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Status Incongruity in Samoan Youth: A Biocultural Analysis of Culture Change, Stress, and Immune Function

In Samoa, the presence of a matai *title in the family has historically been a valued source of social status. However, as the process of Westernization continues, new sources of social status are emerging. This study explores the degree to which new and old markers of social status agree—or disagree—and the consequences they have for the experience of stress in 329 Samoan adolescents. The study integrates cultural and biological methods and data, and measures an aspect of immune function (antibodies against the Epstein-Barr virus) as a biomarker of psychosocial stress. Results indicate that status "incongruent" adolescents experience significantly more stress (indicated by reduced immune function), and that emerging markers of social status are becoming inextricably linked to "traditional" markers in such a way that discordance between them is a significant source of stress. This study proposes new conceptual models for future studies of culture change and suggests that biomarkers may represent ethnographic tools that can provide insight into hidden cultural dynamics and the experience of stress.* [status inconsistency, Westernization, psychoneuroimmunology, adolescence, South Pacific]

The physical and mental health consequences of rapid cultural and economic change have been topics of long-standing interest to anthropologists and public health researchers. Whether they claim to be investigating "culture change," "Westernization," "acculturation," "modernization," or "urbanization," studies in this area all share a common goal: to link individual well-being to surrounding political, economic, and sociocultural processes. This has become a pressing global issue, as over 60 percent of the world's population will be living in urban areas by 2025, and the number of urban residents in developing countries is expected to double or triple in the near future (Parmar 1992; United Nations 1993). Anthropology is well positioned to make productive contributions to these issues by providing insight into the dynamics of culture change and its impact on individual well-being.

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There is also a pressing need for research on children and adolescents to complement the current emphasis on adults. Despite recognition of the growing challenges that face youth in the context of rapid globalization (Black and Krishnakumar 1998; Blanc 1994; Desjarlais et al. 1995; Harpham and Blue 1995), conceptual models specifically relevant to the experience of youth are lacking. This omission is particularly glaring for anthropology, where adolescent "storm and stress" has been a central issue since the early work of Margaret Mead, and where childhood and adolescence are recognized as critical periods of socialization into adult roles and responsibilities.

Research into culture change, psychosocial stress, and health has been hindered by a number of conceptual and methodological difficulties. The notion of "Westernization"[1]—typically defined on a macro-level by the development of a cash economy, secularized government, formal education system, and urban residential units (Levy 1966; Spindler 1984)—is problematic and is often uncritically applied in comparisons of migrants or residents of urban and rural areas (McDade and Adair 2001). New models of culture change are needed that provide a better representation of the proximate person–environment dynamics that define the lived experience of individuals. These models must then be connected to a marker of stress—despite its own challenges in definition and measurement—in order to construct a framework that links culture, the individual, and biology in a meaningful way (Dressler 1995; Dressler and Bindon 2000).

This study attempts to advance cross-cultural stress research through an integration of biological and cultural methods in pursuit of three objectives. First, this study investigates culture change as a source of psychosocial stress in Samoan adolescents to complement the current emphasis on adults.[2] Second, the study develops status incongruity as a conceptual model of culture change that is informed by social theory and local ethnography. Third, on the methodological level, this study evaluates the utility of a new biomarker of psychosocial stress—antibodies against the Epstein-Barr virus—and how this biomarker may be used as an ethnographic tool to gain insight into complex cultural processes.

Modeling Culture Change and Stress: Status Incongruity

Anthropology is marked by a diversity of conceptual and methodological approaches to stress research, with levels of analysis that range from global political economy to local social or ecological disruption, individual mental and physical health, and human physiology. Although the methods and goals of these approaches vary, they all share an interest in the human stress experience across cultures and the specific cultural, ecological, and historical contexts that give it meaning. Of most relevance to the analysis presented here is the work of medical and biological anthropologists who have reported quantitative associations between exposure to nontraditional, Western ways of living—through migration or local change—and self-reported symptoms of physical and emotional distress or physiological measures of stress (e.g., Brown 1982; Graves and Graves 1985; Hanna and Fitzgerald 1993; James et al. 1987; Janes 1990; McGarvey and Schendel 1986; Pollard et al. 2000).

Defining and Measuring Culture Change

Of fundamental importance to all investigations of culture change and stress is a meaningful representation of the surrounding cultural environment. Previous quantitative research has relied on three general approaches to modeling local change: (1) ecological comparisons, (2) assessing levels of "exposure" to novel lifestyles, and (3) inconsistency models.

In the first approach, ecological models employ group-level comparisons of individuals sharing a common biogenetic history but currently living in divergent geographic locations that differ in some meaningful way. This approach has been important for studies of Westernization and health, where comparisons between urban and rural residents or migrants and sedentes have revealed significant differences in various measures of psychological and physical well-being (e.g., Jenner et al. 1987; Patrick et al. 1983; Wessen et al. 1992). Much work in Samoa has relied heavily on this model, where the "modernization" gradient from rural (Western) Samoa to American Samoa and Hawai'i has been associated with ecological differences in blood pressure and stress hormone levels (Baker et al. 1986; McGarvey and Baker 1979; Pearson et al. 1993). In these studies, geographic location provides a proxy for exposure to and engagement in nontraditional ways of living and thinking.

Although ecological comparisons are relatively easy to conduct, they are limited in that causation is impossible to ascertain, and confounding is possible as group differences may be because of factors other than those of interest. Further, assumptions about the nature of the difference between groups need to be evaluated, and substantial heterogeneity of experience *within* the comparison groups may be obscured (McDade and Adair 2001). Nevertheless, ecological analyses have been critical in establishing a link between Westernization and health, and they have provided a solid foundation for studies of culture change and stress.

In moving beyond the group level of analysis, "exposure" models of culture change attempt to rate each *individual's* level of experience with emerging, nontraditional lifestyles. Scales are created to quantify the level of exposure, and the degree of correlation between this exposure and the health outcome of interest is investigated while controlling for potential confounders. For example, James et al. (1987) created a "Western Profile" index—summing information on English language ability, travel, relatives overseas, education, and parental occupation—that was positively associated with urinary catecholamine excretion in (Western) Samoan men.

In general, these exposure models share with the ecological approach an attempt to represent the association between experience with nontraditional ways of life and well-being in a linear, additive way: aspects of Westernization lead to rapid changes in the local sociocultural landscape, posing adaptive challenges that may result in psychosocial stress. Of course, there are exceptions to this pattern: Graves and Graves (1979) have reported a negative association between "Western exposure" and health status in the Cook Islands, and Brown (1982) found that Filipino immigrants to Hawai'i with intermediate levels of "culture contact" have elevated stress hormone levels, while low- and high-contact immigrants have lower levels. Indeed, exceptions such as these underline the complexity of culture change

and have encouraged further development of models for cross-cultural stress research with greater explanatory power.

