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# Unpacking Cultural Factors in Adaptation to Type 2 Diabetes Mellitus

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**BACKGROUND. Race and ethnicity are used as predictors of outcome in health services research. Often, however, race and ethnicity serve merely as proxies for the resources, values, beliefs, and behaviors (ie, ecology and culture) that are assumed to correlate with them. "Unpacking" proxy variables–directly measuring the variables believed to underlie them–would provide a more reliable and more interpretable way of looking at group differences.**

**OBJECTIVE. To assess the use of a measure of ecocultural domains that is correlated with ethnicity in accounting for variance in adherence, quality of life, clinical outcomes, and service utilization.**

**DESIGN. A cross-sectional observational study.**

**PARTICIPANTS. Twenty-six Hispanic and 29 non-Hispanic white VA primary care patients with type 2 diabetes mellitus.**

**MEASURES. The independent variables were patient ethnicity and a summed score of ecocultural domains representing patient adaptation to illness. The outcomes were adherence to treatment, health-related quality of life, clinical indicators of disease management, and utilization of urgent health care services.**

**RESULTS. Patient adaptation was correlated with ethnicity and accounted for more variance in all outcomes than did ethnicity. The unique variance accounted for by adaptation was small to moderate, whereas that accounted for by ethnicity was negligible.**

**CONCLUSIONS. It is possible to identify and measure ecocultural domains that better account for variation in important health services outcomes for patients with type 2 diabetes than does ethnicity. Going beyond the study of ethnic differences alone and measuring the correlated factors that play a role in disease management can advance understanding of the phenomena involved in this variation and provide better direction for service design and delivery.**

**Key words: Type 2 diabetes mellitus; ethnicity; Hispanic. (Med Care 2002;40 [supplement]:I-129–I-139)**

Health services researchers routinely use the concepts of race and ethnicity as independent variables in studying adherence to treatment, attrition from programs, and health outcomes. Reviews of three journals (the *American Journal of Epidemiology*, 1921–1990; *American Journal of Public Health*, 1980–1989; and *Health Services Research*, 1966–1990) found that 50% to 65% of the studies reported contained references to race or ethnicity.[1–3]

Racial or ethnic differences have been repeatedly documented in health services outcomes, including prevalence and severity of illness,[4–7] service utilization,[8–10] and response to treat-

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ment.[11] Documenting such gaps provides the legitimate and important purpose of providing surveillance of the resources, opportunities, and barriers made available to certain groups, particularly minorities that have been traditionally underserved or discriminated against. However, merely identifying these differences does not provide clear direction for ameliorating them. Without a better understanding of what underlies racial or ethnic differences we cannot adequately develop health services that address them. As, Giordano[12] notes, "service delivery that is indifferent to. . .diversity is inefficient and incomplete." Unfortunately, approaches to measuring and understanding race and ethnicity in services research are frequently themselves inefficient and incomplete and, therefore, limited in their usefulness. We propose a more reliable and interpretable approach to the measurement of factors likely to underlie ethnic differences in health services outcomes.

Currently, most studies appear to rely heavily, if not exclusively, on self-reported ethnicity or race, measured by one question. In measuring "race," there seems to be an implicit belief that racial differences in incidence, severity, or outcome of medical conditions are somehow genetically determined.[13–15] But the scientific basis for the view that "race" or "ethnicity" represents a genetic concept is ambiguous at best.[16–22] Even in a field such as ethnopharmocology,[23,24] which examines racial group differences in response to medications, there is controversy about how much of the effect can be attributed directly to biological mechanisms and how much to other factors such as compliance, differential placebo effects, stress, diet, environmental exposure, and subjective response.[25]

*Ethnicity* denotes identification as a member of a social group, usually of national, geographic, religious, or linguistic origin.[26,27] Like race, it is generally assessed with a single question, either by self-report (ethnic identity) or by third-party identification (ethnic labeling). Asking about ethnicity may be useful in some situations, for instance, if we believe that the subjective sense of belonging to a particular ethnic group is important in determining someone's willingness to attend a particular clinic, or to establish rapport with a therapist, or to continue in treatment. In addition, studying ethnicity is often important for political purposes, where it acts as a surveillance variable as described above. However, individuals within ethnic groups are not homogeneous in their beliefs, values, experiences, or behaviors.[26,28,29] As LaVeist[30] points out, "race (or ethnicity) is often conceptualized as a proxy for other (not measured) variables that are known or believed to correlate with race." It is rarely race or ethnicity per se, that is a causal mechanism, but rather the underlying variables associated with it.[31] If these are the variables we believe to have a substantial causal role in our studies, then we should be explicit about that and measure them more directly.

