

THE ROLE OF SOCIAL SUPPORT ON  
ACCULTURATION STRESS AND ALLOSTATIC LOAD  
AMONG FIRST- AND SECOND-GENERATION  
IMMIGRANT COLLEGE STUDENTS

by

LISA GARSMAN

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Karen D'Alonzo, PhD, RN, APNC, FAAN

and approved by

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## ABSTRACT OF THE DISSERTATION

### The Role of Social Support on Acculturation Stress and Allostatic Load Among First- and Second-Generation Immigrant College Students

By LISA GARSMAN

Dissertation Director:

Karen D'Alonzo, PhD, RN, APNC, FAAN

**Purpose:** This study examined the relationship between acculturation stress and allostatic load, and the effect of social support on this relationship among first- and second-generation immigrant college students.

**Rationale:** Research suggests acculturation stress may be a contributing factor to chronic health problems such as obesity, hypertension, Type 2 diabetes, and cardiovascular disease. Numerous studies have explored the effects of general stress on mental and physical health, but less is known about the cumulative effect of acculturative stress on the body's physiologic processes, referred to as allostatic load. Previous studies have indicated that factors such as cumulative exposure to chronic stress, age of arrival, and time living in the United States all contribute to higher levels of allostatic load in new immigrants. There is strong evidence of the stress-buffering effects of social support

specifically regarding acculturative stress. However, to date little is known about the effects of social support on acculturative stress and allostatic load.

**Methods:** A sample of 73 first- and second-generation immigrant undergraduate college students were recruited from Saint Peter's University, an ethnically diverse college in Jersey City. Independent variables were measures of acculturative stress, level of acculturation, perceived social support, and perceived general stress. Blood biomarkers were collected and analyzed to calculate a composite score index as a measure of allostatic load as the dependent variable. **Results:** Acculturation stress was lower among individuals who indicated their level of acculturation as being either assimilation or integration. Although the results of the regression with acculturative stress as the predictor of total allostatic load was not significant, acculturative stress significantly predicted systolic and diastolic blood pressure. Friends' social support and acculturative stress did significantly predict allostatic load, with higher levels of social support decreasing allostatic load.

**Conclusions:** There is increasing evidence that immigrant students who are marginalized may experience higher levels of acculturative stress compared to those who are more integrated. The results of this study add to previous findings that higher social support is associated with lower allostatic load. Future research using longitudinal designs is necessary to examine health behaviors relating to immigration and their influence on allostatic load.

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## DEDICATION

To my husband Jay and my sons, Ian and Ethan, I dedicate this work, for their endless love and support throughout this dissertation journey. I realize the sacrifices you made, which allowed me to achieve my goals. Words cannot express how grateful and proud I am to have my beautiful family who never stopped believing in me.

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## CHAPTER ONE: DISCUSSION OF THE PROBLEM

Increasing evidence has suggested that cumulative, persistent psychological and physiological stress contributes to poor mental and physical health, chronic diseases, and overall health disparities, especially among disadvantaged individuals (Beckie, Groer, & Beckie, 2012). For the past 50 years, the United States has experienced multiple waves of immigration from countries all over the world. The increasing globalization of the US population is particularly evident in the changing face of today's college student.

According to the National Center for Educational Statistics (NCES, 2015), the total enrollment rate (defined as the percentage of 18-24 year-olds enrolled in colleges and universities) at 2-4-year colleges/universities increased from 32% in 1990 to 40% in 2013. Of particular note, the total enrollment rate for Hispanic 18-to-24-year-olds during this time period increased from 23% to 34%, with a 62% total college enrollment for Asians. A significant percentage of students who are ethnic and/or racial minorities are likely to be first- (foreign-born) or second-generation (children of foreign-born parents) immigrants. In a study by Schwartz et al. (2011), among 30 diverse colleges and universities across the U.S., the researchers found that 26% of the students surveyed reported both of their parents were born outside of the U.S., and these figures may be even higher in community colleges.

In the immigration literature, there is a strong argument that the term *immigrant* should include not only individuals born in another country (first-generation), but also US-born children of foreign parents or second-generation immigrants (Portes & Rumbaut, 2001). There is ample evidence that immigrants of all ages may experience higher levels of psychological stress as they encounter various environmental and social

stressors in the host country. These stressors include language barriers, racism and discrimination, separation from family, and fear of deportation (Arbona et al., 2010). Second-generation immigrants also face the challenges of balancing their cultural heritage and customs with American cultural practices. These shared experiences may in part be explained by the normative process of acculturation, defined as the cultural and psychological changes that groups or individuals undergo when there is contact between two or more cultural groups (Berry, 2005). Acculturation is further defined as a dynamic, bidirectional process of adaptation to stress and the individual's coping mechanisms in response to stress (Berry, 2013). Immigrant individuals generally fall into one of four patterns of acculturation: (a) assimilation—individuals replace the norms of their culture of origin with the culture norms from the host culture; (b) separation—individuals reject the host cultural orientation while preserving the culture of origin; (c) integration—individuals combine aspects of both the culture of origin and the host culture; and (d) marginalization—individuals become alienated from both the host culture and culture of origin by rejecting both cultures (Berry, Kim, Minde, & Mok, 1987). In the process of acculturation, negative experiences may become so unpleasant that they are no longer viewed as normative and are more appropriately classified as examples of acculturation stress.

Acculturative stress is a “more specific concept than acculturation” (Hovey, 2000a, n.p.) and refers to a “reduction in health status” resulting from the process of acculturation (Berry et al., 1987, p. 492). Many first- and second-generation immigrants, especially those who are adolescents and young adults, are conflicted between preserving norms and values from their native country and adopting those of the host country,

resulting in acculturation stress. Conflicts may arise between such individuals and their parents over retention of the language and practices of their culture. An immigrant adolescent's attempts to "fit in" can create a rift in the family and lead to a subsequent breakdown in communication with his/her parents, ultimately leading to the teenager's engagement in risk-taking behaviors with peers. Unhealthy lifestyle behaviors such as smoking, drug use, and alcohol use have been identified as coping mechanisms which adolescents may adopt in an attempt to manage acculturation stress (Finch & Vega, 2003; Kulis, Marsiglia, & Nieri, 2009; Zamboanga, Schwartz, Jarvis, & Van Tyne, 2009).

Although studies on the effects of general stress on mental and physical health are found extensively throughout the literature, less is known about the cumulative effects of acculturative stress on the body and its physiologic processes, referred to as allostatic load (AL). Numerous studies have shown that factors such as cumulative exposure to chronic stress, age of arrival, and time living in the United States all contribute to higher levels of AL in new immigrants (Arevalo, Tucker, & Falcon, 2014; Kaestner, Pearson, Keene, & Geronimus, 2009; McClure et al., 2015). While high levels of acculturative stress are often associated with individuals who have newly arrived, their level of acculturative stress may persist indefinitely if immigrants do not experience a better quality of life than they had prior to migration (D'Alonzo, Johnson, & Fanfan, 2012). Using a framework of allostatic load, acculturative stress may be a contributing factor to chronic health problems such as obesity, hypertension, Type 2 diabetes, and cardiovascular disease seen among immigrants (Finch, Hummer, Kol, & Vega, 2001; Katz, Sprang, & Cooke, 2012; O'Brien, Alos, Davey, Bueno, & Whitaker, 2014).

### **Acculturative Stress, Generational Status, and Allostatic Load**

Although the conceptual definitions of acculturation and acculturative stress are clear, the operational definitions of the two terms are more ambiguous. Several studies have used acculturation measures as a proxy for acculturative stress; others have argued that the construct of acculturation is confounded with acculturative stress (Caplan, 2007; Rudmin, 2009). In the early stages of concept development, stressors associated with the process of acculturation were not perceived as either positive or negative. Subsequently, the concept of acculturative stress was defined in general terms as the stress that directly results from and has its source in the acculturation process. Accordingly, individuals who perceive acculturative stressors as threatening tend to report greater levels of acculturative stress, compared to those who view the negative experiences as opportunities (Hovey & Magaña, 2002). Nonetheless, strong evidence throughout the literature has supported the association of acculturative stress with both negative psychological and physical health outcomes (Cervantes & Cordova, 2011; Hwang & Ting, 2008; Torres, Driscoll, & Voell, 2012). Likewise, chronic stress has specifically been linked with increased visceral adiposity and increased risk for metabolic syndrome (Aschbacher et al., 2014; Marniemi et al., 2002; Pyykkonen et al., 2010). Abdominal adiposity and insulin resistance, both key features of metabolic syndrome, markedly increase an individual's risk for cardiovascular disease and Type 2 diabetes. Results from the 19-year Whitehall II study (Brunner, Chandola, & Marmot, 2007) showed that chronic work stress predicted both general and central obesity. Therefore, persistent acculturative stress may contribute to increased rates of obesity and metabolic syndrome in first- and second-generation immigrants.

Several factors can affect the level of acculturative stress, including age at time of immigration. Several early studies have shown that level of acculturative stress was related to generational status, with first-generation individuals experiencing higher levels of acculturative stress than second-generation (Hovey & King, 1996; Lueck & Wilson, 2011; Mena, Padilla, & Maldonado, 1987; Padilla, Alvarez, & Lindholm, 1986). Although all immigrants experience varying degrees of acculturation stress, adolescents who immigrated to the United States as young children (often referred to as the “1.5” generation) and children of first-generation immigrants (also known as second-generation immigrants) may experience acculturation stress in unique ways (Portes & Rumbaut, 2001). This is especially true for immigrant college students struggling to develop their own social infrastructure and identity within the university setting (Gomez, Miranda, & Polanco, 2011; Schwartz et al., 2011). Today more than ever, many immigrant college students come from economically disadvantaged backgrounds and are likely to be the first in their family to attend college. Consequently, these students experience greater financial and academic stress, compounded by increased levels of acculturation stress. All of these factors may contribute to the development of allostatic load.

There is strong evidence in the literature linking acculturation stress with measures of AL. Kaestner et al. (2009) found that 45- to 60-year-old Mexican immigrants had lower allostatic load scores upon arrival than US-born Mexican Americans, non-Hispanic Whites, and non-Hispanic Blacks. Consistent with what has been labeled “the Hispanic Paradox” (Corlin, Woodin, Thanikachalam, Lowe, & Brugge, 2014), this health advantage lessened with duration of residence in the United States. An underlying assumption is that immigrants have healthier lifestyles prior to coming to the United

States, but as their time here increases, this health advantage diminishes (Albrecht et al., 2013; Doamekpor & Dinwiddie, 2015). A similar process, dubbed the “healthy immigrant effect,” has been reported in several other immigrant populations (Kennedy, Kidd, McDonald, & Biddle, 2015). Chronic stress does appear to play a role in the deterioration of health outcomes seen in immigrant populations. Gallo, Jiménez, Shivpuri, Espinosa de los Monteros, and Mills (2011) explored the relationship between chronic stress and AL in middle-aged Mexican American women. The researchers reported that Mexican American women with multiple stressors were significantly more likely to have higher AL scores than Mexican American women without these stressors. Theorists have proposed that the cumulative wear-and-tear of physiological responses manifests across multiple systems (Gallo et al., 2011). As a result of this chronic physiologic dysregulation, increased AL can lead to obesity, atherosclerosis, hypertension, and cardiovascular disease. Because AL provides direct measures of biological outcomes rather than relying on the individuals’ own self-report as a measure of their health, it is thought to be a far better predictor of stress-related chronic disease.

The term *allostasis* refers to the ongoing adaptive efforts of the body to maintain stability (homeostasis) in response to stressors (Juster, McEwen, & Lupien, 2010). In order to maintain normal function and stability, an organism responds through multiple physiologic systems. When an individual experiences real or perceived stress, acute and chronic changes occur in the stress system. These repeated responses cause chronic dysregulation of the HPA axis (hypothalamic-pituitary-adrenal axis), the autonomic nervous system, and the immune system. This physiological wear-and-tear on the body as a result of the constant response to stressors is referred to as allostatic load (AL)

(McEwen, 1998a). Individuals differ in how they perceive a stressful situation as a threat. An individual's physiologic response may be determined by different factors including behavioral (coping mechanisms), life experiences (trauma/abuse, major life events), stage of development, and genetics (Juster et al., 2010). AL can accumulate and increase in several ways: (a) *Frequent stress*—the stressor is repeated for an extensive length of time; (b) *Inadequate response*—the efficacy of the response diminishes over time as the stress continues; and (c) *Failed shut-down*—the stressor response fails to recognize the stressor has resolved (McEwen, 2008a). Any or all of these mechanisms may be responsible for increased AL among first- and second-generation immigrants.

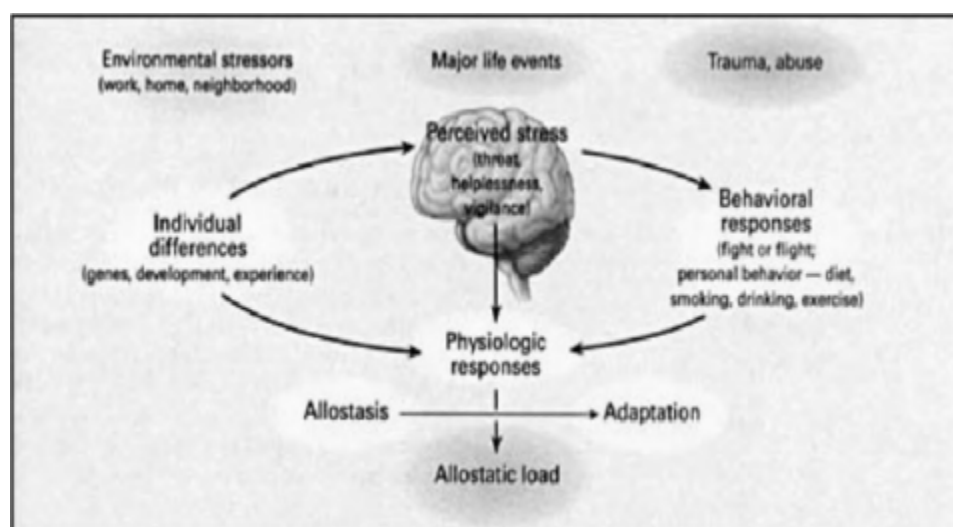


Fig. 1. The allostatic load model (McEwen, 1998a)

### Obesity and Allostatic Load

Allostatic load is made up of a composite index of biomarkers, including anthropometric measures (waist circumference, body mass index, waist-to-hip ratio) which serve as indicators of obesity. Rates of obesity have been steadily increasing in the United States (Ogden, Carroll, Kit, & Flegal, 2014), and stress has been identified as a potential risk factor, particularly for new immigrants. Studies have shown that

immigrants are less likely to be overweight on arrival to the United States than native-born individuals, but their risk for obesity increases over length of time here (Roshania, Narayan, & Oza-Frank, 2008). Rates of obesity among children and adolescents in the United States have continued to rise, despite major efforts in the public health arena to address this issue. Data from 2011-2012 have indicated that 31.8% of youth in the United States were either overweight or obese, with 17% being obese (Ogden et al., 2014). There are marked differences in adolescent obesity rates among certain racial and ethnic groups, with non-Hispanic Black, Mexican American, and Hispanic adolescents having higher obesity rates than non-Hispanic Whites (Fialkowski et al., 2015). Childhood obesity predisposes children for several chronic diseases, including hypertension, Type 2 diabetes mellitus, and cardiovascular disease (CVD).

Obesity in late adolescence is associated with a comparable mortality risk as an adult to that of an individual who is a heavy smoker (Neovius, Sundström, & Rasmussen, 2009). Immigrant adolescents may adopt unhealthy behaviors (smoking, high-calorie diet with excess sugar, sedentary lifestyle) as a means of coping with acculturation stress, resulting in increased rates of obesity. The number of first- and second-generation immigrant Hispanic and Asian groups is increasing, with Asian Americans becoming one of the fastest growing minority groups in the United States. Studies looking at factors that may contribute to increased rates of obesity among immigrant Hispanic youth are evident in the literature, but little research has focused on causes of obesity among Asian Americans (Fialkowski et al., 2015). Consistent with the “Healthy Immigrant Effect” (Corlin et al., 2014), Asian immigrants appear to have much lower risks of developing cardiovascular diseases and Type 2 diabetes on arrival. However, this protective effect

seems to decrease with time in the United States. Particularly with regard to weight gain, some researchers refer to this post-immigration trend as “the negative acculturation effect.” One premise is that immigrants may discard previous dietary preferences and cultural practices from their home countries, and adopt “Western” diets and norms (Ro, 2014).

Past studies have shown that generational status and number of years of residing in the United States are associated with a higher incidence of obesity and BMI (Bates, Acevedo-Garcia, Alegría, & Krieger, 2008; Goel, McCarthy, Phillips, & Wee, 2004; Roshania et al., 2008). In the process of acculturation, young immigrants may take on and engage in their host countries’ cultural norms and values sooner than their parents (Crockett et al., 2007). This may in part explain the disproportionate prevalence of obesity among adolescent minority groups. A related factor that may contribute to the increased rates of obesity is the pressure immigrant groups feel “to prove they belong.” A study by Guendelman, Chervan, and Monin (2011) looked at food preferences and choices made by Asian Americans who felt their American identity had been challenged or threatened. Results from the two experiments showed that when faced with a threat to their American identity, Asian Americans chose more prototypical American food, as compared to Asian American participants whose American identity had not been challenged. Individuals who experience subtle challenges to their emerging identity may alter their traditional home country diet for a prototypical American diet as proof of their commitment to their host country. Dietary changes are just one example of behavior adaptation among immigrant adolescents and young adults who may feel pressured to conform to gain acceptance by their US peers.

Sources of acculturation stress for immigrant college students may be more focused on cultural self-consciousness and “fitting in” (Crockett et al., 2007). A more recent study on second-generation US-born Hmong (one of 30 Asian American subgroups) children found the group that was more acculturated in terms of diet and language use had higher total acculturation scores and body mass index (BMI) measures (Franzen-Castle & Smith, 2014).