Inconsistency models represent the third approach to investigating the relationships between culture change and stress. These models diverge from ecological and exposure models in that they simultaneously explore multiple dimensions of Westernization experience, and do not assume that exposure to nontraditional lifestyles is related to stress in an additive fashion. Rather, these models attempt to capture the tensions, conflicts, and ambiguities that arise within individuals living in the context of cultural diversification. In this approach, Westernization itself is not assumed to universally result in stress; instead, it is the social and/or psychological dissonance associated with rapid change that may be causal.

Models of status inconsistency have their origins in Weberian social theory, where an individual's social status is derived from multiple sources to advertise a certain style of life or social worthiness (Dressler 1988). Consistency across these domains leads to the projection of a coherent social identity, but inconsistency can produce ambiguity and tension, resulting in psychosocial stress. Sociologists have seized on this concept and linked numerous models of status inconsistency to a number of social and psychological outcomes (Hope 1975; Hornung 1977; Lange et al. 1991), while a number of anthropologists have applied variations of these models to a range of ethnographic contexts.

Dressler and colleagues have been most productive in this regard, reporting significant associations between elevated blood pressure and "lifestyle incongruity" in the West Indies, southern Alabama, Mexico, and Brazil, as well as American and (Western) Samoa (Bindon et al. 1991; Bindon et al. 1997; Chin-Hong and McGarvey 1996; Dressler 1982, 1990; Dressler, Dos Santos, et al. 1987; Dressler, Mata, et al. 1987). In this model, occupational/educational class and outward symbolic signs of prestige (e.g., ownership of Western consumer goods, travel, etc.) are proposed to be important axes of social status, and discrepancy between them is hypothesized to result in psychosocial stress. Dressler argues that lifestyle incongruity is a particularly useful model for culture change and stress in the context of globalization, because Western lifestyles and material goods tend to be associated with high status around the world, while developing economies cannot provide enough wage-based jobs to support the demand for high levels of consumption.

Others have adapted the concept of status inconsistency to the specific ethnographic contexts within which they worked. For example, McGarvey and Schendel (1986) found that for men in American Samoa, having a high-status job but relatively low educational status was associated with elevated blood pressure. For Samoan migrants in California, Janes (1990) identified economic status and leadership in the local community as two important dimensions of social status and found that inconsistency between them was associated with increased blood pressure. In a recent offshoot of previous work on lifestyle incongruity, Dressler and colleagues have developed the concept of "cultural consonance" as a tool for assessing the degree to which individuals conform to locally defined cultural models for a "successful" lifestyle. A lack of consonance has been linked to elevated blood pressure in Brazil (Dressler and Bindon 2000).

Models of status inconsistency all share a common conceptual foundation. In a given ethnographic context, an increasing level of exposure to, or engagement in, nontraditional, Western ways of life leads to changes in the sociocultural landscape

that foster the emergence of new, locally meaningful markers of social status. To the extent that these markers are in agreement within individuals, a coherent social identity is projected. However, disagreement—or status inconsistency—may invalidate an individual's claim to a certain social prestige, thereby resulting in stress. Status inconsistency represents a dynamic measure of individual experience vis-à-vis culture change that incorporates individual as well as contextual factors to provide a more realistic and proximate representation of the struggles facing individuals in the context of ongoing Westernization.

In developing models of status inconsistency, the challenge is to identify meaningful markers of social status in a given ethnographic situation, and to operationalize them in such a way that they can be related quantitatively to outcome measures of stress. Two locally important dimensions of social evaluation must be present, and each must be scalable in such a way that individuals can be recognized as being "high" or "low" with respect to their peers on each scale (Hartman 1974). In ethnographic situations where such conditions are met, a measure of status inconsistency can be constructed and quantified.

In previous work among Samoan adolescents, a significant association between lifestyle incongruity and stress was found such that adolescents from households where the level of consumption of Western material goods exceeded socioeconomic status had higher burdens of psychosocial stress (McDade 2001). These findings extended the utility of the lifestyle incongruity model from adults to adolescents, but the question remained as to whether this was the most relevant model of culture change and social status for adolescents, particularly since adolescents have yet to attain a relatively independent social identity through occupational or educational attainment. For this reason, a new status inconsistency model—referred to here as *status incongruity* to identify it as a specific application of status inconsistency—was developed to capture the unique ethnographic situation of adolescents in Samoa and its implications for the experience of stress.

Defining and Measuring Stress

Stress is a slippery concept that is rarely defined explicitly yet retains a high degree of conceptual and methodological utility. In behavioral science research, the term *stress* has been used to signify aspects of the social and cultural environment; the perception of a certain level of anxiety or discomfort; reports of mental, behavioral, social, or physical problems; or clinical or physiological assessment of biological outcomes. In an attempt to avoid any confusion, in this section I define *stress* and its associated terms and describe how they are applied in this analysis.

Current stress research owes a substantial intellectual debt to Hans Selye (1976), whose "General Adaptation Syndrome" provides an implicit framework for work in fields as diverse as mammalian physiology and cultural anthropology. Although the terms have changed over the years and aspects of the stress process have received varying degrees of attention (Elliott and Eisdorfer 1982; McEwen and Stellar 1993), the conceptual foundation remains largely the same. Building on this tradition, the following stress model is employed here: The term *stress* describes a process that incorporates the following elements: (1) stressor; (2) response; (3) consequences; and (4) moderators.

A *stressor* is defined as an environmental event or situation that disrupts normal functioning and poses an adaptive challenge to the individual. The reaction that follows the stressor is a *response,* representing an attempt by the individual to restore homeostasis, or maintain stability around a new baseline (allostasis). These responses may have deleterious *consequences* for an individual's health, especially if they are particularly severe or sustained for a prolonged period of time. *Moderators* include developmental, genetic, or situational factors that intervene at each step in this causal pathway to account for individual differences in vulnerability to stressors, responses, and consequences.

A source of potential confusion in stress research stems from the fact that the concept of "response" may be operationalized as a mental process (e.g., symptoms of depression or anxiety, self-reports of perceived "stress"), a behavioral process (e.g., changes in diet, sleep patterns, smoking, etc.), or a physiological process (e.g., changes in hormonal levels, nervous system activity, cardiovascular function). This confusion is compounded by the fact that these processes are interrelated (e.g., symptoms of depression may lead to changes in diet; smoking may stimulate the nervous system) and that different studies may place these variables in different locations along the causal pathway. For example, in one study, traumatic life events (the stressor) may be hypothesized to result in increased self-reports of perceived stress (the response). Another study may start with perceived stress as the independent variable (the stressor) and investigate its effects on cortisol levels (the response). Inconsistent use of these concepts reflects the diversity of goals and methods associated with stress research across a wide range of disciplines.

Physiological processes are central to the stress process, particularly if one is interested in connecting stressors to health outcomes. Physiology can be used not only to evaluate the effects of stressors but also to identify individuals who are under stress. This may be particularly salutary for cross-cultural stress research, where stress responses are notoriously difficult to measure and interpret. For example, interview or self-report methods—where participants are asked to report verbally or in writing on certain aspects of their stress experience—are subject to recall bias and confounding. In the health psychology literature, this is known as the problem of "confounded measures," where self-reports of stress have been shown to be significantly correlated with self-reports of physical problems in the absence of underlying pathology (Dohrenwend et al. 1984; Watson and Pennebaker 1989). In addition, self-reports are subject to the problem of observer bias, where study participants may report what they think investigators want to hear.