The specific causal factors of interest may vary from disorder to disorder. It is plausible that what effects functional status in ischemic stroke will be different from what affects service utilization in schizophrenia. However, broad overlap is likely in the types of factors that are correlated with ethnicity. From an anthropological viewpoint, these can be conceptualized as cultural and ecological, or *ecocultural*, factors.[32–34]

*Cultural variables* represent the shared values, beliefs, norms, attitudes, and behaviors of an ethnic or other closely-knit group. Cultural factors relevant to health services can be, among other things, perceptions about illnesses, assumptions about causes, when to seek treatment, what one might do about symptoms, and the perceived role of the doctor patient relationship.[35–37] Ecological variables represent the social or physical resources and constraints in an individual's environment. Social resources may be things like a close-knit community, available family members, and religious support; social constraints may be isolation, loss of privacy, and discrimination. Physical resources may be transportation, near-by services, and neighborhood safety; physical constraints may be poverty, toxic environmental exposures, and occupational hazards. Socioeconomic status, as measured by income, is often used as a proxy for these sorts of ecological constraints and resources. Income, though, fails to capture the range of ecological opportunities and challenges that may have an impact on health and that are often differentially distributed by race or ethnicity.[38,39] Just as using ethnicity as a proxy is often insufficient, using income as a proxy can be equally so. We propose that explicating and directly measuring the ecological and cultural factors believed to be causally responsible for differential outcomes between ethnic groups can allow health services researchers to better understand these differences and so better design and target services that optimize health outcomes for all patients.[34]

The focus of the current study is on examining ecocultural factors that are presumed to underlie documented ethnic differences in type 2 diabetes mellitus. Differences in prevalence of type 2 diabetes between Hispanic patients and non-Hispanic white patients have been puzzling. The Centers for Disease Control and Prevention puts the prevalence rate of type 2 diabetes in Hispanic patients at 10% compared with approximately 6% for non-Hispanic white patients and, in addition, Hispanic patients have between 4.5 and 6.6 times the age-adjusted rate of diabetic End Stage Renal Disease (ESRD) as compared with non-Hispanic white patients, and between 1.2 and 1.9 times the corresponding rate in black patients.[40] The higher rate of diabetic ESRD in Hispanic adults as compared with non-Hispanic white patients is not completely accounted for by the increased prevalence rate seen in Hispanic patients.[5]

Unfortunately, we are no closer to understanding these ethnic differences than when they were first noticed. No plausible biogenetic mechanism has been posited for these Hispanic versus non-Hispanic white differences,[41] and standard risk adjustment approaches have not been sufficient to eliminate them.[42,43] Stern[44] has asserted that "if there are additional environmental determinants beyond the 'usual suspects' which explain residual [ethnic] differences in diabetes rates, nothing would reinvigorate this field as much as a few innovative and creative ideas about what these new 'players' might be." The work conducted here was an attempt to make progress toward determining to what extent these differences, and, by implication, many others, may be ecocultural rather than ethnic in origin.

An earlier phase of the current study aimed to identify factors, or domains, likely to be important in disease management.[45] This identification phase used three qualitative techniques, and involved patients with an array of chronic health conditions prevalent in the VA population and usually requiring substantial adaptations on the part of veterans and their caretakers. Multiple conditions, rather than just type 2 diabetes mellitus, were selected to provide a more general framework for instrument development. The details of these processes are not the focus of the current report. In summary, we used multiple methods (literature review, interviews, focus groups, and concept mapping)[46] and multiple stakeholders (consumers, health care providers, and cultural scholars) to generate categories and items to represent both ecological and cultural domains. The ecocultural domains identified were:

- **Economic marginality (EM):** a condition in which the veteran is struggling to get by, has limited equity and resources, and reports frequent cost-cutting measures.
- **Domestic and family workload (DW):** amount of work and effort involved in the daily routine, including household workload, arranging and sustaining child or elder care, and needing to adapt daily routine to include treatment.
- **Domestic help (DH):** help received around the house, from both family and nonfamily members.
- **Positive family relations (PF):** extent to which the veteran has positive relations with family members living both in and out of the home.
- **Salience of religion (RL):** degree of involvement in religious or spiritual practices and the use of religion/spirituality to cope with illness.
- **Proactive response to illness (PR):** amount of activity that the veteran puts into taking care of his or her illness-related needs, including getting and using illness-related services, actively attempting to improve quality of existing care, and taking personal responsibility for becoming informed about and managing chronic illness.
- **Negative impact of illness (NI):** social and emotional burden of illness on close relationships, activities, and social networks.
- **Social support (SS):** amount of emotional and instrumental support received from family and friends.
- **Social costs (SC):** amount of time and resources spent providing emotional and instrumental assistance to others.

We emphasize at this point that although these domains were constructed with possible areas of ethnic difference in mind, they are conceptually independent of ethnicity. Rather than assuming that Hispanic and non-Hispanic white veterans would be clearly differentiated by these domains, we expected that there would be a distribution of veterans of both ethnicities across the factors. If these domains are to be useful in explaining ethnic differences in services outcomes, however, they should be correlated to some degree with ethnicity and should explain at least as much, and preferably more, of the variance in outcomes than does ethnicity.