### **Acculturative Stress and Social Support**

The literature provides strong evidence for the stress-buffering effects of social support (Cohen & Wills, 1985a), specifically with regard to acculturative stress (Crockett et al., 2007; Yeh & Inose, 2003; Zhang & Goodson, 2011). The acculturative stress model identifies social support as a variable that may serve as a “buffer” in reducing the degree to which acculturative stress is experienced (Safdar, Lay, & Struthers, 2003; Williams & Berry, 1991). For immigrants, social support provided by family, peers, and the community can diminish the level of acculturative stress the individual experiences (Finch & Vega, 2003; Martínez García, García Ramírez, & Maya Jariego, 2002). Several studies have examined the relationship between acculturative stress and mental health issues, including depression and suicidal ideation, with social support as a protective factor (Ayers et al., 2009; Cho & Haslam, 2010; Lee, Koeske, & Sales, 2004). The study by Lee, Koeske, and Sales (2004) looked at the relationship between acculturative stress and mental health symptoms and the role of social support as a moderator in a sample of Korean international students living in the United States. Their results demonstrated a strong correlation between acculturative stress and mental health symptoms, with social support as a moderator having a buffering effect on stress symptoms. A study by

Katsiaficas, Suárez-Orozco, Sirin, and Gupta (2013) examined the association between acculturative stress, symptoms of anxiety and depression, and the role of perceived social support in urban first- and second-generation immigrant adolescents. The results showed that social support mediated the relationship between acculturative stress and symptoms of anxiety and depression. To date, however, little is known about the moderating effects of social support on acculturative stress and physical health.

### **Acculturative Stress, Allostatic Load, and Immigrant College Students**

The number of immigrant students being admitted to American universities is increasing (Schwartz et al., 2013). A large percentage of these students are the first in their family to attend college, and lack both the financial and social support to succeed. These students experience greater stress and difficulty adjusting to college life than those who are not first generation to attend college (Rodriguez, Myers, Morris, & Cardoza, 2000; Smedley, Myers, & Harrell, 1993). College students in general deal with several different forms of stress, which include adjusting to college life and academic and economic stressors (Guo, Wang, Johnson, & Diaz, 2011). A study by Stephens, Townsend, Markus, and Phillips (2012) showed increased cortisol levels in students who were the first in their family to attend college, as compared with students whose parents had completed a 4-year college degree. Immigrant college students also appear to be vulnerable to many risky health behaviors, although it is not clearly understood if they adopt these behaviors as a coping mechanism for stress, or if they reflect the individuals' attempts to identify with their U.S. peers. Claudat, White, and Warren (2016) examined acculturative stress, self-esteem, and eating disorders, including bulimic symptoms and body dissatisfaction in Asian American and Latina female college students. Their results

suggested that acculturative stress is associated with increased eating pathology. Acculturative stress among immigrant college students, compounded with academic and general college-related stress, can impact the level of allostatic load and increase the incidence of both psychological and physical health issues. High levels of stress experienced by immigrant and minority college students may also contribute to increased rates of attrition and lower academic performance (Zajacova, Lynch, & Espenshade, 2005). Acculturative stress may include feelings of alienation, isolation, depression, and suicidal ideation (Hovey, 2000a; Hovey & King, 1996; Hovey & Magaña, 2000). This can put added pressure on immigrant college students' social support systems (Gomez et al., 2011). Research has suggested that acculturative stress is associated with predictors of suicidal behavior (Cho & Haslam, 2010), which underscores the need to study this phenomenon among immigrant college students. The overarching aim of this study, then, was to examine the factors associated between level of acculturation stress and allostatic load (AL), and the effect of social support on the relationship between acculturative stress and allostatic load among first- and second-generation immigrant college students.

### **Statement of the Problem**

What are the relationships among acculturation stress, perceived social support, and allostatic load for first- and second-generation immigrant college students?

### **Sub-problems**

1. What is the relationship between acculturation stress and measures of allostatic load among first and second generation immigrant college students?
2. What is the relationship between perceived social support and acculturation stress among immigrant college students?

3. Does social support affect the relationship between acculturation stress and allostatic load?

### **Definition of Terms**

#### **Acculturation**

Acculturation can be defined in a more simplistic manner as the normative changes that groups and individuals undergo when they come in contact with another culture (Berry et al., 1987). As a concept, acculturation has been further explicated to include psychological acculturation, which refers to “changes in an individual who is a participant in a culture contact situation, being influenced both directly by the external culture, and by the changing culture of which the individual is a member” (Berry, 2013, p. 200). Acculturation is operationally defined as a participant’s score on the Acculturation, Habits, and Interests Multicultural Scale for Adolescents (AHIMSA).

#### **Acculturative Stress**

Acculturative stress is a “more specific concept than acculturation” (Hovey, 2000a, n.p.) and refers to the stress reaction resulting from the process of acculturation (Berry, 2005). For many individuals, the process of acculturation can be stressful due to factors such as language barriers, discrimination, lower socioeconomic status, lack of social support, and conflicts between family values and the new culture. Acculturative stress can be defined as “a reduction in the health status of individuals, and may include physical, psychological and social aspects,” of which the source of the stressors identified result from the process of acculturation (Berry et al., 1987, p. 200). Acculturative stress is operationally defined as a participant’s score on the Social, Attitudinal, Familial, and Environmental Scale (S.A.F.E.).

## **Allostasis**

Allostasis is defined as the ongoing process by which an organism adapts to physical and psychological stressors to maintain homeostasis (McEwen & Gianaros, 2010). It was first described by Sterling and Eyer (1988) as the “regulatory process of approximating biological functioning to environmental demands to preserve physiological stability” (n.p.).

## **Allostatic Load**

Allostatic load (AL) is described as cumulative wear-and-tear on the body’s system as a result of repeated activation of allostatic responses to stressful situations, which can lead to illness (Juster & Lupien, 2012; Juster et al., 2010; McEwen & Gianaros, 2010). In stressful situations, several physiological responses are elicited, which include the release of multiple stress hormones. The hypothalamic-pituitary-adrenal (HPA) and sympathetic-adrenal-medullary (SAM) systems are activated when exposed to real or perceived stressful situations. The release of catecholamines, glucocorticoids, and stress hormones epinephrine, norepinephrine, and cortisol initiates the “fight-or-flight response” (Juster et al., 2010). The physiologic parameters reflecting AL are divided into primary mediators, secondary outcomes, and tertiary outcomes. Norepinephrine, a primary mediator, increases blood pressure and heart rate, which are defined as secondary outcomes. Hypertension, diabetes, and atherosclerosis are considered tertiary outcomes which result from the cumulative effect of AL (Katz et al., 2012). Allostatic load is operationally defined as a calculated total score index based on cardiovascular, metabolic, and anthropometric biomarkers. Body mass index (BMI),

defined as weight in kilograms divided by height in meters squared and waist-to-hip ratio, will serve as anthropometric biomarkers and indicators of obesity. National Institute of Health (NIH) guidelines defines obesity as  $BMI \geq 30 \text{ kg/m}^2$  (NIH, National Heart, Lung, and Blood Institute, & North American Association for the Study of Obesity, 2000).

### **Social Support**

Perceived social support is theoretically defined as “the psychological and material resources available from an individual’s interpersonal relationships” (Rodriguez & Cohen, 1998, p. 535). Social support is operationally defined as a participant’s score on the Multidimensional Scale of Perceived Social Support (MSPSS).

### **Generation**

Individuals are defined as first-generation immigrants if born outside of the United States; second-generation immigrant individuals are born in the United States with at least one foreign-born parent (Rumbaut, 2004). Immigrant youth who arrived in the United States as children or young adolescents are often referred to as the 1.5 generation (Almeida et al., 2015).

### **Delimitations**

The literature indicates that chronic psychosocial stress and the physiological dysregulations that occur can influence health risks. In children and young adults, measurable allostatic load could be an early warning sign of accumulating health risks. Young adulthood is therefore a pivotal time to make changes in lifestyle choices and health behaviors that can dramatically impact an individual’s lifetime risk. Therefore, this study included English-speaking, first- and second-generation immigrant undergraduate college students between 18 to 28 years of age.



### **Significance of the Study**

Although several studies on adolescents and allostatic load can be found in the literature, there is a paucity of information on college-age students, particularly those who are first- or second-generation immigrants. College students in general are required to cope with multiple stressors, which include academic, economic, social, and developmental issues. Many students are separated from sources of support such as family and friends, compounding these stressors. Numerous studies have found that college-related stress has an inverse relationship with academic performance, including immigrant college students (Buddington, 2002). Many immigrant college students are at increased cumulative risk due to both psychosocial factors (lower income and parent education, separation from one or both parents, and exposure to violence) as well as physical factors (substandard housing and crowding). A study by Evans (2003) showed that allostatic load increased among school children exposed to similar elevated cumulative risk factors. Allostatic load (AL) has been identified as a predictor of cardiovascular disease (CVD) and an underlying risk for other co-morbidities and mortality (Karamangla, Singer, McEwen, Rowe, & Seeman, 2002; Seeman, McEwen, Rowe, & Singer, 2001; Seeman et al., 2010). An additional stressor for many immigrant students is that they are the first in their family to attend college, which may increase their risk. A study by Stephens et al. (2012) compared college students who were first in their family to attend college (first-generation students) with students who had at least one parent who had attended college (continuing-generation). Study results demonstrated greater increases in cortisol and negative psychosocial effects in first-generation students. Young adults measures' of allostatic load (AL) could be an early warning sign of

accumulating health risks; making early changes in lifestyle choices and health behaviors could dramatically change a patient's lifetime risk. By targeting the antecedents of AL for adolescents and young adults at critical periods of development, researchers can develop tailored interventions for reducing allostatic load.

## **CHAPTER TWO: REVIEW OF THE LITERATURE**

The relationships among acculturative stress, social support, and allostatic load were examined in this research. This chapter discusses the theoretical and empirical support for these relationships. The model of acculturative stress is presented in the first section. The second section discusses the concept and theoretical framework of allostatic load. In the third section, theoretical support for the concept of social support is provided. The last section presents empirical support for relationships among acculturative stress, social support, and allostatic load, followed by the hypotheses that were tested in this research.

The conceptual frameworks for acculturation stress and allostatic load were used to examine the relationships among acculturation stress, social support, and allostatic load among first- and second-generation immigrant college students. A review of empirical literature is presented to support the cumulative impact of stress, particularly acculturative stress on allostatic load, and the effect of social support.

### **Theoretical Rationale**

#### **Acculturative Stress Model**

Berry and Kim (1988) developed a theoretical model of acculturative stress based on cultural and psychological factors and the relationship among three concepts: Acculturation Experience, Stressors, and Acculturative Stress. Their conceptual framework posits that the level of acculturative stress experienced is influenced by several moderating factors (Williams & Berry, 1991). In their model, the researchers included factors such as family support, socioeconomic status, knowledge of the new language, multiculturalism, and the ability to assimilate (Hovey, 2000b). On the left side

of the model (illustrated in Figure 2), individuals experience acculturation in varying degrees and situations. The center of the model depicts the varying stressors that may occur as a result of the acculturation experience. The right side indicates varying levels of acculturative stress resulting from the acculturation experience and stressors (Berry et al., 1987). Berry and Kim's model includes five moderating factors that influence the relationship among the three concepts. These moderating factors are: (a) Mode of acculturation, (b) Phase of acculturation, (c) Nature of larger society, (d) Characteristics of acculturating group, and (e) Characteristics of acculturating individual.

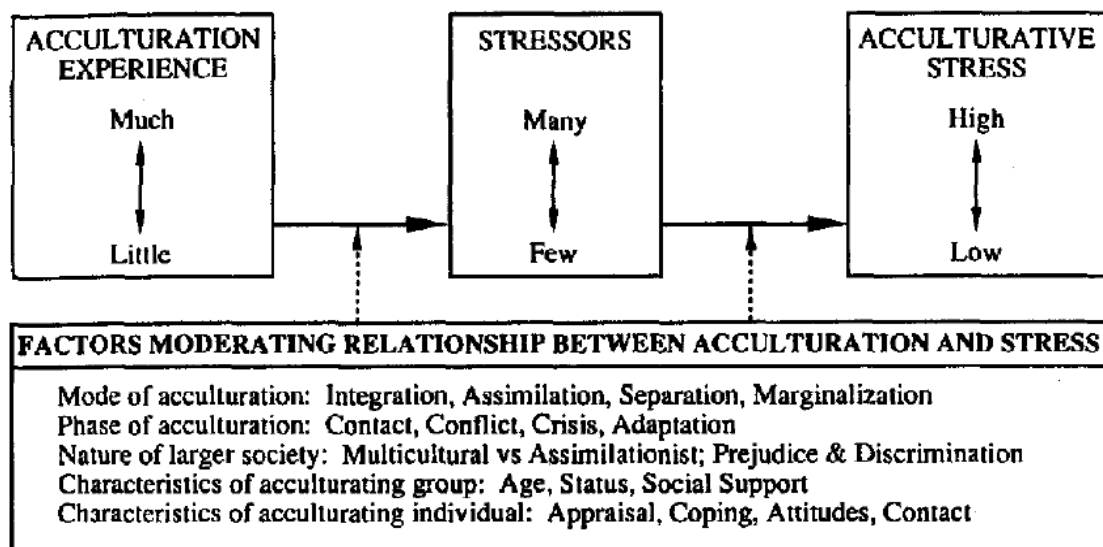


Figure 2. Model of acculturative stress (Berry et al., 1987)

The acculturation process varies among individuals. For some, the process may take months or years, while in others, the acculturation process may take several generations. Berry and Kim (1988) described the stress building up over a period of time until adaptation occurs, as proposed in the U-curve theory. Empirical work on the well-known U-curve theory of cross-cultural adaptation initiated by Lysgaard (1955) stated:

Adjustment as a process over time seems to follow a U-shaped curve: adjustment is felt to be easy and successful to begin with; then follows a “crisis” in which one feels less well-adjusted, somewhat lonely and unhappy; finally one begins to feel better adjusted again, becoming more integrated into the foreign community.  
(p. 50)

Oberg (1960) further described the stages of the U-curve theory as four stages beginning with: the “honeymoon” stage, followed by a period of “disillusionment” or “culture shock.” The third stage is gradual adaptation or “transition” to the cultural norms of the new culture, and the final stage is “adjustment” and integration into the new culture.

Despite numerous studies supporting the U-curve theory, many have criticized the theory as being more descriptive of the four stages rather than a theoretical framework (Black & Mendenhall, 1991; Ward, Okura, Kennedy, & Kojima, 1998). A study by Tartakovsky (2009) explored the cultural identities of Jewish adolescents from Russia/Ukraine who immigrated to Israel without their parents. The 3-year longitudinal study covered both the pre-migration and post-migration period. The results of the study showed curvilinear changes in cultural identity during immigration. Following a U-curve, psychological well-being (self-esteem, body image, school competence, and social competence) was highest during pre-migration, followed by a decline in the first year after immigration, and improving in the third year after immigration. A similar study done by Markovizky and Samid (2008) examined the relationship between length of residence and

psychological adjustment of new immigrants from the Soviet Union during their first 2 years in Israel. The results partially supported the three-stage U-curve social adjustment model, beginning with stage one, Deterioration. The second stage of Low Well-Being occurs between 5 and 11 months, followed by the third and final stage of Recovery. Other studies have demonstrated psychological distress among immigrants during the first 5 years after migrating, with higher levels of psychological distress in the second and third year (Mirsky, 2009).

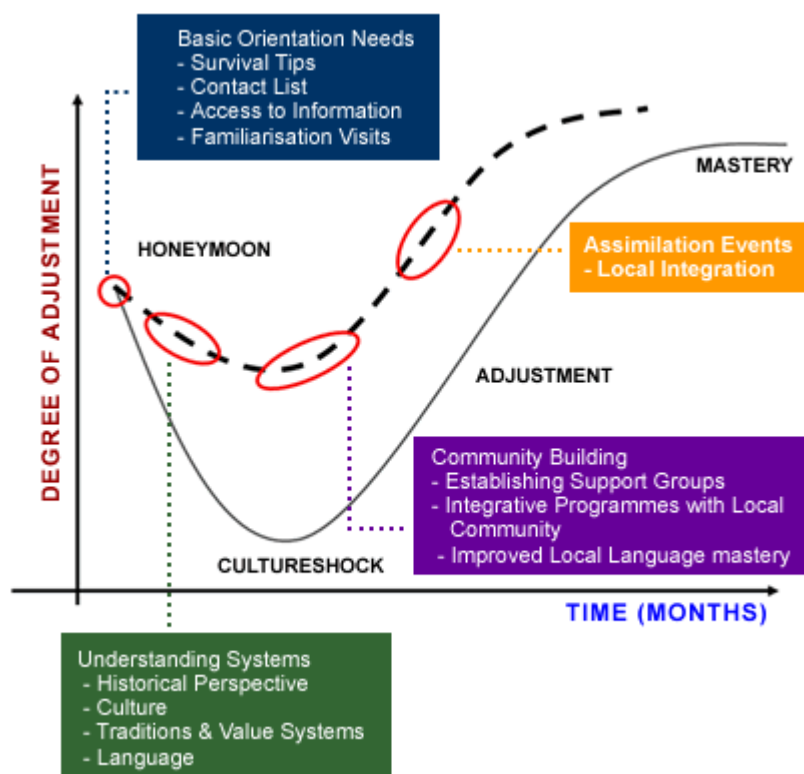


Figure 3. Lysgaards' U-Curve of Cultural Adjustment

### Allostasis and the Allostatic Load Framework

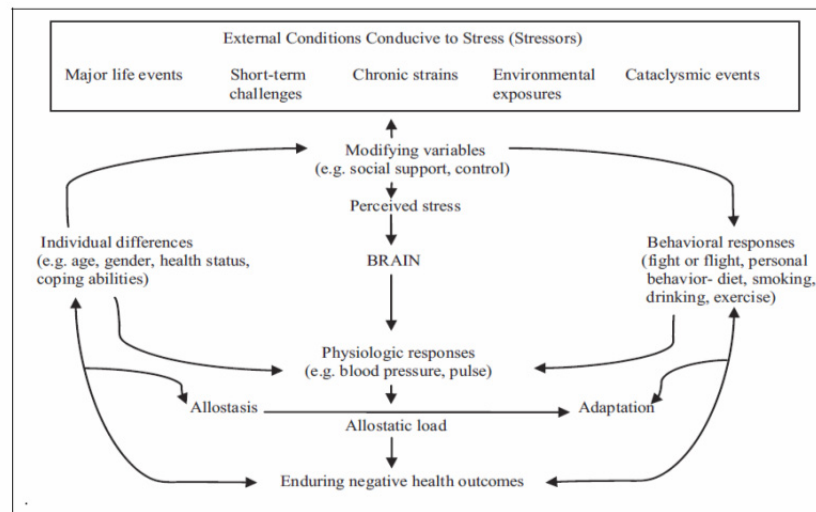
A review of stress theories and empirical evidence linking stress and disease are found throughout the literature (Gunnar & Quevedo, 2007; Miller, Chen, & Zhou, 2007;

