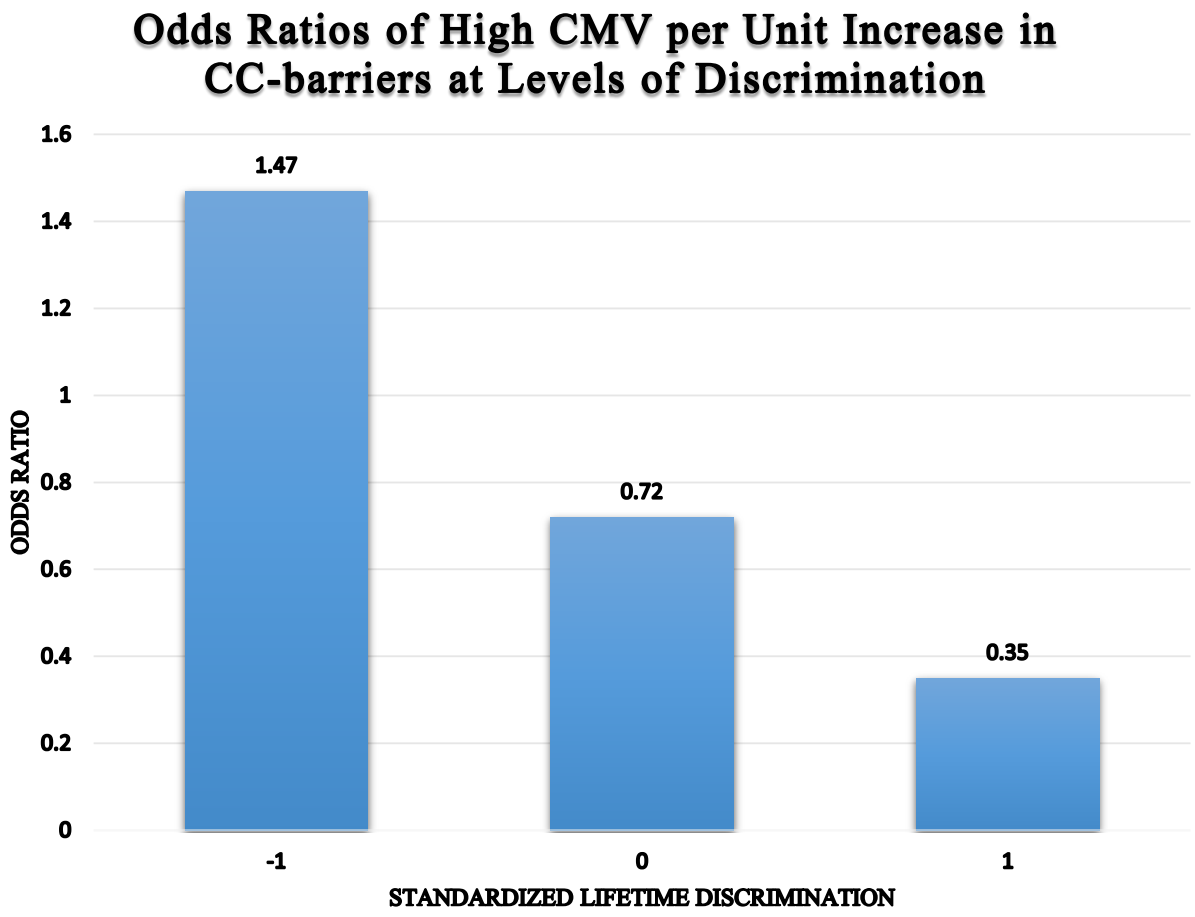

Figure 5.5. This bar graph illustrates the change in odds ratio of high CMV per unit increase of CC-barriers at levels of lifetime discrimination. The odds ratio diverges from 1:1 at each level, indicating an effect of increasing CC-barriers across levels of discrimination for likelihood of having high CMV.

Log odds of having high CMV is not an intuitive measure, so another illustration of the interaction between CC-barriers and lifetime discrimination is provided in Figure 5.5. Odds ratios associated with a one unit increase in CC-barriers at three levels of standardized lifetime discrimination are shown. At one s.d. below the mean of lifetime discrimination the odds ratio of high CMV is 1.47 per unit increase in CC-barriers. At the mean score of lifetime discrimination, the odds ratio of high CMV per unit increase in CC-barriers is 0.72. At one s.d. above the mean of lifetime discrimination, the odds ratio of high CMV per unit increase in CC-barriers is 0.35.