Two instruments were developed to measure these constructs. The first instrument was a semi-structured interview, the Ecocultural Veteran Interview (EVI). The interview consists of the semi-structured interview itself, guided by cue cards with suggested probes, and a code book that describes the domains and the items within it, illustrated by examples from the narratives from the earlier interviews and focus groups. The interviewer uses the code book to rate the interview on those items. The interview was modeled after the work of Weisner et al[32] and Gallimore et al,[33] which has been used with a variety of populations.[47–49] However, the time- and resource-intensive nature of the interviews makes them unfeasible for larger-scale research studies. Briefer measures that could be completed by patients would make the ecocultural approach more clinically useful. Therefore, we also developed a self-report instrument and assessed the correspondence between interviewer-rated items and veteran self-reported items as a validity check on the self-report instrument.

The self-report version of the EVI (Ecocultural Veteran Self Report [EVSR]) was closely modeled after the domain descriptions used by the interviewers for coding the interview, and included a matching item for each EVI-rated item. The items were rephrased to make them more accessible to the anticipated lower-bound of the reading level of the veterans.

Multitrait Multimethod (MTMM) analysis[45] suggested that the two versions of the instruments were tapping the same conceptual domains. Therefore, scores on each of the domains were pooled between instruments, where available, to increase reliability of measurement of those domains.[50] This was done by taking the mean of the standardized scores for each domain from both instruments to produce a single score for each domain. It is these combined scores that are used in the current study.

The current study examines the utility of using ecocultural factors to explain ethnic differences in outcomes for veterans with type 2 diabetes mellitus. If ecocultural factors are, indeed, the more causal factors for which ethnicity stands as a proxy, then these ecocultural factors should:

1. Be correlated with ethnicity
2. Be correlated with health service outcomes
3. Share common variance in explaining outcomes with ethnicity
4. Uniquely explain as much or more variance in outcomes than does ethnicity

We tested these assumptions in a pilot study that was part of a larger, qualitative study of potential cultural factors in adaptation to chronic illness among veterans in the Southwest.

## Materials and Methods

### Subjects

Eligible subjects were Hispanic or non-Hispanic white veterans younger than 80 years of age residing in Tucson, Arizona, and who were seen in any primary care clinic serviced by the Tucson Veterans Affairs Medical Center (TVAMC) between 1 April 1996 and 31 March 1997. Potential subjects had an ICD-9 diagnosis of 250.xx (type 2 diabetes), and neither diagnosis of dementia nor a primary diagnosis of substance abuse. The Veterans Health Information Systems and Technology Architecture (VISTA), the VA computerized clinical record, was used to identify eligible subjects.

Subjects were recruited for two portions of the pilot study. The first set of subjects were interviewed with the EVI and later also completed the self-report version of the instrument and standardized quality of life instruments (Hispanic veterans, n = 15; non-Hispanic white veterans, n = 13). Veterans in the second set were contacted by phone, and completed only the self-report instruments by mail (Hispanic veterans, n = 10; non-Hispanic white veterans, n = 17). Descriptive variables, by ethnicity and by set, are given in Table 1. For purposes of the current study, the two groups of participants were pooled (see Previous Work, above), producing a total number of 55 subjects. However, one Hispanic veteran did not complete the EVSR, and so did not have a score for adaptation to illness. Therefore, the effective maximum sample size for the current analyses is 54 subjects.

### Measures

Because this pilot study was restricted to a fairly small sample with numerous variables, an important methodological approach was the use of theory-guided data aggregation to reduce measurement error, increase statistical power, and

TABLE 1. Sample Descriptives

| | Ethnicity | | | | Set | | | |
|---|---|---|---|---|---|---|---|---|
| | Non-Hispanic White N = 29 | | Hispanic N = 26 | | EVI + EVSR Sample N = 28 | | EVSR Sample N = 27 | |
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| Age | 64 | 11 | 64 | 15 | 63 | 9 | 67 | 6 |
| Sex (% male) | 86% | | 100% | | 89% | | 96% | |
| Ethnicity (% Hispanic) | 0% | | 100% | | 57% | | 37% | |
| Years since diagnosis | 8.6 | 8.0 | 12.2 | 8.0 | 10.9 | 9.6 | 9.6 | 6.4 |
| Treatment | | | | | | | | |
| Exercise | 72% | | 69% | | 75% | | 67% | |
| Diet | 86% | | 73% | | 79% | | 81% | |
| Tablets | 24% | | 27% | | 39% | | 11% | |
| Insulin | 59% | | 46% | | 36% | | 70% | |
| Mean HbA1c past year | 7.66% | 2.29% | 7.33% | 1.33% | 7.91% | 1.77% | 7.08% | 1.92% |
| Mean glucose past year | 172 | 66 | 161 | 58 | 164 | 69 | 169 | 55 |

avoid capitalization on chance in statistical inference.[50]

**Independent Variables.** The independent variables in the study were patient ethnicity and patient adaptation to illness.