Finally, as anthropologists, we are fully aware that the stress experience is situated and constructed within specific social, cultural, and political–economic contexts (O'Neil 1986; Young 1980). Gaining access to this experience poses a formidable challenge. A meaningful interpretation of self-reports from study participants relies on a shared discourse of "stress," where the interviewer can speak the same language—both literally and figuratively—as the participant. In other words, if someone says that he or she is "under stress," how does one know what that really means?[3]

Assessment of physiological markers of stress can help surmount some of these obstacles by providing a quantitative measure of "stress response." Previous anthropological work has successfully linked stressors to differences in blood pressure

(Dressler 1991; James 1991; Janes 1990; McGarvey and Schendel 1986), catecholamine and cortisol levels (Brown 1981, 1982; Flinn and England 1995; Hanna et al. 1986; Pollard et al. 1992; Schmitt et al. 1995), and cell-mediated immune function (McDade 2001, in press; McDade, Stallings, and Worthman 2000). These markers are "objective" in that they are beyond the conscious control of the study participants and are therefore not vulnerable to recall or observer bias. They are also objective in the sense that they are comparable and interpretable across different populations, as the physiological processes that underlie these biomarkers are assumed to be the result of a shared human evolutionary history, thereby eliminating difficulties in translation across languages and cultures. However, biomarkers present challenges of their own, including the difficulty of collecting data in remote field settings, and potential confounding by factors other than psychosocial stress.

In this study, antibodies against the Epstein-Barr virus (an index of cell-mediated immune function; see below) are used as a biomarker of psychosocial stress. Status incongruity is hypothesized to be a "stressor" that results in a physiological response as measured by differences in antibody level. A link to negative health consequences (increased risk of infectious disease) is inferred but not explicitly evaluated. The terms *stress* and *under stress* are used throughout the text to refer to the entire stress process.

Ethnographic Context: Samoa

Historically, the South Pacific has been an important testing ground for evaluating the relationships among culture change, stress, and health. A major research effort launched in the 1970s by Paul Baker and colleagues (Baker et al. 1986) established this as an important area of inquiry and demonstrated convincingly that culture change has multidimensional consequences for biological and psychological well-being for Samoans. And in the wake of the bitter Mead–Freeman controversy, much attention has been focused on Westernization as a contributor to adolescent "storm and stress" that may account for some of the differences in Mead's and Freeman's accounts of adolescence in Samoa (Côté 1994; Holmes 1987; Leacock 1987).

The Independent State of Samoa is a sovereign nation that shares cultural and historical roots with the other islands of Polynesia, including Hawai'i, New Zealand, Tonga, the Cook Islands, and the Society and Marquesas Islands. Samoa became an independent nation in 1962 following a series of political arrangements with Germany and, then, New Zealand. Despite these colonial and more recent postcolonial influences, Samoans have managed to maintain a strong cultural identity.

The islands of Samoa are mountainous and lush and currently support over 160,000 people in more than 300 rural villages and one urban area. The vast majority of the population resides on the two main islands: Savai'i and Upolu. Savai'i encompasses 660 square miles and has a population of approximately 45,000 people in 100 villages, all but a few of which ring the coastline (Department of Statistics 1991). The mountainous terrain has limited economic development and population growth, and most villagers engage in subsistence cultivation of family-owned lands, with some cash-cropping of copra and cocoa. Families on Savai'i

embody what Samoans recognize as the most traditional forms of Samoan culture practiced today.

Upolu is smaller in size (440 square miles) but is home to nearly three-fourths of the population in two distinct geographic regions: urban Apia and rural Upolu. Approximately 34,000 people live in the capital city of Apia, where economic development has created extensive commercial activity and opportunities for wage labor. An additional 40,000 people reside along the 25-mile main road between town and the airport, where rapid development is transforming villages into incipient suburbs.

The remainder of Samoa's residents live in rural villages outside of the bustle of Apia. When compared with the villages of Savai'i and urban (and urbanizing) Apia, the villages of rural Upolu represent an economic and cultural transition zone: the relative proximity of Apia, high-quality roads, and regular bus service provide alternatives to family plantations for a significant number of villagers who commute to Apia for work, education, or commerce.

A number of Samoan scholars have written about the degree to which children in Samoa are socialized to be status conscious and communally minded. The age-grade hierarchies of extended families provide the training ground for learning the lessons of service, respect, and submission, and parents distance themselves emotionally from their children (Mageo 1988, 1989; Ochs 1988; Shore 1982). These and other socialization practices de-emphasize individualism and reinforce the child's identification with, and dependence on, the extended family and community. Honor and self-esteem are inextricably linked to one's position in the family and the status of the family in the community (Fitzgerald and Howard 1990; Howard 1986).

Rural Samoan villages are ruled by the *fono* (council of chiefs), and people continue to take pride in the *fa'aSamoa* (Samoan way of life) (Holmes 1980; O'Meara 1990). At the heart of the fa'aSamoa lies the *matai* system of village political organization. Extended families (*'āiga*) each elect by consensus a matai to represent them at the fono and to exert authority over the family land, property, and labor. There are no simple rules of succession, as neither heredity nor achievement is consistently linked with the bestowal of a chief's title. Considerable honor and dignity are conferred on those who possess a title, in addition to a heavy burden of responsibility for the welfare of the 'āiga. The council of chiefs, comprising village matai, meets frequently to act as the legislative, executive, and judicial body of local governance (Shore 1982).

There are two types of matai titles: *ali'i* (high chief) and *tulāfale* (orator, or talking chief), with the tulāfale serving as the lieutenant, or spokesman, for the more powerful ali'i. Each ali'i and tulāfale title has a specific name and a particular history, and certain titles are more prestigious than others, with their holders wielding greater power in village affairs (Shore 1982). However, even though the matai system is often described as a stable hierarchy of power relationships, in reality the relative ranks of specific titles, and even the distinctions between ali'i and tulāfale, are subject to challenge. Shore quotes a chief who advised him that "in a Samoan village, there are *ali'i* and *ali'i* and you should never confuse them" (1996:169). In view of this, Shore (1982, 1996) emphasizes the importance of distinguishing between status (a qualitatively distinct social role or position; e.g., having a matai title) and *rank* (graded or quantitative distinctions within a single status; e.g., having a title that is more prestigious than lesser titles) in understanding Samoan political life.

Although the 'āiga continues to play a fundamental role in everyday life, residents of Samoa are currently experiencing an unprecedented period of cultural diversification: nontraditional legal, political, and economic institutions continue to encroach, and Western consumer goods and services are increasingly available and desired. More children are attending Western-style schools for longer periods of time, and teachers are becoming major agents of socialization (Baker 1986). Urban families are becoming smaller and less fluid, potentially increasing conflict between parents and their children (Mageo 1988). Sons and daughters are being sent to American Samoa, New Zealand, and Hawai'i for education or to earn money to send back to the family (Macpherson 1994; O'Meara 1990).