CC-barriers and lifetime discrimination appear to interact in important ways for prediction of CMV.

The correlation between CMV and CC-material goods in the Non-White sample suggested an interaction between race-ethnicity and CC-material goods. This interaction was tested in a logistic regression model predicting high CMV. The interaction term was not significant (p = .20). Unstandardized regression coefficients and 95% confidence intervals for this model are shown in Table 5.13.

Table 5.13. Interaction of Race-Ethnicity and CC-material goods in Predicting High CMV.

Term	Unstandardized Logistic Regression Coefficient	95% CI
Race-Ethnicity	2.60	[-.37, 5.58]
CC-material goods	.00	[-.01, .01]
Interaction of Race-Ethnicity and CC-material goods	.01	[-.03, .06]
constant	-1.34	[-3.64, -.97]

CHAPTER 6

DISCUSSION

Phase I

It was hypothesized that cultural models would be present among UA students in the domains of the life trajectory identified by Brown *et al.* (2006). Evidence for partial confirmation of this hypothesis was found in the current study. In the domains of barriers and material goods, sufficient consensus on the relative rankings of elements was found to suggest the presence of a cultural model. Insufficient consensus was found in the relative rankings of elements from the socioemotional resources domain to suggest the presence of a cultural model.

The lack of agreement in this domain may have to do with contextual differences between the setting of the GSMS and UA. The GSMS purposefully sampled from a rural, poor region of the U.S. with a saturation subsample of Native Americans. The subjects in the current study were all students at UA, with the concomitant life opportunities and resources associated with gaining admission to a large, selective university. This is a marked contrast to the sample in the GSMS. These contextual differences may have resulted in a lack of consensus in the domain of socioemotional resources at UA. Another consideration is the distance in time between the current study and the GSMS. The current study was carried out at least ten years after the Brown *et al.* (2006) data were collected. The results of Phase I may suggest that the idea of socioemotional resources is not static through time. Regardless of the exact reason, there was insufficient evidence to infer the existence of a cultural model in the domain socioemotional resources at UA.

Interestingly, there was consensus around the domains of barriers and material goods. One might have predicted that there would not be consensus around the domain of material goods, based on the idea of changing taste and rapidly changing consumer technology. The evidence from the current study shows that this domain is organized in the form of a cultural model among UA students. This suggests that conceptions of the relative importance of material goods for achieving goals are shared across space and time. Similarly, the domain of barriers was organized in the form of a cultural model among UA students, despite the differences in context and time mentioned above between the current study and Brown *et al.* (2006). This suggests that conceptions of the relative power of particular life-course barriers are shared across space and time.

The distribution of gender and race-ethnicity in the Phase I sample might be interpreted as fundamentally different from the Phase II sample distribution, and it might seem inappropriate to develop a consonance instrument from the Phase I sample and apply it to the Phase II sample. This critique posits differences in cultural models by gender and race-ethnicity. One of the lessons learned by the researchers conducting the GSMS was *not* to assume differences in cultural models based on ethnicity. Specifically, they expected to find fundamentally different cultural models among Native Americans and White subjects in Appalachia. The researchers *did not* find this to be the case, and instead found shared cultural models across ethnic boundaries (Brown *et al.* 2009).

An example using the dimension of class also illustrates this point. Dressler *et al.* (1996) studied a cultural model of lifestyle in urban Brazil across four different neighborhoods, stratified by socioeconomic status. In their discussion, they state the following: "…*the individuals across these four neighborhoods could hardly be more different in terms of their*

actual consumption behavior, yet they adhere to the same cultural construction of what that consumption should be" (emphasis in original) (Dressler *et al*. 1996:346).

The perspective of the current study is that subjects in both Phase I and Phase II were all members of a sociocultural group: young students at UA, with shared, meaningful ways of organizing the life trajectory. This suggestion is supported by the current study, and by previous work in cognitive anthropology, in which cultural models have been shown to be present across boundaries of class, gender, and ethnicity.

Phase II

It was hypothesized that there would be differences by race-ethnicity in CMV. Confirmatory evidence for this hypothesis was found in the current study. Non-White subjects had significantly higher CMV than White subjects. Further evidence for this hypothesis comes from the logistic regression model in which race-ethnicity is a significant predictor of CMV, independent of lifetime discrimination, CC-barriers, and an interaction effect of these two variables. Higher levels of CMV among Non-White subjects are indicative of a higher level of chronic stress than that experienced by White subjects.