*Patient ethnicity* was a dummy coded variable (Hispanic or non-Hispanic white) of the ethnic label recorded for the patient in VISTA. Patients were also asked to self-report their ethnicity. There was no cross-over between the two categories among those who self-reported ethnicity; that is, none of the veterans identified through VISTA as Hispanic self-reported as non-Hispanic white, nor vice versa. However, 1 (4%) of VISTA-identified Hispanic veterans and 4 (17%) non-Hispanic veterans identified with neither ethnic group (eg, wrote in a third, such as Irish or Native American) and 8 (31%) of VISTA-identified Hispanic vets and 5 (14%) non-Hispanic white veterans chose not to answer the self-reported ethnicity question.

*Adaptation to illness* was a construct that combined the ecocultural subscales described in the introduction into a single variable that was meant to reflect the overall strength of the veteran's available cultural and ecological resources for coping with and managing—in other words, adapting to–his or her illness.[32,33] Table 2 presents the psychometric properties of the subscales. Higher-level scales were constructed in a theory-driven way by standardizing and combining relevant subscales into four indices representing two areas of constraint (economic marginality, high domestic workload) and two of resources (strong social network, positive response to illness). These were combined into an over all Adaptation to Illness score. Estimates of the reliabilities of the higher-level scales are presented in Table 3.

**Dependent Variables.** The outcomes of interest in this study were selected to be outcomes valued in health services research, namely adherence to treatment, health-related quality of life, clinical indicators of disease management, and utilization of urgent and emergent services.

*Adherence to treatment* was represented by the mean of standardized patient reports of adherence to diet, exercise and medication. These were all highly correlated, with a mean corrected item-scale correlation of 0.92 (SD = 0.02).

*Poor disease management* was indicated by poor glycemic control. Two clinical indicators that have been linked to increased morbidity and service use[51–54] were selected: hemoglobin A1c and fasting glucose level. Test results from the previous 12 months were downloaded from VISTA and averaged. The mean of the standardized scores of these means was used as a summary score to represent disease management.

*Utilization* of urgent services was represented by the mean of the standardized VISTA reports of numbers of urgent cardiac clinic appointments, urgent care appointments, emergency room visits, and diabetes-related inpatient stays during the past year.

*Health-related quality of life* was measured by three standardized instruments: the SF-36,[55] the Diabetes Quality of Life scale,[51] and the Patrick

TABLE 2. Psychometric Properties of Subscales

| Subscale | Number of Items | Item Convergent Validity Estimate: Range of Item-Scale Correlations | Item Discriminant Validity Estimate: Scaling Success Rate (%) | Internal Consistency Reliability Estimate: Cronbach α |
|---|---|---|---|---|
| Economic marginality | 14 | 0.26–0.77 | 98 | 0.87 |
| Domestic workload | 13 | 0.29–0.70 | 100 | 0.84 |
| Domestic help | 8 | 0.03–0.65 | 100 | 0.73 |
| Positive family relations | 3 | 0.18–0.68 | 100 | 0.64 |
| Salience of religion | 6 | 0.48–0.76 | 100 | 0.80 |
| Proactive response to illness | 12 | 0.22–0.57 | 100 | 0.76 |
| Negative impact of illness | 13 | 0.25–0.71 | 100 | 0.87 |
| Social support | 6 | 0.40–0.67 | 100 | 0.77 |
| Social cost | 6 | 0.46–0.62 | 100 | 0.79 |

Quality of Life scale.[56] An aggregated score was computed from the mean of the standardized scores on the three scales. Cronbach α for the aggregated score was 0.87, with a mean corrected item-scale correlation of 0.70 (SD = 0.14). Given the high interrelatedness of the scales, the aggregated score was used to maximize the reliability of the construct.[50]

TABLE 3. Reliabilities of Higher-Level Scales

| Scale | Estimated Reliability of Subscales | Estimated Reliability of Linear combination |
|---|---|---|
| Domestic workload | | 0.77 |
| Domestic workload | 0.84 | |
| Domestic help (R) | 0.73 | |
| Social network | | 0.85 |
| Positive family relations | 0.61 | |
| Salience of religion | 0.80 | |
| Social support | 0.77 | |
| Social cost (R) | 0.79 | |
| Response to illness | | 0.83 |
| Proactive response to illness | 0.76 | |
| Negative impact of illness (R) | 0.87 | |
| Economic marginality | | 0.87 |
| Adaptation | | 0.88 |
| Economic marginality (R) | 0.87 | |
| Domestic workload (R) | 0.77 | |
| Social network | 0.85 | |
| Response to illness | 0.83 | |

### Statistical Analyses

Both ethnicity and adaptation to illness were correlated with one another and with each of the outcomes to give a broad indication of the associations among the variables. Regression analyses were then conducted to provide an estimate of the bivariate and combined effect of the independent variables. Because of the small sample size and corresponding lack of statistical power, α for statistical significance was set at 0.10 rather than the conventional 0.05-level. Finally, commonality analyses were used to illustrate the unique and shared contribution of both ethnicity and adaptation to the variance in study outcomes.