The matai system itself is changing, as single titles are increasingly being split and shared among multiple holders, creating further ambiguities and tensions in rank. Chiefs, in particular, and Samoans, in general, are faced with emerging sources of power that potentially circumvent the matai system: education, wage labor, church, remittances from relatives overseas, and universal suffrage provide alternate avenues of social and economic status (O'Meara 1990; Shore 1996). Recently, the *Sunday Samoan*—a weekly newspaper printed in Apia—published an article entitled "Families sue matai council" (September 22, 1996). Nine families from Savai'i had been forced out of their village after it was discovered that they had voted against the general election candidate endorsed by the village matai council. In the court proceeding, the matai defendants requested that the court "officially acknowledge the decision made by this village in regard to the removal of the petitioners so that the customary rights and power of the village could be maintained at all times." The court ruled in favor of the evicted families, thereby undermining—at least in this case—the absolute authority of the matai council.

In a recent fictionalized account of "coming of age" in a rural Samoan village, Sia Figiel—who was raised in Samoa and educated in Samoa, New Zealand, and the United States—commented on the emerging significance of Western lifestyles through Alofa, the adolescent narrator:

> Two coloured TVs. Mu's family had two coloured TVs—one on the first floor of the fale, and the other on the second floor in Pola and Lalogi's room—and all the kids and some adults went there to watch Little House on the Prairie, Charlie's Angels, and Dallas.
>
> Plus a video machine, too . . . with Rambo, and Mickey Mouse, and men and women without clothes . . .
>
> A refrigerator where all the food was kept, and where all the ice-water bottles of Malaefou were kept, too. They didn't have a sefe, like us. That was too primitive (her mother's words).
>
> A gas stove, too. Mu's family had a gas stove. The kind you just turned the button and fire came out.
>
> I remember the first time we saw that. We were amazed and amazed. It was the most fascinating thing. It was the topic of our conversations for days—weeks. Until Elisa returned from New Zealand with her hair dyed blond. . . .
>
> Yes, we were envious of Mu and tried desperately by association to be her friend. If not that, then just to be seen with her, to sleep over at her house. [1996:26–27]

The social importance of Western lifestyles and material goods and their impact on the lives of adolescents in Samoa are prominent themes in Figiel's work.

Concordantly, in an interview conducted during the course of this study (see methods for details), a mother expressed concern over the rising influence of Western consumer culture in urban Apia:

> The children receive no solid foundation of the (Samoan) culture because most can only learn it from the schools or out of hearsay but they do not live it. It's the thing of the past. They grow up in a least developed economy where nearly every family has a car, TV, video, and better meals, unlike the past. . . . So children do not realize what it was like to try and make ends met. They are too materialistic, want more sophistications, and whatnots.

These changes have not come easily, particularly for the youth of Samoa. Although adolescents interviewed for this study believed that Westernization provided a "higher standard of living" and a situation where "people are free to decide for themselves," they also expressed concerns over the "temptations" associated with a more Western lifestyle *(fa'apālagi)* and noted that "because of the freedom it is too easy for the young people to be sidetracked."

Inquest records demonstrate a steady increase in the number of suicides from 1970 through the early 1980s, with both young males and females at particular risk (Bowles 1985). The most recently available data from the National Hospital in Apia (1988–1996) show that Samoans between the ages of 15 and 24 were two to four times more likely to commit suicide than U.S. adolescents and young adults of the same age. A parallel suicide epidemic in Micronesia has fueled speculation that the encroachment of Western institutions and values, the decline of local communities, the rise of the nuclear family, and lack of economic opportunity have contributed to adolescent distress in the South Pacific (Hezel 1987, 1989; Macpherson and Macpherson 1987; Rubinstein 1983, 1992).

The high rates of suicide lend a certain urgency to an understanding of the causes and consequences of adolescent stress in Samoa. This study seeks to contribute through the development of a status inconsistency model specifically relevant to the current experiences of youth in Samoa. As noted above, matai presence and Westernization experience are two salient dimensions of social status. Historically, the presence of a matai titleholder within a household has been an important and valued source of prestige. However, as conspicuous consumption of Western ideas and material goods weaves its way into the social fabric of Samoa, engagement in a more Western lifestyle is becoming an additional, positively valenced source of social status. The degree to which these new and old markers of social status agree—or disagree—may have implications for adolescent stress.

Methods

Data Collection

Participants were recruited from 14 randomly selected villages across the three main geographic regions of Samoa. Overall, 352 individuals between the ages of ten and 20 years were surveyed, and 329 provided complete data for these analyses, with comparable age and sex distributions in each of the three regions

(Table 1). The study was conducted under conditions of informed consent, as approved by the Emory University Human Investigations Committee and the Western Samoa Health Research Council.

Each participant was interviewed to gather demographic and psychosocial information, and standard anthropometric measurements were taken. Dried spots of whole blood were collected for later analysis of immune function. A sterile disposable lancet was applied to the participant's finger and two to five drops were placed directly on standardized filter paper (#903 Schleicher and Schull, Keene, NH). This relatively noninvasive blood collection protocol minimizes pain and inconvenience to the participants and facilitates the collection of large numbers of blood samples despite the constraints of field conditions. Samples were allowed to dry and then were stored refrigerated prior to shipment to the Laboratory for Comparative Human Biology in the United States, where they were frozen at -23°C until analysis.

Following this stage of data collection, a series of in-depth, semistructured interviews were conducted with 16 adolescents (13 to 18 years of age) and 13 adults (35 to 54 years of age). Participants were asked about their experiences with, and attitudes toward, various aspects of Samoan culture in the context of Western encroachment. These interviews provided qualitative perspectives within which the quantitative data could be contextualized and interpreted.

Scale Construction

Status inconsistency models require two scalable dimensions of social status that can be meaningfully compared (Hartman 1974). To assess matai status, participants were asked if any member of their household (defined as those individuals who sleep and eat together on a regular basis) was the holder of a matai title. Adolescents were then classified as "matai present" or "matai absent." Although the presence or absence of a matai title is an important marker of social status, as discussed above, it is recognized that this binary categorization discounts the complex and shifting set of relationships and local meanings that define the matai system in

Table 1
Distribution of participants across the three geographic regions of Samoa, as well as mean (standard deviation) values for selected variables.

	Total Sample	Apia	Rural Upolu	Savai'i
N	329	109	114	106
Sex (% female)	56.2	56.9	57.9	53.8
% with matai	47.7	68.8	36.0	38.7
Age (years)	13.8 (2.9)	13.9 (2.6)	14.3 (2.7)	13.3 (3.0)
BMI[1] (kg/m^2)	20.8 (3.7)	20.7 (3.5)	21.3 (3.7)	20.3 (3.7)
SSF[2] (mm)	22.9 (10.3)	22.8 (10.3)	23.8 (10.9)	22.1 (9.7)
Westernization experience	3.6 (2.0)	3.3 (1.9)	4.2 (1.9)	3.3 (2.1)

[1]BMI: Body mass index
[2]SSF: Sum of skinfolds

Samoa. However, thick description is beyond the scope of this analysis, and a certain degree of simplification is necessary in order to relate aspects of the social environment to stress in a quantitative fashion.