Schneiderman, Ironson, & Siegel, 2005; Segerstrom & Miller, 2004). Despite the evolution of humans, the “fight or flight” response remains, even though the environmental threats (e.g., predators) which threatened survival may no longer exist. Situations that an individual finds mentally, physically or emotionally stressful may trigger a broad array of physiological responses. Allostatic load can be used as a conceptual framework (illustrated in Figure 4) to examine and measure the effects of acculturative stress and social support among first- and second-generation immigrant college students. The concept of allostasis as first presented by Sterling and Eyer (1988) provided an explanation for the ill effects of prolonged stress, resulting in increased morbidity and disease trajectories. The researchers described allostasis as the process by which physiological stability is maintained by changing its “internal milieu” to match environmental demands (Sterling & Eyer, 1988). Allostasis can be further defined as “stability through change,” or adaptation when faced with real or perceived threat, which activates neural, neuroendocrine, and neuroendocrine-immune systems (McEwen, 1998b). AL is described as cumulative wear-and-tear on the body’s system as a result of repeated activation and deactivation of allostatic responses to stressful situations (Juster et al., 2010; McEwen & Gianaros, 2010; McEwen & Wingfield, 2003). In stressful situations, several physiological responses are elicited, which include the release of multiple stress hormones. These stress hormones allow the body to respond to threatening situations (e.g., the “fight or flight” response) (McEwen & Gianaros, 2010). Individuals interpret and respond differently to stress, which ultimately determines resilience or vulnerability to stress-related illness. The problem arises with individuals who experience chronic stress and have allostatic systems that do not completely turn off, which results in

constant release of stress hormones (Kaestner et al., 2009). The impact of the chronic stress and increase in allostatic load predisposes individuals to develop chronic illnesses and health disparities. The AL model involves measuring multisystem interactions and biomarkers, and incorporating an allostatic load index representing neuroendocrine, immune, metabolic, and cardiovascular system functioning (Juster et al., 2010).

Examples of biomarkers that have been repeatedly used in AL studies include:

Neuroendocrine-cortisol, Dehydroepiandrosterone (DHEA-S); Immune-C-reactive protein, fibrinogen; Metabolic-total cholesterol, triglycerides, glycosylated hemoglobin (HbA1c); Cardiovascular-Systolic blood pressure, Diastolic blood pressure; Anthropometric-waist-to-hip ratio (higher levels represent greater adipose fat distribution); and body mass index (BMI, represents a proxy measure of an individual's relative body fat percentage with three different classifications of obesity) (Juster et al., 2010).



*Figure 4.* The stress response and development of allostatic load.  
Adapted from McEwen (1998a) and Israel and Schuman (1990).  
Adapted with permission from Massachusetts Medical Society, © 1998  
and from Jossey-Bass, respectively.

### **Empirical Support for the Relationship Among Acculturation, Acculturative Stress, and Generational Status**

As previously noted, several studies in the literature have demonstrated that immigrants have better health on arrival to the United States yet experience a decline in health as their length of residence increases (Albrecht et al., 2013; Bates et al., 2008; Koya & Egede, 2007; Oza-Frank & Venkat Narayan, 2010; Ro, 2014; Roshania et al., 2008). Research has also suggested that age of arrival to the United States is a strong determinant for an individual's risk of weight gain (Kaushal, 2009). In a study of immigrant adults aged 18-74 years old, the researchers found the odds of being overweight were three times higher in migrants from Mexico, South America, Europe, Russia, Africa, and the Middle East who had lived in the U.S. for 15 years or more than for individuals who had lived in the United States for less than 5 years (Oza-Frank & Venkat Narayan, 2010). Previous studies found that immigrants who were 20 years old or less at the time of immigration, and who had resided in the United States for 15 years or more, were 11 times more likely to be overweight/obese than immigrants who arrived before the age of 20 and resided in the U.S. less than 1 year (Roshania et al., 2008).

A study by Bates et al. (2008) explored the distribution of BMI and obesity among first-, second-, and third-generation Latinos and Asian Americans. The results from their study suggested that generational status is associated with increased BMI and obesity. Patterns of obesity rates are particularly alarming among immigrant adolescents. There is a disparity in adolescent obesity rates among certain racial and ethnic groups, with non-Hispanic Black, Mexican American, and Hispanic adolescents having higher obesity rates than non-Hispanic Whites. Childhood obesity predisposes children for several chronic diseases, including hypertension and cardiovascular disease (CVD). Five

of the 12 articles reviewed explored the association of acculturation and obesity in adolescents (Fialkowski et al., 2015; Franzen-Castle & Smith, 2014; Popkin & Udry, 1998; Schaefer et al., 2009). Popkin and Udry (1998) analyzed data from the National Longitudinal Study of Adolescent Health survey. Their results showed that second-generation (born in the United States) Asian American and Hispanic adolescents are more than twice as likely to be obese as first-generation adolescents.

A more recent study explored environmental, personal, and behavioral influences on BMI and acculturation status among second-generation Hmong children (Franzen-Castle & Smith, 2014). Their results showed acculturation and BMI to be positively associated. Although lower rates of obesity and overweight for Asian Americans have been reported using the WHO global standard cutoff points ( $25\text{kg/m}^2$ ) when compared with other groups, a study using the lower WHO-recommended BMI standard cutoff for Asian Americans ( $23\text{kg/m}^2$ ) found that 32% of their sample of Vietnamese American students were overweight (Choi, Hwang, & Yi, 2011). Moreover, nativity and years living in the United States were significantly associated with weight. Foreign-born Vietnamese American students were less likely to be overweight than the US-born; however, as length of time of residence increased, the foreign-born students became more overweight at a faster rate than the US-born.

Although acculturation is sometimes used as a proxy for acculturative stress (Caplan, 2007), empirical evidence has suggested that it is not the acculturative process itself, but the stress of adapting to life in a new country that has the greatest impact on the physical and emotional health of Latino immigrants. Despite a general assumption by many researchers of the inverse relationship between level of acculturation and

acculturative stress, several studies in the literature have disputed this association (Cuellar, Bastida, & Braccio, 2004; Gil & Vega, 1996; Hovey & King, 1996).

### **Empirical Support for the Relationship Between Acculturative Stress and Allostatic Load**

Immigrants of different racial/ethnic groups often experience significant socioeconomic stressors upon arrival to the United States (Crimmins, Soldo, Ki Kim, & Alley, 2005; Doamekpor & Dinwiddie, 2015; Peek et al., 2010). There is strong evidence in the literature suggesting that social determinants such as race, ethnicity, education, and income are related to allostatic load. In six of the nine studies reviewed, the findings suggested that individuals who experience multiple socioeconomic stressors such as chronic poverty, limited educational opportunities, and unemployment have higher allostatic load indexes (Brody et al., 2013; Chao et al., 2014; Gruenewald et al., 2012; Hickson et al., 2012; McEwen & Gianaros, 2010; T. Seeman, Epel, Gruenewald, Karlamangla, & McEwen, 2010).

Hickson et al. (2012) looked at socioeconomic status (SES) patterning of allostatic load in African American adults. Though not immigrants, their results suggested lower education and income were associated with higher AL scores in African American adults. Similarly, Gruenewald et al. (2010) examined whether AL levels were higher in those adults who experienced disadvantaged SES from childhood through adulthood. The researchers analyzed data from 1008 participants (92.2% White) from the Biomarker Sub study of the Study of Midlife in the US (MIDUS). Their findings suggested that individuals who experienced disadvantaged SES throughout the lifespan had higher AL measures, resulting in increased risk of negative health outcomes and development of chronic health conditions (Gruenewald et al., 2012).

The inverse association between socioeconomic status (SES) and chronic health conditions such as cardiovascular disease, hypertension, and its associated risk factors (obesity, Type 2 diabetes) is well documented in the literature (Myers, 2009). Likewise, there is ample evidence that cardiovascular disease (CVD) begins early in life, but individuals may not experience a major event until adulthood. This is concerning, as obesity and Type 2 diabetes, two major risk factors for CVD, have been increasing in children and adolescents (Goodman, McEwen, Huang, Dolan, & Adler, 2005). A study of adolescents by Goodman et al. (2005) explored the associations between social status (lower parent education) and biomarkers of cardiovascular risk. Their results suggested that lower parent education is associated with increased cumulative risk in adolescents, predisposing them to future cardiovascular risk as adults.

The literature supports early childhood poverty as a risk factor for obesity, linking childhood obesity with negative health outcomes such as cardiovascular disease in adults (Wells, Evans, Beavis, & Ong, 2010). In 2014, an estimated 9.5 million children of immigrants lived below the poverty level. Children of immigrants are more likely to live in poverty, experience food insecurity, and live in crowded housing. Today more than ever, many immigrant college students come from economically disadvantaged backgrounds and lack health insurance.

### **Empirical Support for the Moderating Role of Social Support**

A plethora of evidence in the literature indicates that social support has a beneficial effect on an individual's well-being. The buffering model (Cohen & Wills, 1985a) posits that psychological support from family members, friends, and other social resources "buffers" or protects the individual from the negative psychological and

physical health outcomes that can result from multiple stressful events. Evidence of both parental and peer social support have been shown to have a buffering effect on physiological stress reactions among adolescents (Adams, Santo, & Bukowski, 2011; Brody et al., 2013; Brody et al., 2014). In adolescent development, the perception of social support is vital for promoting psychological well-being, especially for adolescent immigrants (Almedom, 2005; Portes & Zhou, 1993). The lack of adequate social resources in addition to multiple environmental stressors can be detrimental for the health of immigrant adolescents. Many immigrant youth live in urban areas and experience overcrowding, noise pollution, crime, and violence, which compound daily stressful life events (Ozer & McDonald, 2006).

Immigrant college students' perceptions of social support may impact the level of acculturative stress they experience. A study by Lee et al. (2004) examined the relationship between acculturative stress and mental health symptoms and the moderating effect of social support. Their results showed a strong correlation between acculturative stress and mental health symptoms, with social support having a moderating and buffering effect. Students with high levels of social support were significantly less likely to report symptoms with increased levels of acculturative stress, as compared to students with low levels of social support. Crockett et al. (2007) found acculturative stress had a negative effect on internalizing symptoms in a sample of Mexican American youth who perceived low social support, compared with individuals who perceived greater social support. The results of their study showed lower levels of anxiety and depression in response to acculturative stress for those who perceived greater social support.

Moreover, evidence in the literature supports the hypothesis that social support and positive social experiences are associated with lower allostatic load (Seeman, Singer, Ryff, Love, & Levy-Storms, 2002a). A more recent study by Seeman, Gruenewald, Cohen, Williams, and Matthews (2014) examined associations between social relationships (social ties, social support, and social strain) with levels of allostatic load. Their results showed that social support and social strains were strongly related to total AL scores, with social ties and emotional support negatively related to AL.

### **Hypotheses**

The following hypotheses were tested to determine the relationships between acculturation and acculturative stress and differences among various racial/ethnic groups:

1. Hypothesis 1: Individuals who have a higher degree of acculturation are more likely to experience lower levels of acculturation stress.
2. Hypothesis 2: Individuals who experience increased levels of acculturation stress will be more likely to have higher scores of total allostatic load.
3. Hypothesis 3: Individuals who are first-generation immigrants will have higher acculturation stress levels and higher scores of total allostatic load than second-generation immigrants.
4. Hypothesis 4: Perceptions of social support will affect the relationship between acculturative stress and allostatic load.

### **CHAPTER THREE: METHODOLOGY**

The first section of this chapter describes the study design, research setting, sample, and sampling method. The instruments and procedure for data collection and analysis used for this study are discussed in the second half of this chapter. This study used a cross-sectional design to examine the relationships among acculturative stress, allostatic load, and social support.

#### **Research Setting**

Subjects who met the eligibility requirements were recruited from among undergraduates attending Saint Peter's University through the Office of Student Life. Saint Peter's University is a Jesuit university located in Jersey City. In keeping with Jersey City's distinction as the most ethnically, racially, and linguistically diverse urban area in the United States, the student body is ethnically, religiously, socioeconomically, geographically, and culturally diverse, representing over 60 national origins. In the undergraduate population, approximately 50% of the students are Federal PELL Grant recipients (based on financial need), 25% are non-native English speakers, 50% are first-generation college students, and 65% come from minority backgrounds (Middle States Self-Study, 2013). The university was selected because of its student diversity evidenced by its ethnically diverse cultural clubs (e.g., A Taste of Africa Student Association, Asian American Student Union, Indian & Pakistan Culture Club, LASO, and Muslim Students Association) and the inception of the Center for English Language Acquisition (CELAC). Recruitment took place through subject pools from all major departments, including CELAC.

## **Sample**

All subjects were English-speaking, self-reported as first- or second-generation immigrants, and were free of injury and chronic illnesses. Pregnant women were also excluded, as fluctuations and elevated biomarker levels are considered normal during pregnancy. A total of 70 subjects were recruited to participate in the study. A priori power analysis was done using the G\*Power analysis program (Faul, Erdfelder, Buchner, & Lang, 2009). The necessary sample size was computed using t-tests between means: differences between two independent groups, with a significance level  $\alpha = 0.05$ , statistical power  $1 - \beta = 0.8$  and effect size  $d = 0.7$ . In a meta-analysis of 33 intervention studies on social support as a protective buffer (Renner, Laireiter, & Maier, 2012; Röhrle & Sommer, 1998), the researchers found a mean effect size of  $d = .71$ . Thus, it was determined that a convenience sample size of 68 total subjects would be needed for the study (Tabachnick & Fidell, 2013).

## **Measures**

### **Dependent Variables**

The purpose of this study was to explore the association between acculturation stress and allostatic load, and the effect of social support among first- and second-generation immigrant students. The dependent variable of this study was allostatic load. More specifically, the outcome for this study was allostatic load, operationally defined as a calculated total score index based on cardiovascular (systolic and diastolic blood pressure), metabolic (total cholesterol, lipid panel, and HgA1c), and anthropometric biomarkers (waist circumference, body mass index, waist-to-hip ratio). Body mass index (measured as weight in kilograms divided by the square of height in meters) served as an

indicator of obesity. NIH (2000) guidelines define obesity as BMI  $\geq 30$  kg/m<sup>2</sup> (see Table 1, BMI classifications). Cholesterol measurements are used in the diagnosis and treatment of disorders involving excess cholesterol in the blood and lipid disorders. Cholesterol is a major cause of coronary heart disease, with the most recent guidelines recommending lipoprotein profiles every 5 years in all adults aged 20 years and older (Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults, 2001). The percent of glycosylated hemoglobin (HbA1c), used to measure long-term blood glucose control, was used as a marker of insulin resistance (Yoshinaga & Kosaka, 1996). A composite AL index score was calculated based on the nine biomarkers. Each of the nine biological parameters was divided into quartiles, based on the distribution of scores in the sample. Participants' values falling within the high-risk 75<sup>th</sup> percentile were dichotomized as 1 = values in high-risk quartile), and those with normal ranges as 0 = values in low-risk quartile. The total AL score (range 0-9) was calculated by summing the number of parameters for which the subjects fall into the highest-risk quartile, with higher scores indicating greater dysregulation (Seeman et al., 2010). Biomarker cutoff points are included in Table 4.

Table 1

*Classification of Overweight and Obesity by BMI*

	BMI (kg/m <sup>2</sup> )	Obesity Class
Underweight	< 18.5	
Normal	18.5-24.9	
Overweight	25.0-29.9	
Obesity	30.0-34.9	I
	35.0-39.9	II
Extreme Obesity	40.0 +	III

## Independent Variables

In this study, acculturation stress was measured using the Social, Attitudinal, Familial, and Environmental Acculturative Stress Scale (S.A.F.E.). The S.A.F.E. Scale has been used extensively as a measure of acculturative stress (Mena et al., 1987; Padilla, Wagatsuma, & Lindholm, 1985; Padilla et al., 1986). The S.A.F.E. scale consists of 24 items that measure acculturative stress in social, attitudinal, familial, and environmental contexts, and perceived discrimination toward immigrants. The S.A.F.E. Scale uses a 5-point Likert-type scale (ranging from 1, *not stressful* to 5, *extremely stressful*). The sum for each item is calculated for the total score and by domain. The scores can range from 0 to 120. An example of items includes the following: “I feel uncomfortable when others make jokes about or put down people of my ethnic background”; “In looking for a good job, I sometimes feel that my ethnicity is a limitation”; and “It bothers me that I have an accent.” Higher scores indicate a higher level of acculturation stress. The scale is sensitive to language and cultural stressors experienced by immigrant college students.

Based on Berry’s theoretical framework, the original S.A.F.E. Scale was developed by Padilla, Alvarez, and Lindholm (1986). The steps required for scale development as described by DeVellis (2012) are: (a) clearly define the construct/concept; (b) generate an item pool and determine the format for measurement; (c) conduct expert review of item pool and include validation items; (d) administer scale to sample; and (e) evaluate the items. The original 60-item scale was developed based on preliminary interviews with immigrant students who answered open-ended questions about social and cultural difficulties they had experienced. The interview questions and item construction were based on a literature review of studies that had shown difficulties

related to language, conflicting cultures, discrimination, and prejudice. A shorter version of the scale (24-item) was developed by Mena, Padilla, and Maldonado (1987). Both scales were designed to measure acculturative stress in four domains: social, attitudinal, familial, and environmental contexts.