## Results

### Relation of Measures to Ethnicity

The bivariate correlations of ethnicity with adaptation to illness, and of both ethnicity and adaptation with outcome variables, are given in Table 4. Of interest is the pattern of results showing that ethnicity is indeed correlated with adaptation and that adaptation is more highly correlated with each of the outcome measures than is ethnicity. Furthermore, adaptation is correlated with the outcomes in the direction anticipated. That is, higher adaptation scores are correlated with more positive outcomes (better adherence, higher quality of life, better glycemic control, and less utilization of urgent/emergent services).

TABLE 4. Correlations of Variables With Ethnicity and Adaptation

| Measures* | Ethnic Label in VISTA† | Adaptation |
|---|---|---|
| Adaptation to illness | −0.27‡ | 1.00 |
| Adherence to treatment | −0.15 | 0.24‡ |
| Quality of life | −0.21 | 0.46‡ |
| Poor disease management | 0.11 | −0.28‡ |
| Utilization of urgent/emergent services | 0.21 | −0.36‡ |

*Measures are coded so that higher reflects "more" of the construct (eg, higher quality of life, greater service utilization).

†Hispanic is coded as 0; Non-Hispanic white is coded as 1.

‡$P < 0.10$.

Also worth noting is that the Hispanic veterans in our sample tended to have higher scores on adaptation than did the non-Hispanic white veterans, as evidenced by the negative correlation. The mean standardized score for the Hispanic veterans was 0.28 (SD = 0.92) and for non-Hispanic white veterans was −0.24 (SD = 1.02), $t = 2.01$ (df = 52, $P = 0.05$). Although ethnic differences in the other variables were not statistically significant, probably because of the small sample size, the general pattern for this sample of veterans is toward Hispanic veterans displaying better outcomes than non-Hispanic white veterans.

### Regression Analyses

Three models were tested for each of the four outcome measures (adherence, health-related quality of life, clinical indicators of disease management, and utilization of urgent and emergent services). Model 1 examined the relationship between ethnicity and the outcome variable. Model 2 regressed adaptation to illness on the outcome variable. Model 3 determined the additional contribution of the adaptation construct after controlling for ethnicity, as a conservative test of the importance of the adaptation construct relative to ethnicity. These results are presented in Table 5.

The pattern of results was consistent across outcomes. For each of the four outcome measures, adaptation explained more of the variance in the outcome than did ethnicity. Furthermore, adaptation continued to be an important predictor even when entered into the model with ethnicity; that is, it explained variance above and beyond that explained by ethnicity. Moreover, what little explanatory power ethnicity had was primarily attributable to its shared variance with adaptation. This can be seen in the reduction of the β-weight for ethnicity when included in the combined model (ie, the difference in β from Model 1 to Model 3). It can be more clearly illustrated by the results of the commonality analysis. This technique partitions the amount of variance explained into that variance that is shared between the two constructs, and the variance uniquely explained by each.[57] As can be seen in Table 6, there is little variance that is uniquely explained by ethnicity.

## Discussion

The results of this study clearly support the theoretical expectations. The identified ecocultural domains of adaptation are moderately correlated with ethnicity. They are also correlated with the central health service outcomes. The explanation of these outcomes can be attributed to a shared contribution of ethnicity and adaptation, and a unique contribution of adaptation. The unique contribution of ethnicity was negligible. Therefore, adaptation can be seen as a more useful and more interpretable concept than ethnicity in explaining health and services outcomes.

Because these results are based on a small sample, no great confidence can be placed in the specific parameter estimates. The results reported here, however, are not arbitrary and are not a product of data dredging. The analyses were prespecified and represent a theory-driven approach. Although any particular result may be suspect as to the specific parameter estimate, the *pattern* of results is convincing and suggests that this line of research is likely to be fruitful. The small sample size also precluded us from examining the specific effects of the various ecocultural domains. With data from a larger sample, investigators would be able to look more closely at the differential effects of different domains. It is here that this line of research will have the largest payoff relative to the more traditional approach to ethnic difference research. By identifying which specific cultural and ecological factors seem to have the most effect on outcomes, clinicians and services researchers should be able to better design and target inter-

TABLE 5. Regression Models of Health Outcomes

| Variable | Model 1: Ethnicity | Model 2: Adaptation | Model 3: Ethnicity + Adaptation |
|---|---|---|---|
| Dependent variable | | | |
| *Adherence* | | | |
| Independent variable (β) | | | |
| *Ethnicity** | −0.19 | | −0.13 |
| *Adaptation to illness* | | 0.24† | 0.21 |
| Model *F* | $F(1, 52) = 1.85$ | $F(1, 52) = 3.18$† | $F(2, 51) = 2.02$ |
| $R^2$ of model | 0.03 | 0.06 | 0.07 |
| $R^2$ change | | | 0.04 |
| *F* change | | | *F* chg. $(1, 51) = 2.16$ |