A comparable scale of Westernization experience was developed by asking participants a series of questions regarding their exposure to and familiarity with nontraditional lifestyles through travel, siblings who have lived overseas, television, and friendships with Westerners (Table 2). Items were positively scaled such that a higher score indicates a higher level of exposure. Chronbach's coefficient alpha was calculated to evaluate the internal consistency of the scale and the degree to which items represent a common underlying construct (Bernard 1994; Spector 1992). The standardized alpha of .62 represents a low but acceptable level of internal consistency, particularly given the small number of items in the scale and low item–total correlations for three of those items. These items were kept in the scale because they are theoretically significant and because their removal increased alpha only to .65. Adolescents with scale scores of 3 or less were assigned to the "low Western" group, and those with scores of 4 or greater were assigned to the "high Western" group.

A status incongruity variable was created such that individuals with a matai titleholder in the household but low Westernization status, or no matai and high Westernization status were labeled "incongruent." All other individuals were assumed to be "congruent" (matai and high Western; no matai and low Western) (Table 3). This formulation may seem puzzling, because one might hypothesize that having a matai in the household and a high level of Western experience should be the incongruity situation because of tension between traditional Samoan institutions and emerging Western lifestyles. The logic behind this follows early research proposing that stress results from dissonance between one's current sociocultural

Table 2
Westernization experience scale.

Variable	Item-total Correlation
Travel overseas to: (no = 0; yes = 1)	
American Samoa	.31
New Zealand	.31
Hawai'i	.44
Mainland USA	.45
Siblings overseas in: (no = 0; yes = 1)	
American Samoa	.20
New Zealand	.16
Hawai'i	.42
Mainland USA	.37
Watch television how often? (never = 0; once a month = 1; once a week = 2; every day = 3)	.13
Friends who are white/European (palagi) (no = 0; 1 = yes)	.15

Coefficient alpha (standardized) = .62.

Table 3
Status incongruity, as defined by matai presence or absence and the level of Westernization experience.

	Westernization Experience		
Matai Title	low	high	Total
absent	congruent $N = 85$	INCONGRUENT $N = 87$	$N = 172$
present	INCONGRUENT $N = 64$	congruent $N = 93$	$N = 157$
Total	$N = 149$	$N = 180$	$N = 329$

environment and the socialization environment that shaped one's social roles and expectations (Henry and Cassel 1969). The conceptual basis of the status incongruity model proposed here differs in that it focuses on inconsistency in markers of social status as a potential stressor rather than inconsistency between early and current environments. Although this is an important distinction, the current formulation of the model will evaluate both hypotheses by comparing "congruent" and "incongruent" individuals, and the results will suggest an appropriate interpretation of the meaning of "incongruent" in this context.

Epstein-Barr Virus Antibodies: Biomarker of Stress

Antibodies against the Epstein-Barr virus (EBV) have been shown to be among the strongest and most consistent immunological markers of chronic stress (Herbert and Cohen 1993). This method has been developed and validated by psychoneuroimmunologists who are interested in establishing links between psychosocial experience and immune function, and details of the logic and physiology behind this method have been presented elsewhere (Glaser et al. 1993; Glaser et al. 1991; McDade, Stallings, Angold, et al. 2000).

Briefly, EBV is a ubiquitous herpesvirus to which nearly 90 percent of adults in industrialized nations and nearly 100 percent of adults in developing nations have been exposed (Henle and Henle 1982). About 40 percent of primary infections in adolescence and adulthood result in acute infectious mononucleosis, while most individuals remain clinically asymptomatic. Once infected, individuals harbor the virus for life in infected cells, and adequate cell-mediated immune function is critical for maintaining the virus in a latent state. Stress-induced immunosuppression allows EBV to reactivate and release viral antigens into circulation, to which a humoral antibody response may emerge (Glaser et al. 1991). As a result, levels of antibodies against EBV antigens provide an indirect measure of cell-mediated immune function, such that increased EBV antibody levels indicate lower immunity.

In samples drawn from American middle-class populations, increases in EBV antibody levels have been associated with stressors such as medical school exams

(Glaser et al. 1993; Glaser et al. 1987), involvement in a poor-quality marriage (Kiecolt-Glaser, Fisher, et al. 1987; Kiecolt-Glaser et al. 1988), and caring for a family member with Alzheimer's disease (Kiecolt-Glaser, Glaser, et al. 1987). In addition, loneliness, defensiveness, and anxiety have all been positively associated with EBV antibodies (Esterling et al. 1993; Glaser et al. 1985). Conversely, stress management interventions and disclosure of previously repressed trauma have been associated with decreases in EBV antibody levels (Esterling et al. 1992; Lutgendorf et al. 1994). These studies have validated the EBV model as an indirect measure of stress-induced cell-mediated immune suppression such that higher stress burdens are reflected in higher levels of EBV antibodies.

This model may seem counterintuitive at first, as an *increase* in EBV antibody level—itself an aspect of immune function—is interpreted as indicating a *decrease* in cell-mediated immune performance. However, it is important to keep in mind that the immune system comprises multiple integrated subsystems that play complementary roles in protecting the body against pathogens. With respect to viruses such as EBV, cell-mediated immunity represents the first, and most important, line of defense. Humoral-mediated immunity involving the production of antibodies represents a second line of defense that kicks in when cell-mediated processes fail to control the virus. Therefore, increases in specific antibody levels can indicate a relative failure on the part of cell-mediated immunity.

Blood samples were analyzed using a previously developed ELISA method for assaying EBV antibodies in dried blood spots (McDade, Stallings, Angold, et al. 2000). Samples remain stable on filter paper at room temperature for up to eight weeks. EBV antibody levels are not subject to acute, short-term fluctuations since the duration of time linking a stressor to EBV antibody response is on the order of days, not minutes, as with cortisol or catecholamines. This facilitates the interpretation of EBV antibody level as a marker of chronic stress. Because the model linking psychosocial stress to suppressed cell-mediated immune function and increased EBV antibody level does not apply to individuals who have not been exposed to EBV, analyses must be limited to seropositive individuals. Previous work in this population indicates that 98.8 percent of Samoans under the age of 20 show evidence of exposure to EBV (McDade, Stallings, and Worthman 2000). Six of 352 individuals who were surveyed for this study were seronegative for EBV and were therefore excluded from further analysis.

Potential Confounders

In addition to psychosocial stress, immune function is sensitive to nutritional and infectious disease stress, raising the possibility that attempts to use immune function as a biomarker of psychosocial stress may be confounded by nutritional and/or infection status (Kiecolt-Glaser and Glaser 1988; McDade, Stallings, and Worthman 2000). This poses a particular challenge to field-based studies of stress and immune function in developing nation contexts where food shortages and endemic disease may be unfortunate realities. However, previous analysis of this data set has shown that Samoans under the age of 20 years are well nourished, and no significant relationships were found between EBV antibody level and multiple markers of nutritional status (McDade, Stallings, and Worthman 2000). To verify this finding in the sample of adolescents used in this study, body mass index (BMI = weight in kilograms/height in meters^2) and sum of skinfold (SSF = triceps skinfold [mm] + subscapular skinfold [mm]) measures were considered.