Adequate reliability measures for the scale have been demonstrated in various populations both by gender and ethnicity (Asian Americans, Hispanic Americans, African Americans, and Mexican Immigrants). Fuertes and Westbrook's (1996) study on Hispanic college students reexamined the reliability of the S.A.F.E. Scale. The results for the overall S.A.F.E. Scale indicated reliability (21 items, Cronbach's  $\alpha = .89$ ). Specifically, the reliabilities for each of the four factors were: Factor 1-Environmental ( $\alpha = .88$ ), Factor 2-Attitudinal ( $\alpha = .73$ ), Factor 3-Social ( $\alpha = .71$ ), and Factor 4-Familial ( $\alpha = .70$ ). Additional subsequent studies showed acceptable reliabilities in African American college students ( $\alpha = .87$ ; Perez et al., 2002;  $\alpha = .89$ ; Joiner & Walker, 2002); Hispanic women ( $\alpha = .86$ ; Negy et al., 2010); and diverse ethnic groups of students ( $\alpha = .89$ ; Gomez et al., 2011).

Construct validity of the S.A.F.E. Scale was assessed by Fuertes and Westbrook (1996) using factor analysis. They conducted a principal component analysis and the varimax rotation method, resulting in four factors explaining 55% of the overall variance. Factor 1 accounted for 31% (eigenvalue of 7.46) of the variance, Factor 2 accounted for 9% (eigenvalue of 2.25), Factor 3 accounted for 8% (eigenvalue of 2.02), and Factor 4 accounted for 6% (eigenvalue of 1.52). Factor loadings with each item were included. The number of factors resulting from the analysis corresponds with the four dimensions

(environmental, attitudinal, social, and familial) of the S.A.F.E. Scale, providing further evidence of construct validity.

In their study, Fuertes and Westbrook (1996) included three open-ended questions to allow participants to elaborate further on the stress they had experienced. Evidence of convergent validity was demonstrated by correlating the responses from three open-ended questions with the responses from the 21 items that make up the four factors of the S.A.F.E. Scale. All three open-ended questions correlated moderately with Factor 1 ( $r = .40, .51, \text{ and } .49$ ).

A study by Joiner and Walker (2002) showed evidence of convergent and discriminant validity. The correlation of acculturative stress (S.A.F.E.) and general life stress measured with the Negative Life Events Questionnaire (NLEQ) was moderate ( $r = .46, p < .01$ ), suggesting discriminant validity.

Evidence of predictive validity was demonstrated in an early study by Padilla et al. (1985); their results showed the S.A.F.E. Scale discriminated between generations for both Japanese and Mexican American students. Subsequent studies (Mena et al., 1987; Padilla et al., 1986) found the S.A.F.E. Scale discriminated between first, second, and third generations, giving evidence of predictive validity. Their results also suggested that acculturative stress levels decreased with later generation immigrants. Hovey and Magaña (2002) found acculturative stress was a significant predictor of anxiety in a sample of migrant workers ( $\beta = .57, t = 5.7, p < .0001$ ). These findings were congruent with their previous study suggesting that elevated levels of acculturative stress also had high levels of anxiety and depression (Hovey & Magaña, 2000). Numerous studies have

suggested adequate predictive validity for the S.A.F.E. Scale on acculturative stress, suicidal ideation, and depression (Cho & Haslam, 2010; Hovey & King, 1996; Hwang & Ting, 2008). A study on Mexican immigrants by Hovey (2000) explored the relationship between acculturative stress, depression, and suicidal ideation. The study results showed the strongest predictor of depression was acculturative stress ( $\beta = .54, t = 5.5, p < .01$ ), which accounted for 29% of the variance in depression. In summary, this scale has been widely used to measure acculturative stress. There is strong evidence of the reliability and validity for this tool to be used in this study as a measure acculturative stress.

**Independent variables: Acculturation.** Acculturation was measured in this study using the Acculturation, Habits, and Interests Multicultural Scale for Adolescents (AHIMSA). Acculturation is defined as the normative changes that groups and individuals undergo when they come in contact with another culture. Items for the AHIMSA scale were generated by a diverse group of researchers (health psychologists, developmental psychologists, sociologists, cultural studies researchers, and health behavior researchers). Age-appropriate and multicultural relevant items were adapted from existing scales (ARSMA-II, Suinn-Lew Ethnic-Identity Acculturation Scale, and the Stephenson Multigroup Acculturation Scale). Newly written items were added to assess multiple components of acculturation in adolescents. Items were written to be applicable to any individual's ethnic or cultural background (Unger et al., 2002). Adolescent focus groups evaluated 30 potential items for relevance and ease of interpretation. In addition to the focus groups, the researchers evaluated the items' relevance to the concept of acculturation. The scale consists of eight items with four response categories, generating four sub-scores based on the four orientations: United States Orientation (indicating

Assimilation), Other Country Orientation (indicating Separation), Both Countries Orientation (indicating Integration), and Neither Country Orientation (indicating Marginalization). Examples of items include: “I am most comfortable being with people from...,” “My best friends are from...,” and “The people I fit in with best are from...” Respondents select which of the four orientations best indicates their cultural preference. The score for each orientation can range from 0 through 8. Validation of the AHIMSA was conducted to evaluate the psychometric properties of the scale. This included completion of a modified version of the ARSMA-II scale which represents a widely used, standard, and comprehensive measure of acculturation. Exploratory factor analysis was performed, with the scree test indicating a single-factor solution. Cronbach’s alpha for the overall eight-item scale were adequate (United States Orientation,  $\alpha = .79$ ; Both Countries Orientation,  $\alpha = .79$ ) (Unger et al., 2002). Subsequent studies showed the Cronbach’s alphas were .76 for the US orientation subscale, .76 for the Other Country subscale, and .74 for the Integration subscale (Unger, Ritt-Olson, Wagner, Soto, & Baezconde-Garbanati, 2007). The AHIMSA subscales were positively correlated with the ARSMA-II, giving evidence of construct validity. The AHIMSA scale has been used extensively in diverse adolescent and emerging adult research populations, specifically college students (Pedersen, Cruz, LaBrie, & Hummer, 2011; Santos, Hurtado-Ortiz, & Sneed, 2009; Sirin et al., 2008).

**Independent variables: Perceived social support.** Perceived social support was measured using the Multidimensional Scale of Perceived Social Support (MSPSS). Perceived social support is defined as “the social resources that persons perceive to be available or that are actually provided to them by nonprofessionals in the context of both

formal support groups and informal helping relationships” (Cohen, Gottlieb, & Underwood, 2001, n.p.). The MSPSS is a widely used self-report measure of perceived social support from three different dimensions (i.e., sources): family members, friends, and significant others. The scale consists of 12 items designed to measure the individual’s perception of support from family (Items 3, 4, 8, and 11): “I get the emotional help and support from my family”; friends (Items 6, 7, 9, and 12): “I can count on my friends when things go wrong”; and significant other (Items 1, 2, 5, and 10): “I have a special person who is a real source of comfort to me” (Zimet, Powell, Farley, Werkman, & Berkoff, 1990). Respondents use a 7-point Likert-type scale (ranging from *very strongly disagree* to *very strongly agree*). Total composite MSPSS scale scores range from 12 to 84, with higher scores indicating higher levels of perceived social support. Items within each subscale are summed to give total subscale score. To calculate the total scale, all 12 items are summed to obtain a composite MPSS scale score and then divided by 12 for the total mean score. Mean total scale scores ranging from 1 to 2.9 are considered low support; a score of 3 to 5 is considered moderate support; a score of 5.1 to 7 is considered high support. To calculate each subscale: Significant Other subscale, items 1, 2, 5, and 10 are added together and divided by 4; Family Subscale, items 3, 4, 8, and 11 are added together and divided by 4; Friends Subscale, items 6, 7, 9, and 12 are added and divided by 4. A high total mean score on a specific subscale indicates high levels of perceived social support from that source (i.e., friends). Confirmatory factor analysis confirmed the three-factor structure with factor loadings changing from .77 to .89 and explaining 74.04% of the total variance (Duru, 2007). Good internal reliability is evident with coefficient alphas for the subscales, a total scale ranging from .81 to .94, and test-retest

values of .72 to .88. Significant correlations between the MSPSS subscales and the Depression and Anxiety subscales of the Hopkins Symptom Checklist indicate construct validity. Concurrent validity was examined using the UCLA Loneliness Scale and the Life Satisfaction Scale. Results showed significant correlations between the MSPSS total score and measures of loneliness ( $r = -.59, p < .01, .79$ , large effect size of 2.5) and life satisfaction ( $r = .37, p < .01, .90$ , large effect size of 4.2) (Duru, 2007). Discriminant validity was demonstrated for the Family subscale of the MSPSS with the Adolescent Family Caring Scale (AFCS). The correlation of the Family Support subscale with the AFCS ( $t = 10.44, p < .001$ ) was significantly stronger than the correlations of Friends Support and Significant Other Support with the AFCS ( $t = 7.74, p < .001$ ). This provided evidence of the MSPSS scale's ability to discriminate among Family, Friend, and Significant Other Support in a sample of urban adolescents (Canty-Mitchell & Zimet, 2000). The MSPSS has been used to measure social support in different samples and various cultures, and can be considered as a reliable and valid scale to measure perceived social support. In this study, perceived social support was treated as a continuous variable, with a total composite score calculated to measure overall perceived social support.

**Independent variables: Perceived stress.** Perceived stress was measured using the Perceived Stress Scale (PSS-10), developed by Cohen and Williamson (1988). The PSS was originally constructed as a 14-item self-report instrument by Cohen, Kamarck, and Mermelstein (1983). The PSS 10-item scale was designed to measure the individual's perception of his or her ability to manage stress, as well as the degree to which an individual perceives aspects of his or her life as "uncontrollable, unpredictable, and

overloading” (Cohen et al., 1983, p. 314). Subjects are asked to respond to each question on a 5-point Likert scale ranging from 0 (never) to 4 (very often). Scores ranging from 0-13 indicate low perceived stress, 14-26 indicate moderate stress, and scores from 27-40 indicate high perceived stress. The PSS-10 is a reliable and valid self-report measure of perceived stress. Exploratory factor analysis revealed a two-factor model. Internal consistency and interscale correlations were strong between the two factors (Roberti, Harrington, & Storch, 2006). The scale has demonstrated good internal reliability with Cronbach alpha reliability coefficient ranging from .84 to .89. Convergent validity was supported with a high correlation between the PSS-10 total score and State-Trait Anxiety Inventory (STAI) total score. Divergent validity was supported by weak correlations between PSS-10 and several scales: Sensation Seeking Scale (SSS-V) and the Santa Clara Strength of Religious Faith Questionnaire (SCSRFQ-SF), measuring constructs not related to each other (Roberti et al., 2006). In this study, the PSS-10 score was treated as a continuous variable, with higher scores indicating greater perceived stress.

### **Demographic Questionnaire**

A demographic questionnaire was used to collect demographic data from study participants. Individuals were asked to provide information on age, sex, race/ethnicity, individuals’ and parents’ country of birth, individuals’ number of years living in the United States, year in college, students’ GPA, socioeconomic status (household income) and number of years of education completed by parent(s). Demographic variables were considered as covariates in the study. Study instruments are described in Table 2. The detailed descriptions of variables are presented in Table 3.

Table 2

*Description of Study Instruments*

Variable	Instrument	Level of Measurement	Number of Items
Acculturation Stress	Social, Attitudinal, Familial, and Environmental Scale (S.A.F.E.)	Continuous variable	24 items, 5-point Likert scale (ranging from 1 not stressful to 5 extremely stressful)
Acculturation	The Acculturation, Habits, and Interests Multicultural Scale for Adolescents (AHIMSA)	Continuous variable	8 items with four response categories generating four sub-scores based on four orientations
Perceived Social Support	The Multidimensional Scale of Perceived Social Support (MSPSS)	Continuous variable	12 items with three subscales (family, friends, & significant others) Composite score on all 12 items
Perceived Stress	The Perceived Stress Scale (PSS-10)	Continuous variable	10 items, 5-point Likert scale (ranging from 0 = never to 4 = very often)
Allostatic Load	Biomarkers	Continuous variable	A calculated total score index based on nine biomarkers: systolic and diastolic blood pressure, body mass index (BMI), hip-to-waist ratio, total cholesterol, HDL, LDL, triglycerides, HgA1c

Table 3

*Description of Dependent and Independent Variables*

Variables	Description
<u>Dependent Variable</u>	
Allostatic Load	The physiological “wear and tear” on the body as a result of the constant response to stressors, resulting in chronic dysregulation of the HPA axis, the autonomic nervous system, and the immune system
<u>Independent Variable</u>	
Acculturation Stress	Acculturation stress is defined as the stress reaction resulting from the process of acculturation.
Acculturation	Acculturation is defined as the normative changes that groups and individuals undergo when they come in contact with another culture. It can be further defined as a dynamic, bidirectional process of adaptation to stress and the individuals’ coping mechanisms in response to stress.
Perceived Social Support	Perceived social support is defined as “the psychological and material resources available from an individual’s interpersonal relationships” (Cohen Gottlieb, & Underwood, 2001, n.p.).
Perceived Stress	Perceived stress is defined as the individuals’ perception of their ability to manage stress, as well as the degree to which an individual perceives aspects of their life as “uncontrollable, unpredictable, and overloading.
<u>Demographic Variables</u>	
Age	Age in years
Gender	Male or Female
Racial Background	American Indian or Alaska Native; Asian; Black or African American; Hispanic/Latino; Native Hawaiian or Other Pacific Islander; Other Race; White
Generation Status	Individuals are defined as first-generation immigrants if born outside the US; second-generation immigrant individuals are born in the US with at least one foreign-born parent
Years Living in United States (if applicable)	The number of years the individual has lived in the United States
Parent Education	The number of years of education the parent(s) has completed
Household Income	Less than \$21,000/year; \$21,000-\$35,000/year; \$35,000-\$50,000/year; Greater than \$50,000/year
Student’s GPA	Cumulative GPA
Years Student Attended College	The number of years the student has attended college

Table 4

*Cut-off Points for AL Indicators*

Biological Parameters	Highest Risk Quartile
Systolic blood pressure (mmHg)	$\geq 120$
Diastolic blood pressure (mmHg)	$\geq 80$
BMI (kg/m <sup>2</sup> )	$\geq 30$
Waist-to-hip ratio	$\geq 0.90$ in males, $\geq 0.85$ in females
Total cholesterol (mg/dL)	$\geq 240$
Hemoglobin A1C (%)	$\geq 5.7$
Triglycerides (mg/dL)	$\geq 200$
Low density lipoproteins (mg/dL)	$\geq 160$
High density lipoproteins (mg/dL)	$\leq 40$ mg/dL

**Human Subjects Protection**

To ensure the protection of human subjects prior to data collection, permission to implement the study was obtained through the Institutional Review Boards of Saint Peter's University and Rutgers, The State University of New Jersey. There was little risk for harm in the study. Subjects who completed the five questionnaires (Demographic Tool, S.A.F.E., AHISMA, PSS, and MSPSS) and who reported feeling uncomfortable or anxious were given the option of a referral for counseling and psychological services through a local primary care center and/or Saint Peter's University Personal Development Center. Participants were advised there may be a small slight discomfort associated with the finger stick.

### **Data Collection**

Following completion of the questionnaires, each subject's height and weight, waist-to-hip ratio (waist circumference measured at its narrowest point between the ribs and iliac crest, hip circumference measured at the maximal point of the buttocks), and resting blood pressure were measured, and BMI was calculated. Height and weight were measured using a Health O Meter 550KL Digital scale. Blood pressure was measured with the subject in the seated position, with the right arm elevated to heart level, using a Welch Allyn Trim Line Reusable Cuff. Two measurements were taken 15 minutes apart in the same arm with the patient in the same position, and the mean blood pressure was recorded. Biomarker samples were collected and analyzed using Alere Afinion AS100 multi-assay analyzer system. Alere Afinion test cartridges for each analyte were used to measure the following biomarkers: total cholesterol, high-density lipoproteins, low-density lipoproteins, triglycerides, and glycosylated hemoglobin (HbA1c). Subjects were instructed to wash their hands under warm water to help stimulate blood flow. The subject's fingertip was wiped with an alcohol pad, wiped dry with a sterile gauze pad, and then pricked with a sterile, single-use 2.8mm/21 gauge lancet. The first drop of blood is wiped away with sterile gauze pad to remove any tissue fluid from the sample, followed by a gentle squeezing of the finger to obtain a large drop of blood, approximately 40  $\mu$ L (Lakshmy, Gupta, Prabhakaran, Snehi, & Reddy, 2010). Holding the capillary tube horizontally, the tube was touched to the drop of blood without touching the skin, and filled to the black mark within 10 seconds. Each test cartridge was labeled with sample ID and then inserted into the analyzer. Individual test results were recorded.

### **Data Analysis Plan**

Sample characteristics were summarized and described using a descriptive analysis, including ranges, means, standard deviations, and cut points/quartiles for each of the biomarkers used to calculate the total AL index. Data were inspected for outliers and anomalous data entries. Assumptions of normality and equal variances were tested for. Acculturative stress scores were normally distributed for first generation as assessed by Shapiro-Wilk's test ( $p = .12$ ), with a skewness of .835 (SE = 0.374) and kurtosis of 1.49 (SE = 0.733), but were non-normally distributed for second generation with a skewness of 0.74 (SE = 0.40) and kurtosis of -0.268 (SE = 0.798). A "square root" transformation was applied following the guidelines, as suggested by Tabachnik and Fidell (2007). Social support scores were non-normally distributed for both first and second generation, as assessed by Shapiro-Wilk's test ( $p < .05$ ), with a negative skewness of -1.33 (SE = .374) and kurtosis of 2.53 (SE = 0.73) for first generation, and negative skewness of -0.99 (SE = 0.40) and kurtosis of 0.47 (SE = 0.798) for second generation. A logarithmic transformation was applied. Pearson's  $r$ -tests and regression analyses were used to establish relationships between continuous variables, including acculturative stress (S.A.F.E.), acculturation (AHIMSA), and perceived social support (MSPSS), to determine if these are mediators of elevated AL. T-tests were used to examine differences between first-generation and second-generation immigrant students for acculturative stress, acculturation, perceived social support, and AL. Regression analysis was used to examine Hypotheses 2, 3, and 4.