| Variable | Model 1 | Model 2 | Model 3 |
|---|---|---|---|
| Dependent variable | | | |
| *Poor disease management* | | | |
| Independent variable (β) | | | |
| *Ethnicity** | 0.10 | | 0.02 |
| *Adaptation to illness* | | −0.27‡ | −0.27† |
| Model *F* | $F(1, 49) = 0.50$ | $F(1, 49) = 4.06$‡ | $F(2, 48) = 2.00$ |
| $R^2$ of model | 0.01 | 0.08 | 0.08 |
| $R^2$ change | | | |
| *F* change | | | *F* chg. $(1, 48) = 3.48$† |

| Variable | Model 1 | Model 2 | Model 3 |
|---|---|---|---|
| Dependent variable | | | |
| *Utilization of urgent/emergent services* | | | |
| Independent variable (β) | | | |
| *Ethnicity** | 0.20 | | 0.11 |
| *Adaptation to illness* | | −0.36‡ | −0.33‡ |
| Model *F* | $F(1, 50) = 2.18$ | $F(1, 50) = 7.61$‡ | $F(2, 49) = 4.10$‡ |
| $R^2$ of model | 0.04 | 0.13 | 0.14 |
| $R^2$ change | | | 0.10 |
| *F* change | | | *F* chg. $(1, 49) = 5.81$‡ |

| Variable | Model 1 | Model 2 | Model 3 |
|---|---|---|---|
| Dependent variable | | | |
| *Health-related Quality of Life* | | | |
| Independent variable (β) | | | |
| *Ethnicity** | −0.21 | | −0.07 |
| *Adaptation to illness* | | 0.46‡ | 0.44‡ |
| Model *F* | $F(1, 47) = 2.17$ | $F(1, 47) = 12.60$‡ | $F(2, 46) = 6.34$‡ |
| $R^2$ of model | 0.04 | 0.21 | 0.22 |
| $R^2$ change | | | 0.17 |
| *F* change | | | *F* chg. $(1, 46) = 10.10$‡ |

*Ethnicity is coded Hispanic = 0; non-Hispanic white = 1.
†$P \leq 0.10$.
‡$P \leq 0.05$.

TABLE 6. Commonality Analysis

| Outcome Variable | Total Variance Accounted for (%) | Shared Variance (%) | Unique Variance of Adaptation, Controlling for Ethnicity (%) | Unique Variance of Ethnicity, Controlling for Adaptation (%) |
|---|---|---|---|---|
| Adherence | 7.3 | 1.9 | 3.9 | 1.5 |
| Health-related quality of life | 21.6 | 3.9 | 17.2 | 0.5 |
| Disease management | 7.7 | 0.9 | 6.7 | 0.1 |
| Utilization | 13.2 | 3.1 | 10.1 | 1.1 |

ventions designed to address these areas. Finding that domestic workload is an important factor can lead to methods of working with patients that better incorporate monitoring and treatment into already-difficult daily routines. Being able to identify which patients report more economic marginality can alert practitioners to which patients may need more assistance in finding less-expensive alternatives to special dietary needs. Findings such as these would provide more direction and promise better effects than global findings of ethnic differences.

### Further Implications for Unpacking Proxy Variables

The use of proxy variables is almost invariably tempting because they are easily and frequently gathered and easily available in administrative data sets. For instance, a VA Health Services Research and Development service primer on risk adjustment suggests as possible risk adjustment variables age, sex, and "cultural and socioeconomic attributes," along with other dimensions.[58] The primer also states that most risk adjustment information for the VHA comes from the VISTA clinical database and the outpatient National Patient Care Database. Although those files do contain a race and ethnicity field, they do not contain *any* variables pertaining to culture and few that speak to possible socioeconomic attributes. If it is "cultural and socioeconomic attributes" that are of interest, then these are the variables that should be measured. Furthermore, it is not clear that the ethnic labels contained in those administrative variables accurately reflect the self-conceptualized ethnicity of the veterans (see Independent Variables, above), nor that a single item can reflect the likely variability in the strength of that ethnic identification. By using these readily available variables, we are often adding measurement error into our studies, reducing power, making the result less interpretable, and treating a poorly understood concept as an explanatory variable.[34]

Finally, although there is a considerable amount of literature on the difference in disease progression and other outcomes between non-Hispanic white and Hispanic patients with diabetes, such differences were not clearly apparent in this study. The small sample size severely limited the statistical power. Given the magnitude of the effects reported in this study, power was only between 20% and 30% across the different outcomes. A larger sample would allow us to better estimate what differences might exist.

Interestingly, what ethnic differences were suggested by the pattern of results were toward better outcomes for the Hispanic veterans in the sample than for non-Hispanic white veterans. This raises the intriguing possibility that the factors that lead to variability in disease management and outcome in type 2 diabetes are truly more cultural in nature and that the veteran population served by the VA Medical Center tends to be ethnically heterogeneous but culturally homogeneous. For instance, all the veterans speak English, have similar access to care (with some variability in eligibility), tend to be lower income, and probably have less variability in their beliefs and values than in the general population given that they all have shared the experience of military service. If these sorts of ecocultural variables are indeed the ones at play in producing the apparent ethnic differences in disease incidence and outcome, and if the variation in cultural factors is relatively limited in the veteran population, then this restriction in range will serve to attenuate the observed correlation between disease severity and ethnicity. Research on the relation of ecocultural factors to the progression of type 2 diabetes conducted jointly in VA and

non-VA facilities would be an interesting and important contribution to the field.