A second hypothesis was that there would be differences by race-ethnicity in experiences of perceived discrimination, and that these differences would mediate racial-ethnic differences in CMV. Significant differences between White and Non-White subjects were found in experiences of lifetime discrimination; however, lifetime discrimination was not associated with CMV. Thus, no evidence was found for discrimination as a mediator of racial-ethnic differences in CMV.

The findings mentioned above partially confirm a psychosocial model of health disparities, which suggests that being a minority group member is stressful in a racially stratified society. The results indicate that being Non-White leads to greater levels of chronic stress, as

indexed by CMV. The pathways mediating this excess stress operate at multiple scales, from the social determinants of health to interpersonal interactions. The racial-ethnic differences in perceived discrimination did not mediate differences in cell-mediated immunity in this sample, which is a contrast to previous findings reporting associations between perceived discrimination and cell-mediated immunity (Christian *et al.* 2012; McClure *et al.* 2010).

A third hypothesis was that discrimination would mediate racial-ethnic differences in CMV through an effect on cultural consonance. This last hypothesis suggested a relationship between perceived discrimination and cultural consonance, *and* a relationship between cultural consonance and CMV. The correlation data support the suggestion that there is a relationship between experiences of discrimination and cultural consonance. The CC-barriers measure was significantly correlated with all three measures of discrimination used in the current study. A greater number of life-course barriers is associated with an increase in discrimination. This association between cultural consonance and experiences of discrimination was stronger among Non-White participants than White participants.

No evidence was found among the entire sample to support an association between cultural consonance and CMV; however, among Non-White participants, a significant negative correlation was found between CC-material goods and CMV. This suggests that a decrease in CMV (chronic stress) is associated with an increase in CC-material goods among Non-White participants. This relationship did not hold in the entire sample.

There is, however, evidence from logistic regression analyses to support the notion that discrimination and cultural consonance interact to predict log odds of high CMV (Table 5.12.). An interaction was found between lifetime discrimination and CC-barriers in a logistic regression model predicting odds of having high CMV. Figure 5.4. illustrates the interaction. For

those experiencing greater discrimination (one s.d. above the mean), a larger number of life-course barriers results in reduced log odds of having high CMV. For those experiencing less discrimination (one s.d. below the mean), a larger number of life-course barriers results in increased log odds of having high CMV.

The discussion of Figure 5.4. will be limited to the green (low discrimination) and yellow (high discrimination) lines for ease of presentation. There are four points of interest in Figure 5.4. corresponding to the end points of the green and yellow lines: 1) less discrimination and low barriers 2) less discrimination and high barriers 3) greater discrimination and low barriers and 4) greater discrimination and high barriers. The first point makes intuitive sense; people experiencing low levels of discrimination and low numbers of life-course barriers should have relatively low stress levels. The second point may represent subjects who experience a lot of life-course barriers without being able to explain these experiences in terms of being discriminated against. That is, they cannot attribute their difficulties to others or society at large. An inability to attribute life-course barriers encountered to others might be producing high CMV at this point in Figure 5.4. The third point may similarly represent an incongruent status in which people are being discriminated against at high levels despite not facing a great number of life-course barriers. Perceived discrimination may seem especially unjustified for these people, and result in higher levels of CMV. The last point may represent subjects who experience greater numbers of life-course barriers, but who may be able to attribute these experiences to social injustice, recognizing that they are discriminated against at significant levels.

These interpretations are inspired by a long tradition of research in anthropology demonstrating the stressful effects of incongruence in social status. Working in Samoa, McDade (2002) showed that being considered of high status in a Western sense, but not in a traditional

Samoan sense (and vice versa) was more physiologically stressful than being of low status or high status by both Western and traditional Samoan standards. In other words, incongruence between these two standards of social status was stressful. It is suggested here that individuals experiencing greater discrimination and fewer life-course barriers experience a sense of incongruence that may be chronically stressful. For those experiencing greater numbers of life-course barriers, an attribution framework is utilized to explain the interaction. Those participants experiencing greater life-course barriers and who perceive greater discrimination can attribute their difficult experiences to social injustice, while those experiencing less discrimination and simultaneously dealing with large numbers of barriers may have no one to attribute their problems to.