To test Hypothesis 1—Individuals who have a higher acculturation level are more likely to experience lower levels of acculturation stress, Pearson's  $r$ -test was conducted to

examine the correlation between acculturation (AHIMSA subscales) and acculturation stress (S.A.F.E.). Linear regression analysis was used to test if level of acculturation significantly predicted acculturative stress.

To test Hypothesis 2—Individuals who experience increased levels of acculturation stress will be more likely to have higher scores of total AL, Pearson's r-test was used to examine the correlations between acculturative stress and AL. Linear regression analysis was conducted to examine the association between acculturative stress and AL. Demographic variables including age, gender, number of years residing in the United States, student's GPA, parent's level of education, and income were controlled.

To test Hypothesis 3—Individuals who are first-generation immigrants will have higher acculturation stress levels and higher scores of total AL than second-generation immigrants, Pearson's r-tests were used to examine the correlations between acculturative stress, generational status, and AL. Linear regression models were used to test the best predictive association between acculturative stress, generational status, and AL.

To test Hypothesis 4—Perceptions of social support will affect the relation between acculturation stress and allostatic load, multiple regression analyses were conducted. In the first step, a linear regression was used to examine the effect of acculturative stress on AL. Next, a linear regression was used to examine the relationship between perceived social support and AL. In the final step of the regression, acculturation stress, social support, perceived general stress, generation status, gender, and parent's level of education were entered in a hierarchical regression analysis. The change in  $R^2$

was used to determine how much variance in AL was explained by each block of predictors. Statistical analyses were carried out with Statistical Package for the Social Sciences (SPSS) Version 24. All statistical tests were two-sided and  $p$  values less than 0.05 were considered as statistically significant.

## **CHAPTER FOUR: ANALYSIS OF THE DATA**

The purpose of the study was to explore the association between acculturation stress and allostatic load (AL) and the indirect effect of social support among first- and second-generation immigrant college students. Data were collected from undergraduate students attending Saint Peter's University, who self-reported as first- or second-generation immigrants. A demographic questionnaire was used to collect demographic data from study participants. Acculturation stress was measured using the Social, Attitudinal, Familial, and Environmental Acculturative Stress scale (S.A.F.E.). Level of acculturation was measured using the Acculturation, Habits, and Interests Multicultural Scale for Adolescents (AHIMSA). Perceived social support was measured using the Multidimensional Scale of Perceived Social Support (MSPSS). To assess general perceived stress, the Perceived Stress Scale (PSS-10) was administered. Biomarkers representing metabolic (lipid panel and glycosylated hemoglobin) and cardiovascular (systolic blood and diastolic blood pressure) system functions were obtained by finger stick method and analyzed. Anthropometric biomarker measures consisted of body mass index, waist circumference, and hip-to-waist ratio. The analysis of the data is presented in this chapter.

### **Descriptive Results**

Statistical analyses were carried out with SPSS, Version 24. The sample characteristics are described in Table 5 and Table 6. The mean age of the subjects was 18.5 years ( $SD = .98$ ). Almost 55% of the sample (54.8%,  $n = 40$ ) were first-generation immigrants and 45.2% ( $n = 33$ ) were second-generation immigrants. First-generation immigrant students had lived an average of 6.6 years ( $SD = 4.7$ ) in the United States. The

sample consisted of 31.5% ( $n = 23$ ) male and 68.5% ( $n = 50$ ) female; 74% ( $n = 54$ ) of the sample self-identified as Hispanic/Latino, 13.7% ( $n = 10$ ) Black/African American, 6.8% ( $n = 5$ ) Asian, and 4.1% of other race ( $n = 3$ ). Statistical techniques applied in this study included independent sample t-tests, and linear regression. The Mann-Whitney test and chi-square tests were used to examine differences by generation and gender for first- and second-generation immigrant students' level of acculturation, acculturation stress, perceived general stress, social support, and measures of allostatic load with individual biomarkers. Pearson's correlations and multiple linear regressions were used to establish relationships between acculturation stress, level of acculturation, allostatic load (AL) with individual biomarkers, and perceived social support. To determine whether there was a significant difference in generation status for male and female participants, a Pearson chi-square was conducted. The results were non-significant,  $\chi^2(1, n = 73) = 2.96, p = .085$ . The majority (82%) of the participants reported their family's annual income of \$35,000 or less. There was a non-statistically significant difference in level of income between first and second generation,  $\chi^2(3, n = 73) = 2.00, p = .572$ .

Table 5

*Demographic Characteristics of the Sample (n = 73)*

Characteristics	Mean (SD)	Range
Age (years)	18.52 (.988)	17-24
Number of Years in United States	6.6 (4.7)	1-18
Years in College	1.10 (.710)	1-7
GPA	3.33 (.493)	2.0-4.0
Years of Education of Mother	9.37 (5.27)	0-20
Years of Education of Father	10.16 (4.81)	0-20

Table 6

<i>Gender, Racial Composition, and Generation of the Sample (n = 73)</i>		
Group	n	%
<u>Gender</u>		
Male	23	31.5
Female	50	68.5
<u>Race/Ethnicity</u>		
Asian	5	6.8
Black/African American	10	13.7
Hispanic/Latino	54	74.0
Native Hawaiian or Other Pacific Islander	1	1.4
Of Other Race	3	4.1
<u>Generation</u>		
First Generation	40	54.8
Second Generation	33	45.2
<u>Family Income</u>		
Less than \$21,000/year	34	46.6
\$21,00-\$35,00/year	26	35.6
\$36,000-\$50,000/year	4	5.5
Greater than \$50,000/year	9	12.3

### **Biomarkers**

Descriptive statistics for the nine biomarkers are described in Table 7.

Independent sample t-tests were run to determine if there were mean differences in biomarkers between first and second generation. No statistical difference was found between generations. However, a difference was found between male and female participants. The total allostatic load mean scores significantly differed between males

and females,  $t(71) = 2.45, p = .016$ . The males showed higher AL scores than females. HDL cholesterol levels were higher in females than males, a statistically significant difference ( $t = -4.092, p = < .01$ ). Mean systolic blood pressure was higher in male subjects than female, a statistically significant difference ( $t = 2.42, p = .021$ ). Results of independent t-tests for biomarkers by generation and gender are shown in Table 8.

Table 7

*Biological Markers of the Sample (n = 73)*

	Minimum	Maximum	Mean	Std. Deviation
Systolic blood pressure, mmHg	88	151	116.4	13.07
Diastolic blood pressure, mmHg	50	110	74.7	10.08
Body Mass Index (BMI), kg/m <sup>2</sup>	17.2	47.7	26.29	6.00
Waist-hip ratio	.72	1.28	.843	.079
HgA1c (%)	4.5	6.0	5.26	.267
Total cholesterol mg/dl	100	208	159.1	24.15
HDL cholesterol (HDL)	23	100	55.7	15.06
Triglycerides	45	595	125.3	84.4
LDL cholesterol (LDL)	0	124	76.47	30.12
Total AL score	0	6	1.42	1.40

Table 8

*Biomarkers by Generation and Gender*

Variable	First Generation	Second Generation	<i>t</i>	<i>p</i>	Male	Female	<i>t</i>	<i>p</i>
	M(SD)	M(SD)			M(SD)	M(SD)		
AL	1.30(1.41)	1.58(1.39)	-.834	.407	2(1.53)	1.16(1.26)	2.45	.02*
HDL	55.6(15.5)	55.9(14.7)	-.094	.926	46.0(2.68)	60.1(1.97)	-4.092	<.01*
SBP	118(13.8)	115(12.0)	.933	.354	122(15.8)	113(1.50)	2.42	.021*
DBP	74.6(9.6)	74.9(10.7)	-.142	.887	77(11.3)	74(9.3)	1.40	.166
BMI	25.36(6.0)	27.43(5.9)	-1.48	.141	25.42(6.5)	26.7(5.7)	-.845	.401
Waist- hip ratio	.844(.094)	.848(.058)	.142	.887	.843(.060)	.841(.087)	.359	.720
HgA1c %	5.26(.256)	5.27(.283)	-.114	.910	5.3(.298)	5.2(.251)	1.22	.227
Tot Chol	159.3(21.3)	159.0(27.5)	.043	.966	157.6(25.8)	159.9(23.5)	-.381	.704
Trig	122.5(72.4)	128.6(98.2)	-.304	.762	152.7(85.6)	112.6(81.7)	1.92	.059
LDL	78.5(26.5)	74.0(34.2)	.634	.528	82.8(27.1)	73.5(31.3)	1.23	.233

**Acculturation**

Level of acculturation measured with the AHIMSA generated four subscales.

Respondents indicated which of the four orientations best reflected their cultural preference. Frequencies were calculated for each AHIMSA item. Subscale scores were calculated by summing the number of responses in each of the four categories (Assimilation, Separation, Integration, and Marginalization). Responses for male 57.1% ( $n = 12$ ) and female 72.7% ( $n = 32$ ), with a total of 67.7% ( $n = 44$ ) of the sample, identified with “Both Countries” subscale, indicating integration as their cultural preference. A total of 21.5% ( $N = 14$ ), both male and female, identified “US,” indicating

assimilation as their cultural orientation. Chi-square tests were performed to determine if the relationship between generation and level of acculturation was statistically significant. No statistically significant relationship was found between generation and level of acculturation,  $\chi^2 (3, N = 65) = 6.15, p = .104$ , nor between gender and level of acculturation,  $\chi^2 (3, N = 65) = 1.74, p = .62$ .

### **Acculturation Stress**

Acculturation stress scores ranged from 7 to 94 ( $M = 36.9, SD = 16.3$ ). Mean scores indicated comparatively low levels of acculturative stress. There was no significant difference in acculturative stress scores for first-generation and second-generation immigrant students,  $t(71) = -.504, p = .616$ ; however, there were significant differences in levels of acculturative stress between female subjects and male subjects,  $t(71) = -2.64, p = .01$ , with higher levels of perceived acculturative stress in female subjects.

### **Perceived Stress**

Responses to the 10 items of the Perceived Stress Scale were normally distributed, with 75% ( $n = 55$ ) of the respondents' scores ranging from 14 to 26, indicating moderate stress; the remaining 25% ( $n = 18$ ) scored 27 to 40, indicating high levels of perceived stress. Items 4, 5, 7, and 8 were reverse-scored. There was no significant difference in perceived general stress scores for first-generation students and second-generation immigrant students,  $t(71) = -1.26, p = .210$ , or between male and female,  $t(71) = -1.62, p = .108$ .

## Social Support

Social support (MSPSS) scores for the sample were non-normally distributed, with skewness of -1.209 ( $SE = 0.28$ ) and kurtosis of 1.69 ( $SE = 0.55$ ), Shapiro-Wilk's test ( $p = .000$ ). A Mann-Whitney U test was run to determine if there were differences in social support scores between first- and second-generation students. Mean social support for first-generation (5.18) and second-generation (5.35) was not statistically significantly different ( $U = 702$ ,  $z = .466$ ,  $p = .641$ ). An independent t-test was also run using the transformed social support variable and showed no statistical difference in social support between generations  $t(71) = .655$ ,  $p = .515$ . A Mann-Whitney test was run to determine if there was a statistically significant difference that social support was greater for male than for female students. No statistical difference was found ( $U = 441.5$ ,  $z = -1.587$ ,  $p = .112$ ). The mean sample score ( $M = 5.26$ ,  $SD = 1.20$ ) indicated high levels of social support. Results of independent t-tests are shown in Table 9.

Table 9

*Acculturative Stress, Perceived Stress, and Social Support by Generation and Gender*

Variable	First Generation	Second Generation	<i>t</i>	<i>p</i>	Male	Female	<i>t</i>	<i>p</i>
	M(SD)	M(SD)			M(SD)	M(SD)		
S.A.F.E	36.0(17.7)	37.9(14.6)	-.504	.616	29.7(13.1)	40.2(16.6)	-2.64	.010*
PSS-10	22.8(3.6)	24.1(5.0)	-1.26	.210	22.2(3.29)	23.9(4.7)	-1.62	.108
			<i>U</i>	<i>p</i>				
MSPSS	5.18(1.24)	5.35(1.16)	702	.641	5.5(1.12)	5.14(1.23)	441	.112

### Psychometric Properties of Instruments

Cronbach's alphas were calculated as a measure of internal consistency for each of the four instruments and subscales. Internal consistency indicates how well all the items in a scale measure the concept. The S.A.F.E. Scale was found to be highly reliable (24 items;  $\alpha = .84$ ). The 12-item MSPSS had a high level of internal consistency, as determined by Cronbach's alpha .912. A very high reliability (0.95 or higher) may indicate that items may be redundant. The four social support subscales, each consisting of four items, were found to be highly reliable; friends social support ( $\alpha = .89$ ), family social support ( $\alpha = .88$ ), and significant other social support ( $\alpha = .90$ ). Cronbach's alphas for the eight-item acculturation scale (AHIMSA) and the 10-item Perceived Stress Scale (PSS-10) were .71 and .74, respectively. Recommended values are 0.7 or higher ( DeVellis, 2011).

Table 10

#### *Study Sample Alpha Reliabilities*

Instrument	Cronbach's alpha
SAFE	.841
PSS-10	.742
AHIMSA	.713
MSPSS	.912
MSPSS-Friends subscale	.896
MSPSS-Family subscale	.880
MSPSS-Significant Other subscale	.904



## Hypotheses

**Hypothesis 1:** Individuals who have a higher acculturation level are more likely to experience lower levels of acculturative stress.

Pearson's *r*-tests were run to assess the relationships between level of acculturation, generation, and acculturative stress. There was a significant negative correlation between integration orientation and acculturative stress,  $r(73) = -.203$ ,  $p = .04$ , and a significant positive correlation between marginalization orientation and acculturative stress,  $r(72) = .266$ ,  $p = .012$ . Correlations for the predictor variables are shown in Table 11. Multiple regression analysis was used to test if level of acculturation significantly predicted acculturative stress. Although there was a significant positive correlation between the subscale marginalization and acculturation stress, it was not a significant predictor of acculturative stress. For model 1, there was linearity, as assessed by partial regression plots and a plot of studentized residuals against the predicted values. The data met the assumption of independent errors (Durbin-Watson value = 2.10). There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1 (Field, 2009). A linear regression was calculated to predict acculturative stress based on the four subscales for level of acculturation (assimilation, separation, integration, and marginalization). The results showed  $F(4, 67) = 3.389$ ,  $p = .014$ , with an  $R^2 = .168$ . Level of acculturation explained 16.8% of the variance in acculturative stress scores.

In model 2, generation was added as another predictor; the results showed that both the level of acculturation and generation significantly predict acculturative stress  $F(5, 66) = 2.886$ ,  $p = .020$ ,  $R^2 = .179$ . There is strong evidence in the literature suggesting that social determinants such as education and income are related to

acculturative stress; therefore, in model 3, perceived general stress, gender, family income, and parents' level of education were controlled as covariates. A significant equation was found, ( $F(10, 61) = 2.078, p = .040$ ), with an  $R^2 = .254$  ( $R^2$  change from 17.9 to 25.4). Acculturation stress decreased for those individuals who indicated their level of acculturation as being either assimilated or integrated. The two subscales indicating assimilation ( $p = .048$ ) and integration ( $p = .046$ ) were significant predictors of acculturative stress. Hypothesis 1 was supported. Regression coefficients can be found in Table 12. Model summaries of multiple regressions with  $R^2$  change are shown in Table 13.

Table 11

*Correlations Between Predictive Variables and Acculturative Stress*

Variable	1	2	3	4	5	6
1. Acculturative stress	-					
2. Generation	.047	-				
3. Assimilation	-.093	.213	-			
4. Separation	.178	-.418	-.276	-		
5. Integration	-.203*	.096	-.600	-.414	-	
6. Marginalization	.266*	-.022	-.088	-.040	-.420	-

\* $p < .05$

Table 12

*Linear Regression Analysis for Acculturation Stress*

Variable	<i>B</i>	<i>SE</i> <sub><math>\beta</math></sub>	$\beta$	<i>t</i>	<i>p</i>
Intercept	155.439	70.657	-2.066	2.380	.020
Assimilation	-16.660	8.253	-2.066	-2.037	.046*
Separation	-15.145	8.582	-1.477	-1.679	.098
Integration	-17.001	8.350	-2.507	-2.016	.048*
Marginalization	-13.309	8.365	-2.507	-1.535	.130
Generation	1.497	4.266	.046	.946	.348
Perceived stress	.568	.429	.152	1.32	.191
Gender	7.357	4.48	.209	2.239	.029*
Years Education Mother	.165	.698	.054	.490	.626
Years Education Father	-.284	.751	-.084	-.852	.398
Family Income	-.855	2.135	-.051	-.949	.346
$R^2 = .254$					
$F = 2.078$					.040*

Table 13

*Hierarchical Linear Regression Analysis of Acculturative Stress*

	B	SE B	$\beta$	<i>t</i>	<i>p</i>
Model 1					
Constant	170.3	61.9		2.75	.008
assimilation	-17.2	7.7	-2.13	-2.23	.029*
separation	-15.4	7.90	-1.51	-1.96	.054
integration	-17.3	7.79	-2.55	-2.22	.030*
marginalization	-13.5	7.82	-1.05	-1.05	.087
$R^2 = .168$					
$\Delta R^2$ by first block		16.8 %; $F(4, 67) = 3.39, p = .014$			
Model 2					
Constant	153.5	64.5		2.38	.020
assimilation	-16.0	7.8	-1.98	-2.04	.046*
separation	-13.6	8.14	-1.33	-1.68	.098
integration	-15.9	7.92	-2.35	-2.02	.048*
marginalization	-12.21	7.96	-9.48	-1.54	.130
generation	3.86	4.08	.119	.946	.348
$R^2 = .179$					
$\Delta R^2$ by second block		17.9%; $F(5, 66) = 2.88, p = .020$			
Model 3					
Constant	142.8	70.8		2.01	.048
assimilation	-16.5	8.20	-2.05	-2.02	.048*
separation	-15.0	8.50	-1.46	-1.76	.083
integration	-16.8	8.30	-2.48	-2.03	.046*
marginalization	-13.01	8.31	-1.01	-1.56	.123
generation	.957	4.26	.029	.255	.823
perceived stress	.568	.429	.152	1.32	.191
gender	6.53	4.46	.186	1.46	.149
family income	-.623	2.13	-.037	-.293	.771
mother's education	.266	.698	.086	.380	.705
father's education	-.385	.751	-.114	-.513	.610
$R^2 = .254$					
$\Delta R^2$ by third block		25.4%; $F(10, 61) = 2.08, p = .04$			

**Hypothesis 2:** Individuals who experience increased levels of acculturation stress will be more likely to have higher scores of allostatic load (AL)

Pearson correlations and multiple regressions were used to test Hypothesis 2. A linear regression was used to examine the effect of acculturative stress on AL. The results were statistically non-significant  $R^2 = .000$ ,  $F(1, 71) = .011$ ,  $p = .915$ . Although there was no statistical significant correlation between acculturative stress and total allostatic load, there were significant correlations with individual biomarkers of systolic and diastolic blood pressure and acculturative stress, with general stress controlled as a covariate. Regression coefficients and standard errors can be found in Table 14. Linear regressions were calculated to predict systolic blood pressure and diastolic blood pressure based on acculturative stress. Results showed systolic blood pressure  $F(1, 71) = 5.97$ ,  $p = .017$ , with an  $R^2$  of .078, and diastolic blood pressure  $F(1, 71) = 5.68$ ,  $p = .020$ , with an  $R^2$  of .074. Acculturative stress was able to account for 7.8% and 7.4%, respectively, of the variance in the systolic blood pressure and diastolic blood pressure. Hypothesis 2 was not supported. Table 15 shows regression results for individual biomarkers and acculturative stress.