However, in previous analyses, individuals with evidence of a current or recent infection were found to have significantly elevated EBV antibody levels, emphasizing the need to control for this potential confounder. C-reactive protein (CRP) was assayed in blood samples using a previously developed ELISA procedure to provide a measure of current or recent infection (McDade, Stallings, and Worthman 2000). C-reactive protein—an acute-phase protein that provides the body's first line of defense against infection—has been shown to increase in response to a wide range of viral, bacterial, and parasitic agents, making it a useful marker of pathogen exposure (Baumann and Gauldie 1994; Fleck 1989). Participants with elevated CRP, indicating current or recent infection, were removed from the sample prior to analysis to minimize the possibility of confounding. This is a conservative step that biases results toward the null, as individuals with current infection may be the same individuals who are suffering from the infectious consequences of stress-induced immunosuppression. Seventeen individuals showed evidence of recent infection and were removed from the analysis.

Statistical Analysis

Analyses were conducted using Statistical Analysis Software (SAS Institute, Release 6.12, Cary, NC). Prior to analysis, EBV antibody levels were log-transformed to normalize the distribution. Age was considered as a categorical variable because of its nonlinear association with EBV antibody level and broken into the following categories: 10–12, 13–15, and 16–20 years, inclusive.[4] Sex was also included in all models. General linear regression models (PROC GLM) procedures were used to evaluate the relationship between EBV antibody level (dependent variable) and age, sex, region, nutritional status, and status incongruity (independent variables).[5] Interactions between status incongruity and age, sex, and region were also considered. Status incongruity was entered using indicator variable coding. A standardized term summing matai status and Westernization status was also added to control for the direct effects of these variables. Without this control, it would not be possible to determine if a significant effect of status incongruity was because of a discrepancy between matai status and Westernization experience or to the independent effects of these variables (Dressler 1995; Hope 1975; Whitt 1983).

Results

Table 1 presents the distribution of participants across the three geographic regions of Samoa, as well as mean scores for age, BMI, SSF, and Westernization experience. A total of 329 individuals provided data for these analyses. Participants from the three regions were comparable, with the exceptions of slightly higher Westernization experience scores in rural Upolu because of a higher frequency of siblings overseas, and a higher likelihood of having a matai title in urban Apia. Nutritional status was not found to be significantly associated with EBV antibody level (BMI: R = -.02, P = .75; SSF: R = .01, P = .86). However, nutritional status was associated with the level of Westernization experience (BMI: R =

.35, P = .001; SSF: R = .17, P = .002), but not region (BMI: P = .091; SSF: P = .31) or status incongruity (BMI: P = .15; SSF: P = .52). In order to avoid the possibility of confounding, BMI was included in all linear regression models.

Of the 329 ten to twenty year olds, 47.7 percent resided in households with a matai present. Of those with a matai present, 59.2 percent were also in the high Westernization experience group, making them congruent according to the designation outlined above (Table 3). The remaining 40.8 percent were incongruent. Of those lacking a matai, 49.4 percent were congruent, having low Westernization experience scores, and the remaining 50.6 percent were incongruent. Obviously, matai presence and Westernization experience do not necessarily go hand in hand in Samoa, and the possibility exists for incongruity stress if they represent meaningful dimensions of social status.

Table 4 presents the results for the linear regression model including age, sex, region, BMI, status incongruity, and the summary status control variable. There was a significant overall effect of status incongruity, such that individuals in situations of incongruence (matai present, low Western; or matai absent, high Western) had significantly higher EBV antibody levels (1.96 ELISA units) than congruent individuals (matai present, high Western; or matai absent, low Western) (1.86 ELISA units), indicating lower cell-mediated immune function and higher psychosocial stress. In addition, a significant interaction between incongruity and region was found: there was no increase in EBV antibody level with incongruity in Savai'i, a moderate increase in Upolu, and a large increase in Apia (Figure 1).

Significant differences in EBV antibody level were also found across region, and girls had higher levels than boys. Overall, adolescents from Savai'i had lower adjusted mean logEBV antibody levels (1.84 ELISA units) than adolescents from rural Upolu (1.90 ELISA units) and Apia (1.97 ELISA units), consistent with the interpretation that increased exposure to Western, nontraditional ways of life is associated with higher burdens of psychosocial stress, as marked by higher EBV antibody levels. These regional differences have been reported previously (McDade,

Table 4
Linear regression results for the relationship between status incongruity and EBV antibody level after adjusting for potentially confounding variables.

Dependent Variable: LogEBV antibody level			
Model	**$F_{10,318} = 3.94$**	**$p = .0001$**	**R-Square = .11**
Age group	$F_{2,318} = 1.92$	$p = .15$	
Sex	$F_{1,318} = 5.54$	$p = .019$	
Region	$F_{2,318} = 8.67$	$p = .0002$	
BMI	$F_{1,318} = 1.31$	$p = .25$	
StatTot[1]	$F_{1,318} = 0.30$	$p = .58$	
StatInc[2]	$F_{1,318} = 8.85$	$p = .003$	
StatInc*Region	$F_{2,318} = 4.57$	$p = .011$	

[1]StatTot: The summary variable that controls for the direct effects of matai and Westernization status.

[2]StatInc: Status incongruity.

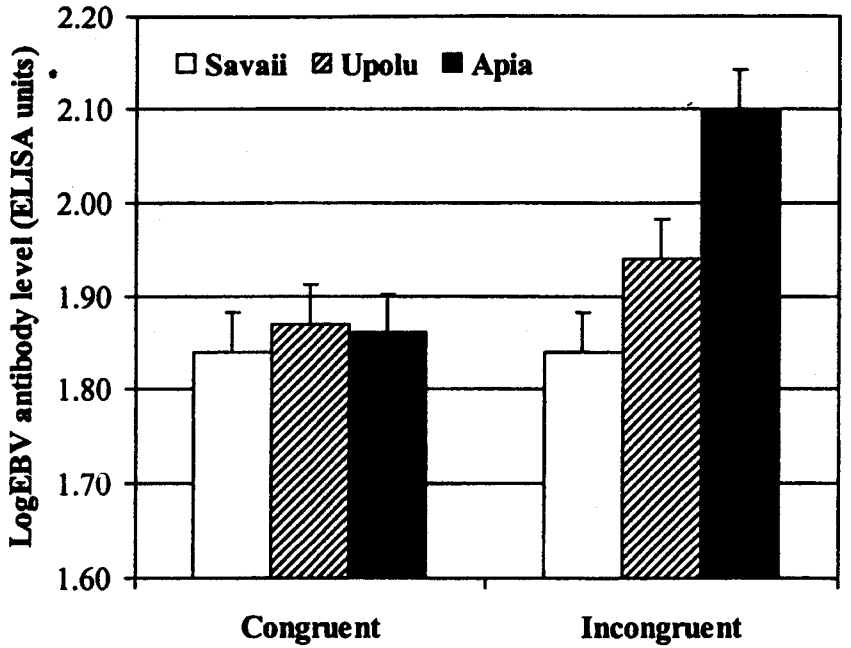

Figure 1
Relationship between status incongruity and EBV antibody level in Samoan ten to twenty year olds, by region. The effect of status incongruity on EBV antibody level is largest in urban Apia, indicating a higher burden of psychosocial stress.