In the context of this discussion, the work of Pennebaker *et al.* (1988) is relevant. Two groups of undergraduates were assigned to write about either traumatic experiences or emotionally neutral experiences over the course of four days, the idea being that confronting trauma reduces suppression of negative feelings, thereby improving health. What this task accomplishes, in effect, is the construction of a narrative around traumatic experience that enables effective healing. Pennebaker *et al.* (1988) showed improved cellular immune system function in the group writing about previous traumatic experiences compared to the control group writing about superficial topics. In a similar research design with HIV patients, Petrie *et al.* (2004) showed that writing about emotional topics increased $CD4^+$ lymphocyte counts. In yet another example of the effect of narrative construction and emotional writing on immune function, Petrie *et al.* (1995) demonstrated a positive effect on response to hepatitis B vaccination in subjects assigned to emotional writing groups.

The results from the current study may be partially explainable in terms of the formation of a narrative around discrimination. Perhaps it is the case that those individuals that can better recognize discrimination are able to process it better, improving their physical health. Recognizing clear examples of racial discrimination, compared to recognizing ambiguous cases of racism, has been shown to be an important factor in the response to racism. Merritt *et al.* (2006) exposed one group of black men to blatantly racist audio content of a shopping incident and another group of black men to non-racist (but unfair treatment) audio of a shopping incident. Suprisingly, they found that the group that listened to the blatantly racist shopping incident had lower diastolic blood pressure during the periods after presentation with the audio content than those in the non-racist audio group. Those in the non-racist audio group that perceived racism in the shopping incident showed exaggerated cardiovascular reactivity across multiple stages of the experiment (Merritt *et al.* 2006). The effects of discrimination are complex, and it may be the case that overt incidences discrimination are easier incidences to understand and cope with.

The preceding discussion highlights the need to pay attention to culture in the production and maintenance of health disparities. Local meaning systems appear to interact with racially stratified power structures to predict levels of immunological stress, as indexed by CMV antibody titers. A structural constructivist model of racial-ethnic health disparities is useful for understanding the results presented by the current study.

Limitations

The current study is limited by the cross-sectional research design. The data presented here do not allow for the establishment of a causal sequence of events. Future studies should utilize longitudinal research designs to investigate causal relationships between cultural consonance, perceived discrimination, and CMV antibody titers.

The preliminary phase (Phase I) of the current study could be vastly improved by carrying out a local cultural domain analysis on which to base the creation of a cultural consonance instrument. A cultural domain analysis carried out in western North Carolina roughly ten years ago serves a useful purpose in the current study, but also represents a limitation. Ideally, cultural domain analyses are carried out where a cultural consonance instrument will be administered. More meaningful cultural consonance results might be obtained by creating a consonance instrument from a more local and recent cultural domain analysis.

Phase II results might be made more meaningful by the addition of an ethnographic component describing discriminatory experiences at UA. The discrimination instruments used by Sternthal *et al.* (2011) and by the current study may not best capture what discrimination looks like at UA. The fact that many participants who reported discrimination did not also report an attribution suggests that attribution categories need to be revaluated. Future work utilizing these instruments might consider adding a "fill in the blank" attribution option. Future researchers might consider how local cultural contexts determine what specific actions are considered discriminatory and what the local view is on causes of these experiences. Instruments that measure these beliefs might be more useful to future studies of discrimination. Lastly, the omission of three questions measuring CC-barriers in the Phase II survey must be recognized as a limitation.

CHAPTER 7

CONCLUSION

Racial-ethnic health disparities are a major public health concern in the U.S. Racially stratified power structures partially determine the influence of the social determinants of health on individuals, and affect their everyday interpersonal interactions. The social determinants of health intersect with local meaning systems and human biology to shape health outcomes across the life-course of an individual. A biocultural approach allows for a unique understanding of the production and maintenance of racial-ethnic health disparities. This approach utilizes the theory and method necessary to integrate considerations of social structure, culture, and human biology.

Convenience samples were utilized at UA for both phases of the current study. CCA was used to test for the presence of cultural models in Phase I. This phase of research provided an empirical basis for the construction of the cultural consonance instrument. In Phase II, a survey was administered and dried blood spots were collected from participants. All data collection took place at UA.

The purpose of this study was to test two mechanisms of racial-ethnic disparities in cell-mediated immunity. It was first hypothesized that minority students would have higher CMV antibody levels than White students due to the various levels of racism (e.g., interpersonal, institutional, etc.) and resultant stressors differentially experienced by minority populations in the U.S. This hypothesis was confirmed. A second hypothesis stated that these racial-ethnic differences in CMV would be mediated by perceived discrimination. While the Non-White

participants did experience higher levels of discrimination, perceived discrimination did not explain the observed racial-ethnic differences in CMV.