Table 14

*Acculturative Stress Predicting Allostatic Load (N = 73)*

Variable	<i>B</i>	<i>SE B</i>	$\beta$	<i>t</i>	<i>p</i>
Acculturative Stress S.A.F.E.	.001	.010	.013	.107	.915
$R^2$	.000				
<i>F</i>	.011				

Table 15

*Summary of Linear Regression Analyses for Acculturative Stress Predicting Biomarkers*

Variable	<i>B</i>	<i>SE B</i>	$\beta$	<i>t</i>	<i>p</i>
Systolic blood pressure	-.223	.091	-.278	-2.44	.017*
Diastolic blood pressure	-.168	.071	-.272	-2.38	.020*
Body mass index	.035	.043	.095	.803	.425
Hip waist ratio	.000	.001	.043	.360	.720
Hemoglobin A1c	.002	.002	.106	.899	.372
Total cholesterol	.013	.007	.223	1.93	.058
HDL cholesterol	.165	.108	.179	1.530	.130
Triglycerides	-.5540	.610	-.104	-.884	.380
LDL cholesterol	.009	.219	.005	.041	.967
$R^2$ (SBP)	.078				
$R^2$ (DBP)	.074				
$F$ (SBP)	5.97				
$F$ (DBP)	5.68				

**Hypothesis 3:** Individuals who are first-generation immigrants will have higher acculturative stress levels and higher scores of total allostatic load than second-generation immigrants.

Pearson correlations and multiple regressions were used to test Hypothesis 3. A linear regression was used to examine the effect of generation on acculturative stress. The results were statistically non-significant,  $R^2 = .004$ ,  $F(1, 71) = .254$ ,  $p = .616$ . Then, total AL was added as another predictor into the main model; the results showed that when entered together, both generation and total AL were not statistically significant,  $F(2, 70) = .127$ ,  $p = .881$ ,  $R^2 = .004$ . Linear regressions were calculated to predict

acculturative stress based on systolic blood pressure and diastolic blood pressure.

Significant regression equations were found for both systolic blood pressure,

$F(1, 71) = 5.97, p = .017$ , with an  $R^2$  of .078, and diastolic blood pressure,

$F(1, 71) = 5.68, p = .020$ , with an  $R^2$  of .074. When systolic and diastolic blood pressures

were entered together, the results were statistically significant,  $R^2 = .091, F(2, 70) =$

3.48,  $p = .036$ . Regression coefficients and standard errors can be found in Table 16.

Hypothesis 3 was not supported.

Table 16

*Generation and Biomarkers Predicting Acculturative Stress*

Variable	<i>B</i>	<i>SE B</i>	$\beta$	<i>t</i>	<i>p</i>
Generation	1.945	3.862	.060	.504	.616
Total AL	.148	1.38	.013	.107	.915
Systolic blood pressure	-.348	.142	-.278	-2.44	.017*
Diastolic blood pressure	-.441	.185	-.272	-2.38	.020*
BMI	.258	.321	.095	.803	.425
Hip-Waist ratio	8.748	24.29	.043	.360	.720
HgA1c	6.48	7.21	.106	.899	.372
Tot chol	.133	.079	.197	1.69	.095
HDL chol	.194	.217	.179	1.53	.130
triglycerides	-.200	.023	-.104	-.884	.380
LDL chol	.003	.064	.005	.041	.967
$R^2$ (SBP)	.078				
$R^2$ (DBP)	.074				
$F$ (SBP)	5.97				
$F$ (DBP)	5.86				

\* $p < .05$

**Hypothesis 4:** Perceptions of social support will affect the relationship between acculturative stress and allostatic load.

Pearson correlations and multiple regressions were used to test Hypothesis 4. A significant positive correlation was found between gender and acculturative stress,  $r(73) = .300, p = .010$ . Significant negative correlations between gender and AL,  $r(73) = -.280, p = .034$ , and between perceived social support and AL,  $r = -.248, p = .036$ , were found. Correlations for the predictor variables are shown in Table 17. In the first step, a linear regression was used to examine the effect of acculturative stress on AL. The results, as stated previously in Hypothesis 3, were statistically non-significant,  $R^2 = .000, F(1, 71) = .011, p = .915$ . Next, a linear regression was used to examine the relationship between total mean score of perceived social support and AL. The results were statistically significant,  $R^2 = .065, F(1, 71) = 4.94, p = .029$ . Linear regressions were then performed separately for each of the three different social support subscales (i.e., sources of social support) and AL. The family members social support subscale ( $M = 5.20, SD = 1.44$ ) had a significant negative correlation ( $r = -.212, p = .036$ ), but was not a significant predictor of AL,  $R^2 = .045, F(1, 71) = 3.34, p = .072$ . The significant others social support subscale ( $M = 5.49, SD = 1.50$ ) was not significantly correlated ( $r = -.087, p = .23$ ) with AL and was not a significant predictor of AL,  $R^2 = .008, F(1, 71) = .542, p = .46$ . The friends social support subscale ( $M = 5.09, SD = 1.46$ ) was significantly negatively correlated with AL ( $r = -.304, p = .004$ ); the results of the regression indicated that the friends subscale significantly predicted AL and explained a significant proportion of variance in AL scores,  $R^2 = .093, F(1, 71) = 7.24, p = .009$ . To

examine the indirect relationship between AL and acculturative stress through social support, a multiple regression was used. There was independence of residuals, as assessed by a Durbin-Watson statistic of 2.110. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. In model 2, total perceived social support (MSPSS) and acculturative stress (S.A.F.E.) were entered as the predictor variables, with AL as the outcome variable. The results were statistically non-significant,  $R^2 = .068$ ,  $F(2, 70) = 2.56$ ,  $p = .085$ .

In model 3, the MSPSS friends subscale and acculturative stress (S.A.F.E.) scales were then entered as the predictor variables, with AL as the outcome variable. The results were statistically significant,  $R^2 = .093$ ,  $F(2, 70) = 3.61$ ,  $p = .032$ . In model 4, in addition to MSPSS friends subscale and acculturative stress, control variables were entered into the regression. The standardized coefficients for acculturation stress (S.A.F.E.) were compared between model 1 ( $\beta = .013$ ), model 2 ( $\beta = .056$ ), model 3 ( $\beta = .031$ ), and model 4 ( $\beta = .133$ ). The analysis showed that friends social support and acculturative stress did significantly predict AL. Total social support scores had a significant direct negative relationship with AL and are a significant predictor for AL; however, social support did not have an indirect effect on the association between acculturative stress and AL. Hypothesis 4 was partially supported. Results for model 1, model 2, model 3, and model 4 are reported in Table 18.

Table 17

*Correlations Between Predictive Variables and Allostatic Load (n = 73)*

Variable	1	2	3	4	5	6	7	8
1. Allostatic Load	-							
2. Acculturative Stress	.013	-						
3. Generation	.098	.060	-					
4. Gender	-.280*	.300*	.202	-				
5. Mother's Education	-.018	-.057	-.076	-.076	-			
6. Father's Education	-.029	-.091	-.164	-.199	.845*	-		
7. Perceived Stress	-.147	.181	.148	.189	-.088	-.044	-	
8. Social Support	-.248*	.188	-.077	.155	.092	.071	-.157	-

\*p &lt; .05

Table 18

*Hierarchical Regression Analysis of AL*

	B	SE	$\beta$	<i>t</i>	<i>P</i>
<u>Model 1</u>					
Constant	1.38	.411		3.36	.001
SAFE	.001	.010	.013	.107	.915
$R^2$	.000				
$\Delta R^2$ by first block					0%; $F(1, 71) = .011, p = .915$
<u>Model 2</u>					
Constant	2.97	.810		3.67	.000
SAFE	.005	.010	.056	.482	.631
Tot-MSPSS	-1.07	.473	-.264	-2.26	.027*
$R^2$	.068				
$\Delta R^2$ by second block					6.8%; $F(2, 70) = 2.56, p = .085$
<u>Model 3</u>					
Constant	3.03	.731		4.15	.000
SAFE	.003	.010	.031	.274	.785
MSPSS-Friends	-1.04	.386	-.306	-2.68	.009*
$R^2$	.093				
$\Delta R^2$ by third block					9.3%; $F(2, 70) = 3.61, p = .032$
<u>Model 4</u>					
Constant	4.93	1.32		3.72	.000
SAFE	.011	.010	.133	1.13	.261
MSPSS-friends	-.921	.405	-.272	-2.27	.026*
Gender	-.816	.384	-.272	-2.13	.037*
Generation	.335	.328	.120	1.02	.312
Mother's education	.014	.057	.051	.238	.813
Father's education	-.023	.064	-.079	-.361	.719
Perceived stress	-.060	.038	-.186	-1.57	.121
$R^2$	.201				
$\Delta R^2$ by fourth block					20.1%; $F(7, 65) = 2.34, p = .034$

### **Additional or Ancillary Findings and Analysis of Same**

The purpose of this study was to assess the effect of social support on acculturative stress and AL among first- and second-generation immigrant college students. Although no statistical difference was found in AL scores between generations, a statistical difference was found between male and female participants, with males showing higher total AL scores and higher mean systolic blood pressure than females. HDL cholesterol levels were higher in females than males and LDL cholesterol levels were higher in males. This may be attributed to the role of the estrogen hormone, which tends to increase HDL cholesterol in young women from puberty until menopause. LDL cholesterol levels begin to increase in women after estrogen production declines with the onset of menopause. Individuals exposed to even modest rises in levels of LDL (100-129 mg/dl) cholesterol or lower levels of HDL cholesterol during young adulthood are associated with significantly higher risk of atherosclerosis (Navar-Boggan et al., 2015). Mean scores indicated comparatively low levels of acculturative stress. Although there was no significant difference in acculturative stress scores for first-generation and second-generation immigrant students, there were significant differences in levels of acculturative stress between female subjects and male subjects, with higher levels of acculturative stress in females. Interestingly, although there was no significant correlation between acculturative stress and social support, acculturative stress was lower in males, with higher levels of social support for males than for females.

## **CHAPTER FIVE: DISCUSSION OF THE FINDINGS**

The purpose of this study was to determine if acculturative stress predicts allostatic load in first- and second-generation immigrant college students, and the effect of social support on this relationship. This chapter presents a discussion of the results and interpretations drawn from the previous analyses and the hypotheses based on the theoretical propositions of the Model of Acculturative Stress (Berry et al., 1987) and the Allostatic Load Model (McEwen, 1998a).

### **Findings for Each Hypothesis**

#### **Acculturation and Acculturative Stress**

The first hypothesis proposed that individuals who have a higher acculturation level are more likely to experience lower levels of acculturative stress. This hypothesis was based on Berry's theoretical model of acculturative stress (Berry & Kim, 1988). The model was based on cultural and psychological factors and the relationship between acculturation experience, stressors, and acculturative stress. The model posited that the level of acculturative stress experienced is influenced by several acculturation factors. According to Berry's model, for many individuals, the process of acculturation can be stressful due to factors such as language barriers, discrimination, lower socioeconomic status, lack of social support, and conflicts between family values and the new host culture. Immigrant individuals generally identify with one of four acculturation patterns or orientations: (a) Assimilation—individual replace the norms of the home culture with the norms of the host culture; (b) Separation—individuals reject the norms of the host culture and maintains their home cultural norms; (c) Integration—individuals combine of both cultures, choosing to keep their home cultural norms while at the same time

participating in and interacting with the host culture; and (d) Marginalization—individuals become alienated from both cultures by rejecting the norms of both the home and the host cultures (Berry, 2013).

There is substantial evidence in the literature of the relationship between level of acculturation and acculturative stress (Berry, Phinney, Sam, & Vedder, 2006; Berry, 2013). Significant regression results supported the hypothesis, with the two subscales indicating assimilation and integration as significant predictors of acculturative stress. Acculturative stress decreased for those individuals who identified their orientation as integrated or assimilated. These results supported previous studies on level of acculturation and stress among different groups, suggesting that individuals who pursue integration experience less discrimination than those who are marginalized or separated. An earlier study by Berry (1989), which included university students, found that those students who were less acculturated reported greater acculturative stress. Similar studies found that those individuals who were more integrated reported better adjustment in school and greater psychological well-being (Berry & Sabatier, 2010; Schwartz et al., 2013). Similar findings from a study on international students found that students in the acculturation category of integration reported lower levels of acculturative stress than those in the separation or marginalization category (Sullivan & Kashubeck-West, 2015). All of the participants in the study were able to meet college admission requirements for reading and writing and spoke English. The majority (90%) identified their cultural orientation as either integration (67.6%) or assimilation (21.5%). Knowledge of the new language, multiculturalism in the college, and the ability to integrate/assimilate may have influenced the level of acculturative stress experienced.

Another source of acculturation stress for immigrant college students is the pressure of “fitting in.” The students in this sample were more acculturated, and therefore may not have experienced “cultural self-consciousness.” Acculturative stress scores were higher in females than males. Several studies in the literature showed an association between gender and the acculturation process (Castillo, Perez, Castillo, & Ghosheh, 2010; Lorenzo-Blanco, Unger, Baezconde-Garbanati, Ritt-Olson, & Soto, 2012). A study conducted by Cano et al. (2014) on Mexican American college students found similar results, with higher acculturative stress levels in females than males. Although no statistically significant relationship was found between gender and level of acculturation, evidence in the literature has suggested that Latino male adolescents tend to acculturate more quickly than girls (Schwartz et al., 2006).

### **Acculturation Stress and Allostatic Load**

Hypothesis 2 proposed that individuals who experience increased levels of acculturation stress will be more likely to have higher scores of total allostatic load. This was derived from the theoretical constructs of allostasis and allostatic load (AL) and the allostatic load model (McEwen, 1998a). The physiologic parameters reflecting AL are divided into primary mediators (release of norepinephrine), secondary outcome (increases in blood pressure and heart rate), and tertiary outcomes (hypertension, diabetes mellitus, and atherosclerosis). There is strong evidence linking acculturation stress with measures of AL. Although the results of the regression between acculturative stress and total allostatic load were not significant, there were significant negative correlations between acculturative stress and the individual biomarkers of systolic and diastolic blood pressure. The results of the regression indicated that acculturative stress significantly predicted

systolic blood pressure and diastolic blood pressure. One explanation for the significant correlation with systolic blood pressure may have been temporary elevations in blood pressure for the participants related to the task of completing the tools and the collection of the biomarkers. This has been suggested in previous study findings linking academic stressors with increases in blood pressure (Conley & Lehman, 2012). Similar research results have been found in cardiovascular reactivity and daily stress-symptom reactivity (Hilmert, Ode, Zielke, & Robinson, 2010). There is also additional evidence in the literature suggesting that gender may influence how an individual reacts to different stressors, with men having greater blood pressure responses relative to women (Matthews et al., 2004; Seeman et al., 2002a). A study that examined sex differences in blood pressure in adolescence showed blood pressure in adolescent girls was lower than adolescent boys, with differences being the greatest during a math-stress test (Syme et al., 2009). The inclusion of additional biomarkers such as cortisol and dehydroepiandrosterone (DHEA) may have provided a more complete picture of the stress response. Previous studies have suggested that DHEA is able to diminish some of the negative effects of chronic stress (Boudarene, Legros, & Timsit-Berthier, 2002; Shiotsuki et al., 2009). There is evidence in the literature that college students who are the first generation to attend college struggle due to lack of economic and academic preparation. A study by Stephens et al. (2012) showed students who were first in their family to attend college experienced a “cultural mismatch,” with higher increases in cortisol and less positive/more negative emotions than those students who had at least one parent with a 4-year degree. Again, the inclusion of neuroendocrine biomarkers, like

cortisol, epinephrine, and DHEA, may have reflected differences in cardiovascular and sympathetic nervous system reactivity.