Stallings, and Worthman 2000) and are consistent with previous ecological studies in Samoa and elsewhere (James et al. 1985; Jenner et al. 1987; McGarvey and Baker 1979; Patrick et al. 1983; Pearson et al. 1993).

The significant sex difference in EBV antibody level suggests that girls may experience more stress than boys in Samoa. This is contrary to earlier reports of higher rates of suicide among males in the South Pacific (Bowles 1985; Rubinstein 1983) and suggests the possibility that recent changes have led to a disproportionate increase in burdens of stress for girls in Samoa. However, there was no evidence of a sex difference in the relationship between status incongruity and EBV antibody, so these potential stressors remain outside the scope of this analysis. Alternatively, a biological, ecological, or developmental factor could be at work. Undernutrition and infectious disease status were explored as potential confounders, but no significant sex differences were found. Because region and sex were included in the full regression model, the effect of status incongruity is above and beyond the effects of these potentially confounding variables.

Socioeconomic status (SES) represents another potential confounder—or a potential mediator—of the relationship between status incongruity and stress, since both matai presence and Westernization experience are associated with socioeconomic status in Samoa. Household SES was defined by father occupation,

mother occupation, and amount of remittances sent from overseas (McDade 2001), and the distribution of values was divided into thirds such that households could be classified as low, intermediate, or high with respect to SES.[6] Of the matai present/high Western households, 56.9 percent belonged to the high SES group, compared with only 17.7 percent of the matai absent/low Western households. Approximately one-third of the incongruent households belonged to the high SES group (matai present/low Western = 32 percent; matai absent, high Western = 30 percent).

If SES was driving the association between status incongruity and stress, then one might expect the lowest EBV antibody levels in the matai present/high Western group and highest levels in the matai absent/low Western group. However, these groups had relatively low and virtually identical adjusted mean EBV antibody levels, suggesting that incongruity, not lack of socioeconomic resources, is a significant stressor for this population (Figure 2). Concordantly, SES was not significantly associated with EBV antibody level in regression analysis ($F_{1,318} = 1.06$, $p = .30$) and did not alter the effect of status incongruity.

In order to investigate further the relationship between status incongruity and stress, the definition of incongruity was expanded in recognition of the fact that there are two ways to be incongruent: matai presence and low Westernization

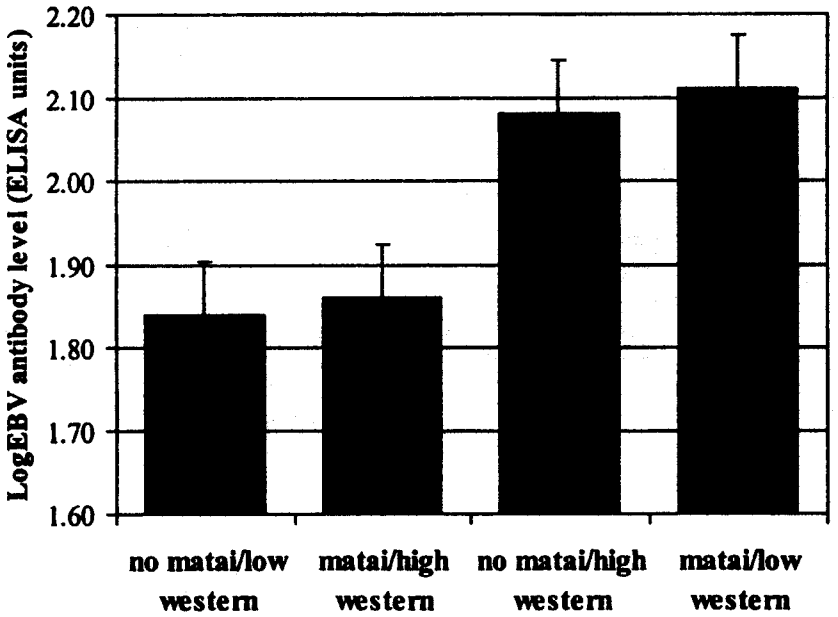

Figure 2

Relationship between status incongruity and EBV antibody level in urban Apia. Status incongruity is associated with elevated EBV antibody levels (indicating higher stress) regardless of the direction of incongruity. Similarly, status congruity is associated with lower EBV antibody levels regardless of the definition of congruity.

experience, or matai absence and high Westernization experience. It is feasible that the direction of incongruity is meaningfully related to stress. To explore this possibility, status incongruity variables were created with three groups: congruent (matai and high Western; or no matai and low Western), incongruent A (matai and low Western), and incongruent B (no matai and high Western).

EBV antibody levels were comparably elevated in both incongruity groups compared with congruent individuals, indicating that the direction of incongruity does not appear to be vital. In Apia, mean EBV antibody level for congruent individuals was 1.85 ELISA units, compared with 2.11 for matai present/low Western individuals, and 2.08 for matai absent/high Western individuals (Figure 2). A similar, though less robust pattern was found for Upolu. These findings support the assumption that incongruity itself is a source of stress and suggest that social status derived from traditional and emerging sources may be linked in Samoa.

Discussion: Models and Methods for a Biocultural Analysis of Culture Change and Stress

Adolescents in Samoa are enduring a turbulent period of uncertainty that is forcing them to reconcile traditional norms, values, and practices with the growing influence of Western lifestyles. In this study, a model of status incongruity was proposed in an attempt to capture this process and to evaluate its implications for stress. Two meaningful dimensions of social status were identified—one old (the presence of a matai title in the household) and one relatively new (experience with Western lifestyles through siblings, friends, travel, and television)—and inconsistency in these dimensions was hypothesized to be a significant stressor. Using EBV antibody level as a biomarker of psychosocial stress, status incongruity was found to be significantly associated with increased EBV antibody level in ten to twenty year olds, indicating reduced cell-mediated immune function and a higher burden of psychosocial stress. These findings complement previous applications of status inconsistency models to adults in (Western) Samoa (Chin-Hong and McGarvey 1996), American Samoa (Bindon et al. 1997), and Samoan migrants to California (Janes 1990).

Why does status incongruity result in psychosocial stress? Historically, matai titleholders have comprised the venerated council of chiefs, and played an important role in village political life. Chiefs command respect from members of their family and the community. Members of their household also command a certain respect and achieve a significant social status because of their affiliation with a matai. Adolescents from matai households likely enjoy a degree of advantage in interactions with their peers as a result of this social status. Westernization experience appears to provide a parallel avenue toward respect and esteem, as Samoan adolescents value Western goods, ideas, and experiences. Findings reported here suggest an important link between these two sources, such that incongruity results in stress, possibly because of challenges to one's self-image or one's claim to a certain standing within the community.