## References


1. **Jones CP, LaVeist TA, Lillie-Blanton M.** "Race" in the epidemiologic literature: An examination of the Am J Epidemiol. Am J Epidemiol 1991;134:1079–1084.

2. **Williams D.** The concept of race in Health Serv Res: 1966 to 1990;Health Serv Res:1994;29:261–274.

3. **Ahdieh L, Hahn RA.** Use of the terms "race," "ethnicity," and "national origins": a review of articles in the Am J Pub Health, 1980–1989. Ethn Health 1996;1:95–98.

4. **Hamman RF, Franklin GA, Mayer EJ, et al.** Microvascular complications of NIDDM in Hispanic patients and non-Hispanic white patients. Diabetes Care 1991;14:655–664.

5. **Feldman H, Klag M, Chiapella A, et al.** In-depth review: End-stage renal disease in US minority groups. Am J Kidney Dis 1992;19:397–410.

6. **Haffner SM, Hazuda H, Mitchell BD, et al.** Lack of awareness and treatment of hyperlipidemia in type II diabetes in a community survey. JAMA 1989;262:360–365.

7. **Horner RD, Matchar DB, Divine GW, et al.** Racial variations in ischemic stroke-related physical and functional impairments. Stroke 1991;22:1497–1501.

8. **Wells KB, Hough RL, Golding JM, et al.** Which Mexican-Americans underutilize health services? Am J Psychiatry 1987;144:918–922.

9. **Whittle J, Conigliaro J, Good BB, et al.** Racial differences in the use of invasive cardiovascular procedures in the Department of Veterans Affairs medical system. N Engl J Med 1993;329:621–628.

10. **Oddone EZ, Horner RD, Monger ME, et al.** Racial variations in the rates of carotid angiography and endareterectomy in patients with stroke and transient ischemic attack. Arch Intern Med 1993;153:2781–2786.

11. **Horner RD, Lawler FH, Hainer BL.** Relationship between patient race and survival following admission to intensive care among patients of primary care physicians. Health Serv Res 1991;26:531–542.

12. **Giordano J.** Ethnicity and aging. In: Mellor J, Solomon R, eds. Geriatric Social Work Education. Binghamton, NY: Haworth Press; 1992:23–37.

13. **Witzig R.** The medicalization of race: scientific legitimization of a flawed social construct. Ann Intern Med 1996;125:675–684.

14. **Dressler WW.** Type A behavior: contextual effects within a Southern black community. Soc Sci Med 1993;36:289–295.

15. **Osborne N, Feit M.** The use of race in medical research. JAMA 1992;267:275–279.

16. **Cavalli-Sforza LL, Menozzi P, Piazza A.** The History and Geography of Human Genes. Princeton, NJ: Princeton University Press; 1994.

17. **Williams DR, Lavizzo-Mourey R, Warren R.** The concept of race and health status in America. Public Health Rep 1994;109:26–41.

18. **Cooper R, David R.** The biological concept of race and its application to public health and epidemiology. J Health Polit Policy Law 1986;11:97–116.

19. **Evinger S.** How to record race: Categories of race and ethnicity and the 2000 census. Am Demogr 1996;18:36–42.

20. **Wright L.** One drop of blood. New Yorker 1994;25:46–55.

21. **Sheldon TA, Parker H.** Race and ethnicity in health research. J Public Health Med 1992;14:104–114.

22. **Hahn R, Mulinare J, Teutsch S.** Inconsistencies in the coding of race and ethnicity between birth and death in US infants. JAMA 1992;267:259–263.

23. **Smith M, Mendoza R.** Ethnicity and pharmacogenetics. Mt Sinai J Med 1996;63:285–290.

24. **Exner DV, Dries DL, Domanski MJ, et al.** Lesser response to angiotensin-converting-enzyme inhibitor therapy in black as compared with white patients with left ventricular dysfunction. N Engl J Med 2001;344:1351–1357.

25. **Lin K, Poland R, Anderson D.** Psychopharmacology, ethnicity and culture. Transcultural Psychiatr Res Rev 1995;32:3–40.

26. **Phinney J.** When we talk about American ethnic groups what do we mean? Am Psychol 1996;51:918–927.

27. **Waters M, Eschbach K.** Immigration and ethnic and racial inequality in the United States. Annu Rev Sociol 1995;21:419–446.

28. **Pelto P, Pelto G.** Anthropological Research: The Structure of Inquiry. Cambridge: Cambridge University Press; 1978.