A third hypothesis stated that discrimination would mediate racial ethnic differences in cultural consonance, and that cultural consonance would mediate differences in CMV. This hypothesis suggested a pathway from 1) race-ethnicity to discrimination 2) discrimination to cultural consonance and 3) from cultural consonance to CMV. Although discrimination and cultural consonance were consistently correlated with each other, cultural consonance did not mediate differences in CMV. There was, however, a significant interaction between CC-barriers and lifetime discrimination in a logistic regression model predicting odds of having high levels of CMV. A significant main effect of race-ethnicity was also found in this model (Table 5.12.).

The hypotheses mentioned above were generated from both a psychosocial model of health disparities and what Dressler *et al.* (2005) have called a structural constructivist model of health disparities. Results from this study demonstrate the utility of these models for constructing and testing hypotheses that give us insight into the production and maintenance of racial-ethnic health disparities. This study found that being Non-White is more chronically stressful than being White. Race-ethnicity, perceived discrimination and cultural consonance may be important factors in predicting cell-mediated immune status. These findings replicate previous findings of racial-ethnic differences in cell-mediated immunity. The findings of the current study do not replicate reports of an association between perceived discrimination and cell-mediated immunity.

A final note on measurement is warranted. An important point of consideration is whether or not the CC-barriers measure should be considered a cultural consonance measure at all. Cultural consonance measures are best suited for measuring congruence with cultural models encoding positive, valued thoughts and behaviors. The CC-material goods measure is an example

of a cultural consonance measurement. The CC-barriers measure, on the other hand, estimates congruence with a model that is explicitly negative. One could argue that cultural consonance is not what is being measured here because the items in the cultural model are avoided rather than valued. This conceptual issues awaits further discussion in the scholarly community.

This study made use of a biocultural approach to racial-ethnic health disparities. Such an approach incorporates culture as an important variable in population health. Local meaning systems interact with social hierarchies to produce patterns in human biology. Future research in racial-ethnic health disparities would benefit from a consideration of biocultural theory and method.

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APPENDIX A - Phase I Interview Schedule

After getting consent, the PI will proceed as follows:

Part I: Exclusion task with Socioemotional Resources, Material Goods, and Milestones

"According to what most people believe, which of these is least important for young people to reach their goals?"

Socioemotional Resources *Material Goods*

Order of Exclusion (Least Important excluded first and listed from top to bottom)

_____ _____
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Milestones

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Part Two: Chronological ordering task of Milestones

*Chronology of **Milestones** – Ideal order of occurrence, from first to last:* **"Place these items in the order in which they should ideally occur, from first to last."**

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Part Three: Ranking of most powerful Barriers

***Barriers** – excluded by power to stop young people from achieving goals (most powerful excluded first) –* **"According to what most people believe, pick out the most powerful barrier in this group, in terms of its ability to keep young people from achieving their goals."**

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APPENDIX B - Phase II Interview Schedule

1. What is your identification number?

2. How old are you?

18 19 20 21 22 23 24 25 26

3. What is your sex?

Male Female Other

4. What is your Race/Ethnicity?

Black
White
American Indian or Alaskan Native
Native Hawaiian and other Pacific Islander
Hispanic
Other: _____

5. What is the name of the high school you graduated from?

6. Where is the high school you graduated from (Town/City AND State)?

7. What is the highest level of education completed by your mother?

Less than High School
High School
Undergraduate studies
Graduate studies

8. What is the highest level of education completed by your mother?

Less than High School
High School
Undergraduate studies
Graduate studies

9. Do you currently have a job?

Yes Skip to question 10.
No Skip to question 11.

-Said yes to currently have a job-
10. How many hours a week do you spend working?

1-5 hours per week
5-10 hours per week
10-15 hours per week
15-20 hours per week
More than 20 hours per week

(Discrimination Instruments)

In your day-to-day life, how often do any of the following things happen to you?