Students who are first in their family to attend college may question whether they can be successful and if they will be able to fit in. In addition to participants being either first- or second-generation immigrants, all but two were the first to attend college in their families. Despite first-generation college students experiencing adversity and challenges due to lack of financial resources and academic preparation, there was no significant association between acculturative stress and AL nor between general perceived stress and AL. This may be partially attributed to the amount of available resources and mentoring environment to better bridge the gap and provide all students with equal opportunities for success. Another possible explanation may be using a general measure of stress as opposed to a tool that measures more specific sources of stress (i.e., economic stress, financial burdens, and future employment opportunities). Social determinants such as race, ethnicity, education, and income are associated with AL (Brody et al., 2013; Chao et al., 2014; Gruenewald et al., 2012). Individuals who experience multiple socioeconomic stressors such as lower education, chronic poverty, and unemployment have higher AL levels. Although 82% of participants reported their family's annual income of \$35,000 or less, study results showed total AL index scores were low, with high levels of social support. The majority (75%) of the participants indicated moderate levels of perceived stress, with the remaining 25% indicating high levels of perceived general stress. The PSS-10 is designed to measure individuals' perception of their ability to manage stress and how they perceive aspects of their life as "uncontrollable or unpredictable." More than half of the participants indicated "sometimes" to "almost

never” on scale items indicating lack of sense of personal control over life events. These results were similar to a study by Seeman et al. (2014), which found that individuals who perceived a sense of low control over life events were associated with higher AL, compared to individuals who perceived a higher sense of control.

### **Acculturation Stress, Allostatic Load, and Generation**

Hypothesis 3 was derived from the Model of Acculturative Stress (Berry et al., 1987) and the Allostatic Load Model (McEwen, 1998a). Berry’s model suggested that negative experiences in the process of acculturation contribute to acculturative stress. Hypothesis 3 states that individuals who are first-generation immigrants will have higher acculturation stress levels and higher scores of total AL than second-generation immigrants. Acculturation stress scores were comparatively low, with no significant difference between first- and second-generation groups. This is in contrast to previous studies which suggested that level of acculturation stress was related to generational status, with first-generation individuals experiencing higher levels of acculturative stress than second-generation immigrants (Hovey & King, 1996; Lueck & Wilson, 2011; Mena et al., 1987). Although Hypothesis 3 was not supported, one possible explanation for the non-significant results and comparatively low acculturative stress scores is that the study was conducted in a racially and ethnically diverse university setting, with almost 68% of the participants indicating integration as their cultural preference. The students may experience less pressure to maintain their native cultural norms and the conflict of adopting behaviors and values from the United States than those who indicated marginalization as their cultural orientation. Another plausible explanation for the lower acculturative stress scores is that all of the participants are college students enrolled in the

Center for English Language Acquisition (CELAC) program. This program provides a wide range of resources to support and promote academic success through language acquisition classes, language labs, conversation practice, and individual graduate tutoring sessions. They also have access to counselors, faculty mentors, and peers who allow them the opportunity to discuss negative acculturation experiences and express their feelings in a supportive environment. Another possible explanation for the lack of difference in acculturative stress scores between the two generations is that second-generation immigrants also face the challenges of balancing two cultures, that of their cultural heritage and those of the United States. In addition, 74% of the sample self-identified as Latino/Hispanic; this may provide an environment in which they can speak their native language without feeling pressured to speak only English. The comparatively low mean acculturative stress scores and lack of statistical difference between the two generational groups may also be partly explained by previous studies showing that second-generation immigrant children also experience acculturative stress because they acculturate at a faster pace than their parents, which may result in conflicts in the home and disconnect with their less acculturated parents (Mena et al., 1987; Miranda, Bilot, Peluso, Berman, & Van Meek, 2006).

The second part of Hypothesis 3 stated that first-generation immigrant students would have higher levels of AL. Extensive research has shown that immigrants have better health on arrival to the United States, yet experience a decline in health after living here and may acquire unhealthy lifestyle practices (Albrecht et al., 2013). Although no significant difference was found between the biomarkers and generation, the BMI for the sample fell under the category of overweight (CDC, 2014). Lifestyle practices such as

exercise, smoking, and use of alcohol were not assessed in the sample, which may have added some clarity to the results. Research has suggested that age of arrival and years living in the United States are strong determinants for an individual's risk of weight gain (Kaushal, 2009; Oza-Frank & Venkat Narayan, 2010). There is evidence in the literature that generation, older age at immigration, and more years in the United States were associated with higher AL. In contrast to previous studies, total AL mean scores did not differ significantly between first- and second-generation students. This may be partially attributed to the relatively low mean number of years for first-generation students living in the United States. Empirical support has shown that immigrant health declines with longer residence in the United States due to acculturation and adoption of unhealthy behaviors. Several studies have indicated that some immigrant groups have lower AL scores upon arrival, but this health advantage disappears with longer residence in the United States (Doamekpor & Dinwiddie, 2015; Kaestner et al., 2009; Peek et al., 2010). One additional factor that may have impacted AL is that for the majority of the participants, their families were also living in the United States so they were not faced with separation from parents and siblings in their homeland. Family reunification has been associated with lower AL levels and lower levels of stress hormones (Bingham et al., 2016).

### **Acculturative Stress, Social Support, and Allostatic Load**

Hypothesis 4 was derived from the stress-buffering model (Cohen, 2004; Cohen & Wills, 1985b) and the AL model. The stress-buffering model posits that psychological support from family members, friends, and other social resources “buffers” or protects the individual from the negative psychological and physical health outcomes that can

result from multiple stressful events. Hypothesis 4 stated that perceptions of social support will affect the relationship between acculturative stress, and allostatic load. This hypothesis suggests that acculturative stress would have a direct effect on AL, and social support would mediate the effect on acculturative stress on AL. This hypothesis was not supported. Results showed there was no indirect relationship between AL and acculturative stress through social support. However, social support was a negative significant predictor of AL and has a direct significant relationship with AL. Social support has been associated with lower activity of the autonomic nervous system and HPA in response to stressors (Ditzen, Hoppmann, & Klumb, 2008). A previous study on AL and social relationships showed that higher levels of spouse negativity, family negativity, friend contact, and network level contacts were associated with higher AL (Brooks et al., 2014). Their results also suggested that network negativity was associated with higher AL among younger adults. The results of several other studies have suggested that the type and quantity of social support are associated with AL. Individuals with more social ties and higher levels of emotional support had lower AL scores (Seeman, Singer, Ryff, Love, & Levy-Storms, 2002c; Seeman et al., 2004). In another study of older Taiwanese adults, higher levels of perceived demands from others were associated with higher levels of AL. The stress-buffering hypothesis (Cohen & Wills, 1985a) posits that perceived availability of social support resources is beneficial for individuals experiencing stress. Perceived social support scores were high for the sample. The results do build on existing literature and suggest that social support and social relationships are associated with AL.

## **CHAPTER SIX: SUMMARY, CONCLUSIONS, IMPLICATIONS, RECOMMENDATIONS**

### **Summary**

The purpose of this study was to examine the relationships among level of acculturation, acculturative stress, social support, and allostatic load in a sample of first- and second-generation immigrant college students. There is a significant amount of evidence in the literature supporting the concept that cumulative, persistent stress—both psychological and physiological—contributes to chronic disease and increased morbidity, especially among vulnerable and disadvantaged populations, including immigrants. Acculturation as defined by Berry (2013) is a dynamic, bidirectional process of adaptation to stress and an individual's coping mechanism. Individuals vary in how well they adapt to the new culture, for some there are negative experiences which may be more accurately defined as acculturative stress. Acculturative stress is a “more specific concept than acculturation” and refers to a “reduction on health status” resulting from the process of acculturation (Berry et al., 1987, p.200). The acculturative stress model by Berry (1987) was based on the relationship between acculturation experience, stressors, and acculturative stress.

The acculturation process varies among individuals, resulting in varying levels of acculturative stress resulting from the acculturation experience. There is strong evidence linking acculturation stress with measures of AL. This includes numerous studies which have shown that the cumulative exposure to chronic stress and time living in the United States all contribute to higher levels of AL in new immigrants. In McEwen's allostatic load model, AL is described as the cumulative wear-and-tear on the body's system as a

result of repeated activation and deactivation of allostatic responses to stressful situations. AL can accumulate and increase in several ways: (a) the stressor is repeated over an extended period of time; (b) as a result of the continuous stress, the response to the stress diminishes; and (c) the stressor response does not recognize that the stressor has resolved and fails to shut down (McEwen, 2008). In response to perceived or actual stress, catechol amines, glucorticoids, and stress hormones epinephrine, norepinephrine, and cortisol are released. The physiological parameters reflecting AL are divided into primary mediators, secondary outcomes, and tertiary outcomes. AL is calculated as a total score index designed to summarize biomarkers across multiple systems (Seeman et al., 2010). Many immigrant college students are at increased cumulative risk due to academic and economic as well as social issues.

There is strong evidence of the stress-buffering effects of social support with regard to acculturative stress (Crockett et al., 2007). The acculturative stress model identifies social support as a variable that may serve as a “buffer” in reducing the level of acculturative stress in individual experiences. Based on the conceptual frameworks for acculturation stress, AL, and the effect of social support, the following hypotheses were formulated:

1. Hypothesis 1: Individuals who have a higher degree of acculturation are more likely to experience lower levels of acculturation stress.
2. Hypothesis 2: Individuals who experience increased levels of acculturation stress will be more likely to have higher scores of total allostatic load.

3. Individuals who are first-generation immigrants will have higher acculturative stress levels and higher scores of total allostatic load than second-generation immigrants.
4. Hypothesis 4: Perceptions of social support will affect the relationship between acculturative stress and allostatic load.

The sample ( $n = 73$ ) included undergraduate students attending Saint Peter's University who were English-speaking, self-reported as first- or second-generation immigrants, and did not have any injuries or chronic illnesses. The sample consisted of 31.5% male and 68.5% female, with 54.8% self-reporting as first-generation immigrants and 45.2% reporting as second-generation immigrants. Hispanic/Latino made up 74% of the sample, with the remaining sample consisting of 13.7% Black/African American, 6.8% Asian, and 4.1% other race. Participants completed a demographic questionnaire and instruments for measuring level of acculturation, acculturative stress, perceived stress, and perceived social support. Blood biomarkers were collected by finger stick. The dependent variable of the study was AL, operationally defined as a calculated total score index based on cardiovascular, metabolic, and anthropometric biomarkers. Acculturative stress was measured using the Social, Attitudinal, Familial, and Environmental Acculturative Stress (S.A.F.E.) Scale. General perceived stress was measured using the Perceived Stress Scale (PSS-10). Acculturation was measured using the Acculturation, Habits, and Interests Multicultural Scale for Adolescents (AHIMSA). Perceived social support was measured using the Multidimensional Scale of Perceived Social Support (MSPSS). Statistical analyses were carried out with Statistical Package for the Social Sciences (SPSS) Version 24. The level of significance for hypothesis testing was

calculated at the .05 level. Data were first examined for outliers and anomalous data entries. Tests for normality and equal variances were performed. Sample characteristics were summarized using descriptive analysis. Tests for skewness and kurtosis were performed. Pearson chi-squares were conducted to determine if there were differences between gender and generation, and differences in level of income between first and second generations.

The results were not statistically significant. The majority of the sample (67%) indicated their acculturation orientation as integration. No significant difference was found between generation and level of acculturation. Independent t-tests showed no statistical difference in biomarkers between first- and second-generation students. Acculturative stress scores and total AL scores were not significantly different between generations; however, there was a significant difference in AL scores between male and female, with males showing higher AL scores. The mean sample social support score indicated high levels of social support; however, social support scores did not differ significantly between first and second generations.

Hypothesis 1 was supported through the research findings. The results suggested that level of acculturation was a significant predictor of acculturative stress. Acculturation stress decreased for those individuals who indicated their level of acculturation as being either one of assimilation or integration.

Hypothesis 2 was not supported through this research. However, there were significant correlations between the individual biomarkers of systolic/diastolic blood pressure and acculturative stress. The cross-sectional design, small sample size, the recruitment of healthy college students with a mean age of 18 and relatively low

acculturative stress scores may have been limitations. Inclusion of neuroendocrine and immune biomarkers should be considered.

Hypothesis 3 was not supported through this research. As stated above, the small sample size, low acculturative stress scores, mean length of time in the United States (6.6 years) for first generation, and lack of neuroendocrine biomarkers may not reflect true biological activities.

Hypothesis 4 was partially supported. The results as stated in Hypothesis 3 showed a non-significant correlation between acculturative stress and AL; however, social support was a negative significant predictor of AL and had a direct significant relationship with AL. Linear regressions were performed separately with each of the social support subscales (friends, family, and significant other). Friends social support subscale was significantly negatively correlated, and the results of the final regression indicated that friends social support and acculturative stress did significantly predict AL.

### **Implications for Nursing**

The findings in this study may provide important information for nurses and other health care providers on the role of social support and AL, in addition to the association between acculturative stress and level of acculturation. Immigrant students who are in the marginalized or separated category of acculturation may experience higher levels of acculturative stress, as compared to those who identify with integration. Acculturative stress is associated with anxiety, depressive symptoms, and predictors of suicidal behaviors, which underscore the importance of assessing acculturative stress in immigrant college students. Developing interventions that address difficulties associated with acculturative stress would be beneficial to the students. The measure of AL is

especially useful in young adults where single measures (i.e., blood pressure or glucose) may not indicate the precursors to future cardiovascular disease. The evidence in the literature is substantial, indicating that higher AL scores predict increased mortality (Crimmins, Kim, Alley, Karlamangla, & Seeman, 2007; Geronimus, Hicken, Keene, & Bound, 2006; Seeman, Singer, Ryff, Love, & Levy-Storms, 2002b; Seeman et al., 2004).

The results of this study add to the literature the significance of social support and AL, particularly friends social support, among immigrant college students. Previous studies have suggested that perceived social support significantly contributes to psychological well-being. Higher social support and positive social relationships are associated with lower AL. Using measures of AL in conjunction with measures of social support could be extremely valuable in predicting both psychological and physical health risks in young adults. Nurses in the college health setting and primary care clinics can be instrumental in promoting annual health physical examinations, offering preventive screenings and use of health services, and encouraging immigrant students to develop social networks and identify major stressors that may result from both academic and social pressures. Because AL provides direct measures of biological outcomes rather than relying on individuals' self-report as a measure of their health, it is a far better predictor of risk for obesity and other stress-related chronic diseases such as atherosclerosis, hypertension, and cardiovascular disease. In young adults, measurable AL could be an early warning sign of accumulating health risks and useful in predicting potential poor health outcomes.

### **Recommendations**

As the data for this study came from one site, it may not be representative of immigrant college students across the country. Future studies should include samples from other geographic regions and private and public universities, especially institutions that are less diverse and where the majority student population is Caucasian. It would be important to include LGBT immigrant college students in future studies, as well as immigrant young adults not attending college. For first-generation immigrant students, it would have been beneficial to consider the reason for immigration, as possible pre-migration trauma could be a factor. Previous research has suggested a relationship between acculturative stress and risk for mental health issues. Future studies should include measures of depression and anxiety, self-esteem, and the effect of stress-coping resources on acculturative stress. Additional intermediate factors to examine may include the effects of health behaviors—exercise, use of alcohol, smoking, sleep, and diet, as well as measures of stress relief on AL. There is evidence that stress and sleep have a reciprocal relationship, and that poor sleep and psychological stress combined can contribute to AL. Sleep deprivation can be considered as an additional factor affecting AL. To better understand the complex relationship of acculturative stress and AL, it would be critical to include multiple psychological factors, such as coping skills and resilience, and their impact on acculturative stress and AL.

In addition to biomarkers as measures of AL, heart rate variability (HRV), which refers to the beat-to-beat changes in heart rate, has also been identified as a possible marker of AL. HRV appears to be sensitive and responsive to acute stress and cumulative stress due to autonomic nervous system activity (Tonello et al., 2007). Future studies

should be considered to examine the relationship between acculturative stress and AL with HRV as a monitoring tool.

### **Limitations**

There were several limitations to this study. The cross-sectional design was a limitation to the study as only associations and not causation can be inferred. Studies on AL are interested in chronic stress measures, with stressors accumulating over a number of years. A longitudinal study would allow participants to be observed at multiple times. One of the strengths of the study was the inclusion of a measure of general perceived stress to better distinguish the specific effects of acculturative stress. The small sample size and disproportionately low number of men compared to women as well as the lack of information on health behaviors (i.e., diet, exercise, and smoking) were limitations. Another potential limitation of the study was the number of biomarkers analyzed. There are no single set of standardized biomarkers to calculate an index allostatic load; however, evidence does support measuring biomarkers representing major biological systems for assessing cumulative health risk (Seeman, Merkin, Karlamangla, Koretz, & Seeman, 2014). The biomarkers in this study did include systolic and diastolic blood pressure (indicators of cardiovascular activity), waist-to-hip ratio (a metabolism index and adipose tissue deposition), total lipid profile (risk factors for development of atherosclerosis), and glycosylated hemoglobin (HbA1c is a marker for glucose metabolism). Due to logistics and financial restraints, this study did not include neuroendocrine or immunological biomarkers, which would indicate inflammation, clotting factors, and immune function, thus increasing the potential for false negative findings (Galen Buckwalter et al., 2015).

## **Conclusions**

There is increased evidence that integration as an acculturation strategy is associated with more positive adaptations than either separation or marginalization (Berry, 2013), although some studies have seen poor health outcomes associated with individuals who are less acculturated. The findings from this study reflected the complexity of the acculturation process, the effect of the individuals' experiences, and the role of acculturative stress. More research is needed to better understand the relationship between patterns of acculturation and AL. Future research should continue to examine health behaviors relating to immigration and ethnicity and how they may influence AL. Allostatic load provides a direct measure of biological outcomes rather than relying on the individuals' own self-reports as a measure of their health; therefore, it is a far better predictor of stress-related chronic diseases. Future research using a longitudinal design is necessary to examine the relationship between social support and AL. Young adulthood is a key time to make lifestyle changes and promote health behaviors that can markedly alter an individual's lifetime risk.