29. **Whiting B.** Unpackaging variables. In: Riegel K, and Meacham J, eds. The Changing Individual in a Changing World Chicago, IL: Aldine; 1976:303–309.

30. **LaVeist T.** Beyond dummy variables and sample selection: What health services researchers ought to know about race as a variable. Health Serv Res 1994;29:1–16.

31. **Rivara FP, Finberg L.** Use of the terms race and ethnicity. Arch Pediatr Adolesc Med 2001;155:119.

32. **Nihira K, Weisner T, Bernheimer L.** Ecocultural assessment in families of children with developmental delays: Construct and concurrent validities. Am J Ment Retard 1994;98:551–566.

33. **Gallimore R, Weisner TS, Guthrie D, et al.** Family responses to young children with developmental delays: Accommodation activity in ecological and cultural context. Am J Ment Retard 1993;98:185–206.

34. **Walsh M, Smith R, Morales A, et al.** Ecocultural Research: A Mental Health Researcher's Guide to the Study of Race, Ethnicity, and Culture. Cambridge, MA: Human Services Research Institute; 2000.

35. **Mechanic D.** The concept of illness behaviour: culture, situation and personal predisposition. Psychol Med 1986;16:1–7.

36. **Miewald C.** Is awareness enough?: The contradictions of self-care in a chronic disease clinic. Hum Organ 1997;56:353–363.

37. **Conrad P.** The meaning of medications: Another look at compliance. Soc Sci Med 1985;20:29–37.

38. **Kaufman J, Cooper R, McGee D.** Socioeconomic status and health in blacks and white patients: The problem of residual confounding and the resiliency of race. Epidemiol 1997;8:621–628.

39. **Oliver M, Shapiro T.** Black Wealth/White Wealth: A new Perspective on Racial Inequality. New York, NY: Routledge; 1995.

40. **Centers for Disease Control and Prevention.** Diabetes Surveillance. Atlanta, GA: US Dept of health and Human Services; 1997:1997.

41. **Pugh J, Stern M, Haffner S, et al.** Excess incidence of treatment of end-stage renal disease in Mexican Americans. Am J Epidemiol 1988;127:135–144.

42. **Marshall J, Hamman R, Baxter J, et al.** Ethnic differences in risk factors associated with the prevalence of non-insulin-dependent diabetes mellitus. Am J Epidemiol 1993;137:706–718.

43. **Cowie CC, Harris MI, Silverman RE, et al.** Effect of multiple risk factors on differences between Blacks and White patients in the prevalence of non-insulin-dependent diabetes mellitus in the United States. Am J Epidemiol 1993;137:719–732.

44. **Stern M.** Invited commentary: Do risk factors explain ethnic differences in type II diabetes? Am J Epidemiol 1993;137:733–734.

45. **Walsh M.** Unpacking proxy variables: Cultural factors in adaptation to type 2 diabetes. Diss Abstracts Int: Section B: Sci & Engineering 1999;60(4-B):

46. **Trochim W.** An introduction to concept mapping for planning and evaluation. Evaluation and Program Planning 1989;12:1–16.

47. **Nihira K, Sakagami H, Kananaga Y.** Support for families with children with developmental delays: Cross cultural observations. Jpn J Public Health 1995;42:1197.

48. **Arzubiaga A, Gallimore R.** Latino Immigrant Ecocultural Family Interview Manual. Los Angeles, CA: Department of Psychiatry, UCLA; 1996.

49. **Reese L, Goldenberg CN, Loucky J, et al.** Ecocultural context, cultural activity, and emergent literacy of Spanish-speaking children. In: Rothstein SW, ed. Class, Culture and Race in American Schools: A Handbook. Westport, CT: Greenwood Press; 1995

50. **Epstein S.** The stability of behavior: II. Implications for psychological research. Am Psychol 1980;35:790–806.

51. **DCCT Research Group.** The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. N Engl J Med 1993;329:977–986.

52. **Clark C, Lee D.** Prevention and treatment of the complications of diabetes mellitus. N Engl J Med 1995;332:1210–1217.

53. **Genuth S.** For aggressive preventive management of type 2 diabetes. What is the evidence and is it enough? J Fam Pract 1998;47(Suppl 5):S23–6.

54. **Ho M, Marger M, Beart J, et al.** Is the quality of diabetes care better in a diabetes clinic or in a general medicine clinic? Diabetes Care 1997;20:472–475.

55. **Ware JE, Sherbourne CD.** The MOS 36-item short-form health survey (SF-36). Med Care 1992;30:473–483.

56. **Patrick DL, Danis M, Southerland LI, et al.** Quality of Life following intensive care. J Gen Intern Med 1988;3:218–223.

57. **Pedhazur E.** Multiple Regression in Behavioral Research. New York, NY: Holt; 1982.

58. **VA Health Services Research and Development Service.** Risk Adjustment: A Tool for Leveling the Playing Field. Boston:MA: Management Decision and Research Center; Washington, DC: VA Health Serv Res and Development Service/Association for Health Serv Res; 1997.