1. You are treated with less courtesy or respect than other people.

a. Never
b. Less than once a year
c. A few times a year
d. A few times a month
e. At least once a week
f. Almost everyday

If you answered c, d, e, or f, what do you think is the main reason for these experiences? (You can check more than one)

Your Ancestry or National Origins___
Your Gender___
Your Race___
Your Age___
Your Religion___
Your Height___
Your Weight___
Some other Aspect of Your Physical Appearance__
Your Sexual Orientation___
Your Education or Income Level___

2. You receive poorer service than other people at restaurants or stores.

a. Never
b. Less than once a year
c. A few times a year
d. A few times a month
e. At least once a week
f. Almost everyday

If you answered c, d, e, or f, what do you think is the main reason for these experiences? (You can check more than one)

Your Ancestry or National Origins___	Your Height___
Your Gender___	Your Weight___
Your Race___	Some other Aspect of Your Physical Appearance__
Your Age___	Your Sexual Orientation___
Your Religion___	Your Education or Income Level___

3. People act as if they think you are not smart.

a. Never
b. Less than once a year
c. A few times a year
d. A few times a month
e. At least once a week
f. Almost everyday

If you answered c, d, e, or f, what do you think is the main reason for these experiences? (You can check more than one)

Your Ancestry or National Origins___	Your Height___
Your Gender___	Your Weight___
Your Race___	Some other Aspect of Your Physical Appearance__
Your Age___	Your Sexual Orientation___
Your Religion___	Your Education or Income Level___

4. People act as if they are afraid of you.

a. Never
b. Less than once a year
c. A few times a year
d. A few times a month
e. At least once a week
f. Almost everyday

If you answered c, d, e, or f, what do you think is the main reason for these experiences? (You can check more than one)

Your Ancestry or National Origins___	Your Height___
Your Gender___	Your Weight___
Your Race___	Some other Aspect of Your Physical Appearance__
Your Age___	Your Sexual Orientation___
Your Religion___	Your Education or Income Level___

5. You are threatened or harassed.

a. Never
b. Less than once a year
c. A few times a year
d. A few times a month
e. At least once a week
f. Almost everyday

If you answered c, d, e, or f, what do you think is the main reason for these experiences? (You can check more than one)

Your Ancestry or National Origins___ Your Height___
Your Gender___ Your Weight___
Your Race___ Some other Aspect of Your Physical Appearance__
Your Age___ Your Sexual Orientation___
Your Religion___ Your Education or Income Level___

In the following questions, we are interested in your perceptions about the way other people have treated you. Can you tell me if any of the following has ever happened to you:

1. At any time in your life, have you ever been unfairly fired from a job or been unfairly denied a promotion? Yes No

If you circled Yes, What do you think was the main reason for this experience? (You may check more than one)

Your Ancestry or National Origins___ Your Height___
Your Gender___ Your Weight___
Your Race___ Some other Aspect of Your Physical Appearance__
Your Age___ Your Sexual Orientation___
Your Religion___ Your Education or Income Level___

2. For unfair reasons, have you ever not been hired for a job? Yes No

If you circled Yes, What do you think was the main reason for this experience? (You may check more than one)

Your Ancestry or National Origins___ Your Height___

Your Gender___ Your Weight___
Your Race___ Some other Aspect of Your Physical Appearance__
Your Age___ Your Sexual Orientation___
Your Religion___ Your Education or Income Level___

3. Have you ever been unfairly stopped, searched, questioned, physically threatened or abused by the police? Yes No

If you circled Yes, What do you think was the main reason for this experience? (You may check more than one)

Your Ancestry or National Origins___ Your Height___
Your Gender___ Your Weight___
Your Race___ Some other Aspect of Your Physical Appearance__
Your Age___ Your Sexual Orientation___
Your Religion___ Your Education or Income Level___

4. Have you ever been unfairly discouraged by a teacher or advisor from continuing your education? Yes No

If you circled Yes, What do you think was the main reason for this experience? (You may check more than one)

Your Ancestry or National Origins___ Your Height___
Your Gender___ Your Weight___
Your Race___ Some other Aspect of Your Physical Appearance__
Your Age___ Your Sexual Orientation___
Your Religion___ Your Education or Income Level___

5. Have you ever been unfairly prevented from moving into a neighborhood because the landlord or a realtor refused to sell or rent you a house or apartment? Yes No

If you circled Yes, What do you think was the main reason for this experience? (You may check more than one)

Your Ancestry or National Origins___ Your Height___
Your Gender___ Your Weight___
Your Race___ Some other Aspect of Your Physical Appearance__
Your Age___ Your Sexual Orientation___
Your Religion___ Your Education or Income Level___

(Cultural Consonance Instrument)

People would say I'm honest, responsible and polite.

Strongly Disagree Disagree Neutral Agree Strongly Agree

I have a good group of close/best friends.