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## Appendix A

## Demographic Questionnaire



## Demographic Questionnaire

Subject # \_\_\_\_\_

1. What is your age? \_\_\_\_\_
2. What is your gender
  - ☐ Male
  - ☐ Female
3. What is your racial background?
  - ☐ American Indian or Alaska Native
  - ☐ Asian
  - ☐ Black or African American
  - ☐ Hispanic/Latino
  - ☐ Native Hawaiian or Other Pacific Islander
  - ☐ Other Race
  - ☐ White
4. Where were you born (country)? \_\_\_\_\_
5. How many years have you lived in the US (if applicable)
6. Where were your parent(s) born?  
 Mother \_\_\_\_\_ Father \_\_\_\_\_
7. How many years have you attended college?
8. What is your cum GPA?
9. Number of years of education completed by  
 Mother \_\_\_\_\_ Father \_\_\_\_\_
10. Family income
  - ☐ Less than \$21,000/year
  - ☐ \$21,000-\$35,000/year
  - ☐ \$35,000-\$50,000/year
  - ☐ Greater than \$50,000/year

## Appendix B

## S.A.F.E. Acculturation Stress Scale



Subject # \_\_\_\_\_

## SAFE Acculturation Stress Scale (Mena et al., 1987)

Below are a number of statements that might be seen as stressful. For each statement that you have experienced, circle only one of the following numbers (1, 2, 3, 4, or 5), according to how stressful you find the situation.

If the statement does not apply to you, circle number 0: Have Not Experienced.

- 0 = HAVE NOT EXPERIENCED  
 1 = NOT AT ALL STRESSFUL  
 2 = SOMEWHAT STRESSFUL  
 3 = MODERATELY STRESSFUL  
 4 = VERY STRESSFUL  
 5 = EXTREMELY STRESSFUL  
 STATEMENTS

- |   |             |
|---|-------------|
| 1. I feel uncomfortable when others make jokes about or put down people of my ethnic background.    | 0 1 2 3 4 5 |
| 2. I have more barriers to overcome than most people.   | 0 1 2 3 4 5 |
| 3. It bothers me that family members I am close to do not understand my new values.                 | 0 1 2 3 4 5 |
| 4. Close family members have different expectations about my future than I do.                      | 0 1 2 3 4 5 |
| 5. It is hard to express to my friends how I really feel.   | 0 1 2 3 4 5 |
| 6. My family does not want me to move away but I would like to.                                     | 0 1 2 3 4 5 |
| 7. It bothers me to think that so many people use drugs.  | 0 1 2 3 4 5 |
| 8. It bothers me that I cannot be with my family.   | 0 1 2 3 4 5 |
| 9. In looking for a good job, I sometimes feel that my ethnicity is a limitation.                   | 0 1 2 3 4 5 |
| 10. I don't have any close friends.   | 0 1 2 3 4 5 |
| 11. Many people have stereotypes about my culture or ethnic group and treat me as if they are true. | 0 1 2 3 4 5 |
| 12. I don't feel at home.   | 0 1 2 3 4 5 |
| 13. People think I am unsociable when in fact I have trouble communicating in English.              | 0 1 2 3 4 5 |
| 14. I often feel that people actively try to stop me from advancing.                                | 0 1 2 3 4 5 |
| 15. It bothers me when people pressure me to become part of the main culture.                       | 0 1 2 3 4 5 |
| 16. I often feel ignored by people who are supposed to assist me.                                   | 0 1 2 3 4 5 |
| 17. Because I am different I do not get the credit for the work I do.                               | 0 1 2 3 4 5 |



18. I bothers me that I have an accent.....	0 1 2 3 4 5
19. Loosening the ties with my country is difficult.....	0 1 2 3 4 5
20. I often think about my cultural background.....	0 1 2 3 4 5
21. Because of my ethnic background, I feel that others often exclude me from participating in their activities.....	0 1 2 3 4 5
22. It is difficult for me to "show off" my family.....	0 1 2 3 4 5
23. People look down upon me if I practice customs of my culture.....	0 1 2 3 4 5
24. I have trouble understanding others when they speak.....	0 1 2 3 4 5

## Appendix C

## Acculturation, Habits, and Interests Multicultural Scale for Adolescents (AHIMSA)



Subject # \_\_\_\_\_

**AHIMSA**  
**Acculturation, Habits, and Interests Multicultural Scale for Adolescents**

**Directions:**

Please complete the following statements by saying:

1. "The United States"
2. "The country my family is from"
3. "Both countries"
4. "Neither country"

Pick only one of those choices to complete the sentence.**Scale items:**

- |   |   |   |   |   |
|---|---|---|---|---|
| 1. I am most comfortable being with people from...                  | 1 | 2 | 3 | 4 |
| 2. My best friends are from...                                      | 1 | 2 | 3 | 4 |
| 3. The people I fit in with best are from...                        | 1 | 2 | 3 | 4 |
| 4. My favorite music is from...                                     | 1 | 2 | 3 | 4 |
| 5. My favorite TV shows are from...                                 | 1 | 2 | 3 | 4 |
| 6. The holidays I celebrate are from...                             | 1 | 2 | 3 | 4 |
| 7. The food I eat at home is from...                                | 1 | 2 | 3 | 4 |
| 8. The way I do things and the way I think about things are from... | 1 | 2 | 3 | 4 |

## Appendix D

## Multidimensional Scale of Perceived Social Support (MSPSS)



Subject # \_\_\_\_\_

## Multidimensional Scale of Perceived Social Support (Zimet, Dahlem, Zimet &amp; Farley, 1988)

Instructions: We are interested in how you feel about the following statements. Read each statement carefully. Indicate how you feel about each statement.

- 1 = Very Strongly Disagree  
 2 = Strongly Disagree  
 3 = Mildly Disagree  
 4 = Neutral  
 5 = Mildly Agree  
 6 = Strongly Agree  
 7 = Very Strongly Agree

- |   |               |
|---|---------------|
| 1. There is a special person who is around when I am in need.           | 1 2 3 4 5 6 7 |
| 2. There is a special person with whom I can share my joys and sorrows. | 1 2 3 4 5 6 7 |
| 3. My family really tries to help me.                                   | 1 2 3 4 5 6 7 |
| 4. I get the emotional help and support I need from my family.          | 1 2 3 4 5 6 7 |
| 5. I have a special person who is a real source of comfort to me.       | 1 2 3 4 5 6 7 |
| 6. My friends really try to help me.                                    | 1 2 3 4 5 6 7 |
| 7. I can count on my friends when things go wrong.                      | 1 2 3 4 5 6 7 |
| 8. I can talk about my problems with my family.                         | 1 2 3 4 5 6 7 |
| 9. I have friends with whom I can share my joys and sorrows.            | 1 2 3 4 5 6 7 |
| 10. There is a special person in my life who cares about my feelings.   | 1 2 3 4 5 6 7 |
| 11. My family is willing to help me make decisions.                     | 1 2 3 4 5 6 7 |
| 12. I can talk about my problems with my friends.                       | 1 2 3 4 5 6 7 |

## Appendix E

## Perceived Stress Scale



Perceived Stress Scale (Cohen et al., 1983)

Subject # \_\_\_\_\_

The following questions ask about your feelings and thoughts during THE PAST MONTH. In each question, you will be asked HOW OFTEN you felt or thought a certain way. Although some of the questions are similar, there are small differences between them and you should treat each one as a separate question. The best approach is to answer fairly quickly. That is, don't try to count up the exact number of times you felt a particular way, but tell me the answer that in general seems the best.

For each statement, please tell me if you have had these thoughts or feelings: never, almost never, sometimes, fairly often, or very often. (Read all answer choices each time)

	Never	Almost Never	Sometimes	Fairly Often	Very Often
1. In the past month, how often have you been upset because of something that happened <u>unexpectedly</u> ?	0	1	2	3	4
2. In the past month, how often have you felt unable to control the <u>important</u> things in your life?	0	1	2	3	4
3. In the past month, how often have you felt nervous or stressed?	0	1	2	3	4
4. In the past month, how often have you felt confident about your ability to handle personal problems?	0	1	2	3	4
5. In the past month, how often have you felt that things were going <u>your way</u> ?	0	1	2	3	4
6. In the past month, how often have you found that you could not <u>cope</u> with all the things you had to do?	0	1	2	3	4
7. In the past month, how often have you been able to control <u>irritations</u> in your life?	0	1	2	3	4
8. In the past month, how often have you felt that you were on top of things?	0	1	2	3	4
9. In the past month, how often have you been angry because of things that happened that were <u>outside</u> of your control?	0	1	2	3	4
10. In the past month, how often have you felt that difficulties were piling up so high that you could not <u>overcome</u> them?	0	1	2	3	4

## Appendix F

## Institutional Review Board Letter



**Saint Peter's**  
UNIVERSITY

Institutional Review Board

To: Professor Lisa Garsman  
Nursing Department  
School of Nursing  
Saint Peter's University

From: Dr. Peter P. Cvek, chair  
SPU Institutional Review Board

Date: December 2, 2016

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Project Title: A study on the effect of social support on acculturation stress, obesity, and measures of allostatic load (AL) among first and second-generation immigrant college students

Protocol Approval Date: December 2, 2016 – May 1, 2017

In accordance with DHHS Regulations for Protection of Human Subjects (45 CFR 46.110), the human subjects application for this project underwent **Expedited** review and was approved as minimal risk to subjects. This project is approved as of December 2, 2016 for the designated time-line and the approval remains active until May 1, 2017.

The investigator agrees to conduct this research project in accordance with the Belmont Report, all SPU Institutional Review Board guidelines, as well as all applicable local laws and regulations.

Re-review of this project is required if:

You wish to continue the project beyond May 1, 2017.

There are any changes in the protocol.

There are any reports of injury or unanticipated problems involving risks to human subjects.

Note: any injuries or adverse events must be reported to the IRB within three days of the event.

The IRB wishes you the best of luck in the successful completion of your project.

Peter P. Cvek, Ph.D.  
Chair, Institutional Review Board  
Saint Peter's University  
pcvek@saintpeters.edu

## Appendix G

## Literature Review and Conclusions

Author/Year	Participants	Relevant Conclusions
Albrecht et al. (2013)	Data was collected on 1,486 Hispanic and 802 Chinese Adults to examine whether foreign-born participants experienced greater increases in BMI and waist circumference (WC) than US born	The foreign-born had a lower adjusted mean BMI and WC than the US-born. Longer time in the US may be linked to adverse anthropometric changes in some immigrant groups
Bates, Acevedo-Garcia, Alegria, & Krieger (2008)	Data was collected on a nationally representative sample of first-, second-, and third generation Latinos and Asian Americans to look at the association between BMI and nativity	Generational status is associated with increased BMI and obesity among Latinos and Asian Americans
Choi, Hwang, & Yi (2011)	Data was collected from 600 Vietnamese university students to examine the effects of acculturation, body perception, and health behaviors on weight.	Nativity and length of US residence were significant predictors of weight status. Foreign-born individuals were less likely to be overweight than US-Born.
Fialkowski et al. (2015)	Secondary analyses, with a longitudinal design, was done on data from early adolescent girls to examine if the changes in development of overweight/obesity was associated with acculturation	Demonstrated race/ethnic groups possess significantly different overweight profiles. Hispanic adolescent girls had a higher probability of being overweight compared to Asian/non-Hispanic whites
Franzen-Castle & Smith (2014)	Data collected from 300 second generation born Hmong children was used to explore environmental, personal, and behavioral influences on BMI and acculturation	50% of children were classified as over/weight/obese. Across age and gender sub-groups, acculturation scores were predictive of variances in BMI percentiles.
Kaushal (2009)	Data from the National Health Interview Survey (1990-2004) looked at prevalence of obesity and length of stay among immigrants	Immigrants with a BA degree did not experience any change in obesity as length of stay increased, as opposed to those without BA, with increased obesity within first 5 years of residence and earlier age of arrival.
Koya & Egede (2007)	Cross-sectional study using data on 5,230 immigrant adults from the 2002 National Health Interview Survey (NHIS). Explored the association between length of US residence and major cardiovascular risk factors (CVD).	Results suggest that length of residence (a proxy for acculturation) is associated with increased odds of CVD risk factors among US immigrants. Longer length of residence is associated with obesity and hyperlipidemia.
Oza-Frank & Venkat Narayan (2010)	Cross-sectional design using 2005 NHIS data from immigrant adults (18-74 years of age). Explored the association between length of residence and being overweight by birth and age of arrival.	Results showed the odds of being overweight were 3 times higher in migrants from Mexico, South America, Europe, Russia, Africa and the Middle East residing in the US > 15 years than their counterparts residing in the US < 5 years

Popkin & Udry (1998)	Data from The National Longitudinal Study of Adolescent Health Survey of 13,783 adolescents was used to explore ethnicity, age, gender, and intergenerational patterns of adolescent obesity	Obesity rates: white non-Hispanics, 24.2%, black non-Hispanics, 30.9%; all Hispanics, 30.4% all Asian- American, 20.6%. Asian-American and Hispanic adolescents born in the US are more than twice as likely to be obese as are first generation.
Ro (2014)	Empirical review of the negative acculturation theory among Asian immigrants	Length of residence is an important aspect of Asian immigrant health
Schaefer et al. (2009)	Data from 144 Asian American and Mexican American female adolescents was used to explore the relationship between acculturation, socioeconomic, BMI and % Body Fat (BF).	Mexican-American female adolescents had a greater tendency toward overweight ( $p < 0.01$ ) than Asian-American. Income and acculturation may predispose toward chronic disease.

Author/Year	Participants	Relevant Conclusions
Brody et al., 2013	Longitudinal study of 443 African American youths. Cumulative SES risk and protective processes were assessed at ages 11-13, 14-18. Genotyping done at age 16, and allostatic load measured at age 19.	Psychosocial stressors impact African American adolescents, suggesting that it increases their vulnerability to poor health by eliciting a cascade of biological responses that overtime damage the body's stress response (AL)
Chao et al., 2014	Cross-sectional design, 4552 Taiwanese university students evaluated parental socioeconomic status (SES) with BMI, systolic/diastolic blood pressure	Low SES (parental education, occupation, household incomes) is associated with the risk of central obesity. Students with central obesity had higher BMI, higher blood pressure, and family history of DM, HTN, and low SES.
Doamefpor & Dinwiddie, 2015	Data from 2001-2010 National Health and Nutrition Examination Survey was used to compare allostatic load (AL) scores for US-born (n = 2745) and foreign-born (n = 152)	For foreign-born Blacks, length of stay and age were powerful predictors of AL. Foreign-born Blacks have a health advantage in AL.
Goodman et al., 2005	Cross-sectional design, data from 758 adolescent non-Hispanic black and white high school students was used to explore the associations between socioeconomic status, biomarkers reflective of CV risks, and cumulative physiological risk score.	Lower parent education was associated with higher insulin, higher glucose/insulin resistance, higher LDL/lower HDL, higher BMI. Suggest a strong intergenerational transfer of education's influence on CV risks.
Gruenewald et al., 2012	Data from the Biomarker Sub study of the Study of Midlife in the US (MIDUS). 1008 adults (92.2% White) explored SES adversity and AL across adulthood	Multiple indicators of SES adversity in childhood, and 2 points in adulthood were used to construct SES adversity measures for each phase. Results indicated higher AL with greater SES adversity as each phase, and cumulatively across the life course.
Hickson et al., 2012	Cross-sectional design, sample of 4048 middle-aged and elderly African American (AA) adults. Examined the social patterning of cumulative dysregulation of multiple systems (AL)	Lower SES (income/education) were associated with higher AL scores, metabolic/immune components in AA women; neuroendocrine component in AA men.
Peek et al., 2010	Data from Texas City Stress and Health Study 2004-2006. Sample size n = 1410 Whites, Blacks, Mexican origin (foreign/US born). Examined the relationship between ethnicity, nativity and acculturation in adults.	Results found that Blacks had higher total AL scores, CV and inflammatory marker scores. Significant advantages in AL among foreign-born Mexicans, even when accounting for acculturation.
Seeman et al., 2010	Data from Coronary Artery Risk Development in Young Adults Study (CARDIA, 2000). 782 men/women aged 32-47. Biomarkers included: blood pressure, metabolic parameters, inflammation markers, heart rate variability, and sympathetic nervous system activity.	Operationalized AL as a multisystem index of biological dysregulation. Providing support for the AL model.

Author/Year	Participants	Relevant Conclusions
Adams, Santo, & Bukowski, 2011	Saliva samples were collected from 103 adolescents to examine how the presence of a best friend might serve as protection against the effect of negative experiences on self-worth and HPA axis.	Having a best friend present significantly buffered the effect of the negativity of the experience on cortisol and self-worth.
Brody et al., 2013	The association between allostatic load, cumulative socioeconomic status risk, genetic and contextual protective factors (i.e. social support) from 443 African American youths.	Genotyping and receiving less peer support distinguished the physical health vulnerability profile from the resilient profile. Suggesting the importance of peer support in reducing the effects of chronic stress in adolescence.
Brody et al., 2014	A longitudinal analysis of the relationship between harsh parenting, adolescent anger, and C-Reactive Protein, depressive symptoms, and health problems (AL) in late adolescence in African American youths (n = 368)	Harsher parenting was associated positively with anger and cumulative poor health (AL).
Lee, Koeske, & Sales, 2004	Data from Korean international students (n = 74) examined the relationship between acculturative stress and mental health symptoms and the role of social support as a moderator	Acculturative stress was strongly correlated with mental health symptoms. Social support moderated and buffered the effect of stress on symptoms.
Ozer & McDonald, 2006	Cross-sectional study examined exposure to violence as predictor of mental health in a sample of 71 Chinese American young adolescents	Adolescents who experienced more violence reported more symptoms of depression and PTSD. Daily stress was also strongly associated with self-reported depression.
Seeman et al., 2002	AL and the effect of social integration/support on morbidity and mortality risks was assessed in two cohorts of older adults (n = 106, n= 765).	Men with positive social experiences and more frequent emotional support had lower AL scores.
Seeman et al., 2014	Data from the Coronary Artery Risk Development in Young Adults (CARDIA) longitudinal study (N = 5115) was used to examine the association of social relationships with differences in levels of allostatic load.	Social strains were positively related to overall AL (Cohen's d = .79). Social ties and emotional support were negatively related to AL (Cohen's d = .33 and d = .44 for lowest vs. highest quartiles of ties and support). Findings suggest a strong relationship between social strains and biological risk, and the cumulative impact of social factors on biological risk.