Why is incongruity, rather than congruity, stressful? One might hypothesize that in Samoa, living in a matai household and having a relatively Western orientation would be most stressful because of conflict between ways of old and new. Although this is a different type of stressor than that proposed by the status incongruity

model, it is one that is evaluated by this formulation nonetheless. If having a matai in the household and a high level of Westernization experience was a source of tension, then individuals in this situation would be expected to have the highest EBV antibody levels. This was not the case (Figure 2).

Rather, the findings reported here suggest that emerging, Western markers of social status have become inextricably linked to more traditional markers of prestige. Perhaps individuals from matai households are expected to assert their social status in both traditional and Western arenas, and those that do not, fail to get the respect they feel they deserve. This effect was strongest in Apia, suggesting that matai status and Westernization experience are both salient status dimensions in this relatively urban context. The absence of an effect in Savai'i implies that Western experience is not a critical source of social status in this more traditional context, although it seems likely that the pattern of results found in Apia will emerge in Savai'i as the process of Westernization continues.

Statements of adolescents and adults in qualitative interviews support and elaborate this convergence. According to a father from Upolu, "Some families, when someone has a good education or a lot of money, he gets the (matai) title even though he has not been serving because he has been away all the time at school or work." And a mother from Apia laments, "Nowadays, if you have the money you become a matai." Obviously, these two domains of experience are not seen as contradictory. Rather than rejecting the matai system as outdated or superfluous, individuals with a high degree of success in the relatively Western world appear to be embracing this more traditional avenue of social status and using it to their advantage. Concordantly, Shore notes that "The *matai* system has managed to attract many of Samoa's wealthiest citizens, who want to have both the comforts and power that money brings and the traditional status that only a chiefly title can afford" (1996:173–174). This underscores the point that both markers of social status remain important, and that the process of culture change in Samoa is not one of replacement but of negotiation and integration.

This sentiment is echoed in the comments of both parents and adolescents who appear to be striving to find a meaningful and workable balance between the traditional Samoan way of life (fa'aSamoa) and a more Western lifestyle (fa'apālagi). A mother from Apia put it this way: "It's not harmful to incorporate both the good aspects of each culture to keep up with the pace of development and what's going on elsewhere. Keep in mind we're not isolated from the outside world." When adolescents were asked about how they intended to raise their own children, over two-thirds claimed that they planned to draw on aspects of both fa'aSamoa and fa'apālagi. They expressed a desire to "take the good aspects of both systems." The heritage, language, and respect of fa'aSamoa were cited as important, while the educational and practical aspects of fa'apālagi were emphasized. According to one 18-year-old female, "It is not to their advantage to raise them fully Samoan when the world is moving forward." The recent epidemic of suicide among adolescents and young adults in Samoa suggests that this process of negotiation and integration may be problematic, at least for the time being. It remains to be seen whether a workable compromise can be reached that reduces their psychosocial burden.

With a few notable exceptions, the vast majority of previous work investigating culture change and stress has used ecological or exposure models of Westernization.

This work has provided a solid foundation for the development of status inconsistency models that hold particular promise for exploring the complexity of cultural processes. These models attempt to capture the tensions and ambiguities associated with culture change that can themselves be sources of stress, and they offer more realistic and more dynamic representations of experience that incorporate individual as well as contextual factors. They allow anthropologists to model aspects of culture change in ways that can begin to consider the diversity and intricacy of this experience.

Measures of blood spot EBV antibody level—and physiological markers of stress in general—provide an opportunity to assay the quality of individual psychosocial environments. Typically, human biologists conceptualize biomarkers such as blood pressure or catecholamine levels as health endpoints that identify individuals at risk for current or future disease. These biomarkers are the outcomes of interest, and attempts are made to explain their population distribution in relation to a range of psychosocial, demographic, and ecological variables.

However, these and other biomarkers can also serve as investigative tools that offer insights into hidden cultural dynamics and access to experiences that cannot be readily observed or communicated. They can draw attention to interesting issues for in-depth analysis using more traditional ethnographic methods: What is the meaning of a matai title in Samoa, and how is it changing in an increasingly Western environment? Does the relative rank of matai titles influence the relationships reported here? Are there additional examples of culture change as a process of negotiation and integration? Do girls and boys share a common experience with culture change, or do higher EBV antibodies in girls signal a unique set of psychosocial stressors?

In this study, a physiological measure of stress has highlighted a number of cultural processes and raised a number of interesting questions. Obviously, biomarkers do not give the last word on these issues, nor do they represent a higher standard of evidence. Rather, they provide a novel way to overcome barriers in communication, observation, and interpretation. They add a piece to the ethnographic puzzle that complements other, more traditional anthropological field methods, and they facilitate the development of enhanced biocultural methods and perspectives in anthropology. It is hoped that this study represents a step in that direction.

NOTES

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1. The terms *Westernization, modernization,* and *acculturation* are used interchangeably in the literature on stress and culture change and often imply progress toward a Western ideal (Hobart 1993; Spindler 1984). No such implication is intended here. The terms *culture change* and *Westernization* are used throughout the article because they most accurately describe the ongoing processes at work in Samoa. In addition, the term *traditional* is used to describe historically significant practices and ideals, but it is recognized that current notions of "tradition" are locally constructed and subject to revision and may not be representative of the past.

2. This study was conducted in the islands formerly known as the Independent State of Western Samoa. In 1997, after this project was initiated, Parliament voted to drop "Western" and officially change the country's name to the Independent State of Samoa. Throughout the text, the terms *Samoa* and *Samoan* refer to individuals from former Western Samoa, unless indicated otherwise.

3. I am not implying that the researcher must always be fluent in the local language to gain insight into the stress experience of study participants. In fact, one's position as an outsider can highlight interesting aspects of local dynamics that participants may take for granted. Nonetheless, a process of translation must take place—either through intensive language training and participant-observation on the part of the researcher or through close working relationships with bilingual (and, to a certain degree, bicultural) individuals—in order to gain a meaningful understanding of self-reports of stress.

4. The percentage of 10–12, 13–15, and 16–20 year olds within each region was as follows: Apia (10–12 years: 33.9 percent, 13–15 years: 35.8 percent, 16–20 years: 30.3 percent); Upolu (29.8 percent, 38.6 percent, 31.6 percent); Savai'i (50.9 percent, 23.6 percent, 25.5 percent).

5. Comparable models were evaluated using PROC MIXED to account for the nonindependence of observations because villages, and not individuals, were randomly selected for study participation. However, PROC MIXED and PROC GLM yielded virtually identical estimates for parameters and standard errors. Therefore, GLM results are presented because they are more familiar to most readers.

6. Values were assigned to father and mother occupations as follows: 1 = planter/housewife (no cash income); 2 = unskilled labor; 3 = skilled labor/professional. Remittances were scored as follows: 0 = no remittances, 1 = money regularly received from one family member overseas; 2 = two family members; 3 = three or more family members. A summary score of household socioeconomic status was obtained by adding remittances to father occupation and mother occupation.

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