Strongly Disagree Disagree Neutral Agree Strongly Agree

People would say I'm able to think for myself.

Strongly Disagree Disagree Neutral Agree Strongly Agree

I have plenty of community connections and support.

Strongly Disagree Disagree Neutral Agree Strongly Agree

People would say I'm characterized by determination, motivation, and drive.

Strongly Disagree Disagree Neutral Agree Strongly Agree

My life is not fun or exciting.

Strongly Disagree Disagree Neutral Agree Strongly Agree

It's important to me to have a partner who is supportive and attractive.

Strongly Disagree Disagree Neutral Agree Strongly Agree

I rarely hang out with friends or party.

Strongly Disagree Disagree Neutral Agree Strongly Agree

It's good for me to have a passion or focus in life.

Strongly Disagree Disagree Neutral Agree Strongly Agree

I prioritize my health, fitness, and stress relief.

Strongly Disagree Disagree Neutral Agree Strongly Agree

My self-esteem is high and I am secure in myself.

Strongly Disagree Disagree Neutral Agree Strongly Agree

It's not important to get higher education (college degree).

Strongly Disagree Disagree Neutral Agree Strongly Agree

I have met many different kinds of people, and been to many different places.

Strongly Disagree Disagree Neutral Agree Strongly Agree

I have access to plenty of money, so money and finances are not a concern for me.

Strongly Disagree Disagree Neutral Agree Strongly Agree

It's important for me to plan ahead and have goals.

Strongly Disagree Disagree Neutral Agree Strongly Agree

I pay close attention to my cultural and family roots.

Strongly Disagree Disagree Neutral Agree Strongly Agree

It's important for me to have status and power in the community.

Strongly Disagree Disagree Neutral Agree Strongly Agree

My family strongly supports me and we spend time together.

Strongly Disagree Disagree Neutral Agree Strongly Agree

I feel supported by my Church, my faith, and prayer.

Strongly Disagree Disagree Neutral Agree Strongly Agree

How important is it for you to have four-wheelers, boats, jet-skis, bikes, etc. (recreational vehicles)?

Unimportant Of little Importance Moderately Important Important Very Important

How important is it for you to have a big house with a pool, yard, deck, etc.?

Unimportant Of little Importance Moderately Important Important Very Important

How important is it for you to have a computer with an internet connection?

Unimportant Of little Importance Moderately Important Important Very Important

How important is it for you to have dogs/pets?

Unimportant Of little Importance Moderately Important Important Very Important

How important is it for you to have expensive sports and hobby equipment (athletic, music, hunting, etc.)?

Unimportant Of little Importance Moderately Important Important Very Important

How important is it for you to have a fancy car or truck (souped up, etc.)?

Unimportant Of little Importance Moderately Important Important Very Important

How important is it for you to have a good cell phone and calling plan?

Unimportant Of little Importance Moderately Important Important Very Important

How important is it for you to have a home entertainment center?

Unimportant Of little Importance Moderately Important Important Very Important

How important is it for you to have investments (stocks, bonds, savings)?

Unimportant Of little Importance Moderately Important Important Very Important

How important is it for you to have jewelry (diamonds, gold, silver, etc.)?

Unimportant Of little Importance Moderately Important Important Very Important

How important is it for you to have a lake or beach house (vacation home)?

Unimportant Of little Importance Moderately Important Important Very Important

How important is it for you to have nice clothes?

Unimportant Of little Importance Moderately Important Important Very Important

How important is it for you to own a business?

Unimportant Of little Importance Moderately Important Important Very Important

How important is it for you to own good property / land?

Unimportant Of little Importance Moderately Important Important Very Important

How important is it for you to vacation and travel?

Unimportant Of little Importance Moderately Important Important Very Important

Addiction (drugs, alcohol, etc.) is not a problem for me.

Strongly Disagree Disagree Neutral Agree Strongly Agree

I'm always the one going for the thrill or being impulsive.

Strongly Disagree Disagree Neutral Agree Strongly Agree

I've had some bad experiences in school (with teachers, students, counsellors, etc.).

Strongly Disagree Disagree Neutral Agree Strongly Agree

Sometimes I'm angry or overly emotional.

Strongly Disagree Disagree Neutral Agree Strongly Agree

My family or community discourages me and holds me back.

Strongly Disagree Disagree Neutral Agree Strongly Agree

Sometimes I get depressed and/or anxious.

Strongly Disagree Disagree Neutral Agree Strongly Agree

I am worried about dropping out of college.

Strongly Disagree Disagree Neutral Agree Strongly Agree

There is fighting, conflict and tension in my life (with friends, family, or community).

Strongly Disagree Disagree Neutral Agree Strongly Agree

It's important not to get married or settle down too early.

Strongly Disagree Disagree Neutral Agree Strongly Agree

I've had a lack of educational opportunities and resources, as well as jobs, throughout my life.

Strongly Disagree Disagree Neutral Agree Strongly Agree

I've dealt with a major loss like divorce, illness, heartbreak, accident, or death of friend/family.

Strongly Disagree Disagree Neutral Agree Strongly Agree

Being lazy and unmotivated is a problem for me.

Strongly Disagree Disagree Neutral Agree Strongly Agree

Overspending and going into debt is a concern for me.

Strongly Disagree Disagree Neutral Agree Strongly Agree

Partying too much is not a problem for me.

Strongly Disagree Disagree Neutral Agree Strongly Agree

There is a lot of pressure in my life to help my family and friends.

Strongly Disagree Disagree Neutral Agree Strongly Agree

There’s a lot stress and pressure on me and not enough time to get everything done.

Strongly Disagree Disagree Neutral Agree Strongly Agree

Some things hold me back from staying in college (homesick, travelling, money, stress, etc.

Strongly Disagree Disagree Neutral Agree Strongly Agree

APPENDIX C

IRB approval letters for Phase I and Phase II (see next two pages).

Office for Research

Institutional Review Board for the
Protection of Human Subjects

THE UNIVERSITY OF
ALABAMA
RESEARCH

April 17, 2015

Edward Quinn
Dept. of Anthropology
College of Arts and Sciences
Box 870210

Re: IRB#: 15-OR-125 "Local Validation of a Life Trajectory Model for Youth"

Dear Mr. Quinn:

The University of Alabama Institutional Review Board has granted approval for your proposed research.

Your application has been given expedited approval according to 45 CFR part 46. You have also been granted the requested waiver of written documentation of informed consent. Approval has been given under expedited review category 7 as outlined below:

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies

Your application will expire on April 16, 2016. If your research will continue beyond this date, complete the relevant portions of the IRB Renewal Application. If you wish to modify the application, complete the Modification of an Approved Protocol Form. Changes in this study cannot be initiated without IRB approval, except when necessary to eliminate apparent immediate hazards to participants. When the study closes, complete the appropriate portions of the IRB Request for Study Closure Form.

Please use reproductions of the IRB approved stamped consent forms to provide to your participants.

Should you need to submit any further correspondence regarding this proposal, please include the above application number.

Good luck with your research.

Sincerely,

Carpantia T. Myles, MSM, CIM, CIP
Director, Research Compliance Officer

358 Rose Administration Building
Box 870127
Tuscaloosa, Alabama 35487-0127
(205) 348-8461
FAX (205) 348-7189
TOLL FREE (877) 820-3066

Office for Research

Institutional Review Board for the
Protection of Human Subjects

THE UNIVERSITY OF
ALABAMA
RESEARCH

August 4, 2015

Edward Quin
Department of Anthropology
College of Arts and Sciences
Box 870210

Re: IRB # 15-OR-235: "Discrimination, Cultural Consonance, and Cell-Mediated Immunity among College Students"

Dear Mr. Quinn,

The University of Alabama Institutional Review Board has granted approval for your proposed research.

Your application has been given expedited approval according to 45 CFR part 46. Approval has been given under expedited review Categories 5 and 7 as outlined below:

(2) Collection of blood samples by finger stick, heel stick, ear stick, or venipuncture as follows: (a) from other adults and children, considering the age, weight, and health of the subjects, the collection procedure, the amount of blood to be collected, and the frequency with which it will be collected.

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

Your approval will expire on August 3, 2016. If the study continues beyond that date, you must complete the IRB Renewal Form within e-Protocol. If you modify the application, please complete the IRB Revision Form. Changes in this study cannot be initiated without IRB approval, except when necessary to eliminate apparent immediate hazards to participants. When the study closes, please complete the Final Report Form. ***Please use reproductions of the IRB-stamped consent form.***

Should you need to submit any further correspondence regarding this application, please include the assigned IRB approval number.

Good luck with your research.

Stuart Usdan, Ph.D.
Chair, Non-Medical Institutional Review Board

cc: Dr. Jason DeCaro

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