

# THE EFFECTS OF JOB INSTABILITY AND FINANCIAL STRAIN ON C-REACTIVE PROTEIN IN A SAMPLE OF MEXICAN IMMIGRANTS

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**Objective:** Mexican immigrants have lower cardiovascular disease risk than US citizens, but risk increases with level of acculturation. Our study investigated whether job stress and financial strain would be related to inflammation (C-reactive protein), lipids, and blood pressure, and if they would play a role in the acculturation process in Mexican immigrants.

**Method:** A sample of 310 Mexican immigrants living in the United States were studied on measures of job stress, financial strain, acculturation, and cardiovascular disease risk factors (C-reactive protein, lipids, and blood pressure).

**Results:** Job instability, financial strain, and acculturation, were related to inflammation, but psychological demands and decision latitude were not related. Lipids and blood pressure were not related to the variables of interest. Body mass index (BMI) was related to both increased acculturation and inflammation, and when controlling for BMI, acculturation was no longer a significant predictor of inflammation. Job instability and financial strain remained significant predictors of inflammation after controlling for BMI, sex, and age. Job instability and financial strain were not related to acculturation, suggesting that these factors are significant stressors for both newly arrived and more established immigrants.

**Conclusions:** Job instability and financial strain predict increased inflammation in Mexican immigrants but they do not play a role in the relationship between acculturation and C-reactive protein. The effects of acculturation on inflammation in this study were mediated by BMI. *Ethn Dis.* 2016(1):37-44; doi:10.18865/ed.26.1.37

**Keywords:** Acculturation, Job Instability, Financial Stress, C-reactive Protein, Immigrant Health

## INTRODUCTION

Acculturation, the process of adapting to a new culture, is a significant stressor for Hispanic immigrants in the United States, and is related to increased cardiovascular disease and cardiovascular disease risk factors such as inflammation, cholesterol, and blood pressure.<sup>1-8</sup> It is not clear, however, why acculturating to life in the United States contributes to increased cardiovascular disease risk. Job stress and financial strain are the two most frequently reported stressors in the United States and are significant stressors for immigrants.<sup>9-12</sup> Given that job stress and financial strain have been related to increased cardiovascular disease risk,<sup>13-15</sup> it is possible that these stressors contribute to the impact of acculturation on cardiovascular disease risk in immigrants. The purpose of our study was to examine this possibility.

## Acculturation and Cardiovascular Disease

Hispanic immigrants to the United States have lower rates of car-

diovascular morbidity and mortality relative to non-Hispanic Whites and African Americans.<sup>1,3,5</sup> This has been called the Hispanic Paradox because immigrants have less income and education and yet have above average health outcomes.<sup>5</sup> As Hispanic immigrants acculturate to life in the United States, however, their cardiovascular disease risk increases and begins to mirror the general population. The process of adapting to a new country can be a stressful experience and have lasting physiological consequences.<sup>6,7,12</sup> As immigrants acculturate to life in the United States, negative changes occur across cardiovascular disease risk factors.<sup>6,7</sup> Those more acculturated have higher blood pressure and are more likely to be diagnosed as hypertensive.<sup>16-17</sup> Acculturation is related to increased cholesterol levels,<sup>7,18-19</sup> and inflammatory markers such as C-reactive protein also increase with acculturation.<sup>4,8</sup> Interestingly, some researchers have proposed that acculturation to Western society be included as a risk factor for cardiovascular disease because higher levels of acculturation predict increased cardiovascular risk.<sup>20</sup>

Obesity is a key factor in both cardiovascular disease and acculturation.<sup>2,18-19</sup> Obesity is related to increased blood pressure, cholesterol, and C-reactive protein.<sup>21-23</sup> As im-

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migrants acculturate, they are also more likely to become obese,<sup>24-26</sup> with Hubert et al<sup>18</sup> finding that acculturation was the strongest predictor of BMI in a sample of Latinos. Acculturation contributes to negative health behaviors such as poor dietary habits and decreased physical activity.<sup>19</sup> Almadi<sup>27</sup> found that the impact of work stress on C-reactive protein was moderated by level of obesity, with relationships stronger in those more obese.

### Job Stress, Financial Strain, and Cardiovascular Disease

Job stress and financial strain are the top two causes of stress in the United States and contribute to cardiovascular disease.<sup>9,13-15</sup> Job instability has been related to increased cholesterol and measures of inflammation.<sup>28</sup> Job instability also predicts future elevations in C-reactive protein.<sup>13</sup> Steptoe et al<sup>29</sup> found that changes in financial strain over a three-year period predicted ambulatory blood pressure levels, with those improving financially over time showing decreased ambulatory systolic blood pressure.

Newly arrived immigrants to the United States have better health relative to more established immigrants and US citizens.<sup>5-6</sup> However, they also tend to experience more stress and show more negative health changes as they acculturate to life in the United States.<sup>10-11</sup> Newly arrived immigrants report more job stress than more established immigrants, and earn lower pay and have more difficulties paying for life necessities such as housing and food.<sup>11</sup> Most immigrants are not fluent in the language

of their new country and can have difficulties understanding what is being asked of them. Immigrants are more likely to work in manual labor jobs, be exposed to hazardous working conditions, and have seasonal jobs or more job instability.<sup>12,30-31</sup>

### Our Study

Acculturation is a predictor of cardiovascular disease risk for Hispanic immigrants, with increasing time lived in the United States re-

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lated to increased levels of cardiovascular disease risk.<sup>1-7</sup> Job stress and financial strain also predict cardiovascular disease risk and may contribute to the effects of acculturation on cardiovascular disease risk.<sup>9-15</sup> We therefore hypothesized that job stress and financial strain would predict cardiovascular disease risk factors (C-reactive protein, cholesterol, and blood pressure) in a sample of Mexi-

can immigrants and moderate the relationship between acculturation and cardiovascular disease. Our specific hypotheses were as follows. First, acculturation, job stress, and financial strain would each predict cardiovascular disease risk factors controlling for relevant covariates such as BMI; and second, the effects of job stress and financial strain would moderate the relationship between acculturation and cardiovascular disease risk factors, with newly arrived immigrants showing a stronger relationship between job stress and cardiovascular disease risk factors.

## METHOD

### Participants

Participants comprised 310 Mexican immigrants aged 18 to 65 years (average 36), 56% female, and had lived in the United States an average of 8 years. Exclusionary criteria included use of hypertensive or cardiovascular disease medications or having a cardiovascular disease diagnosis. Participants were recruited via television and radio announcements and flyers posted in Hispanic supermarkets and stores. Institutional review board approval was obtained prior to beginning the study and the all participants read and signed an informed consent form before in their native language taking part in the study.

### Procedure

Participants were interviewed via telephone to assess whether they met study criteria. Research assistants were fluent in both English and

Spanish and appointments were conducted in Spanish. All questionnaires were administered in Spanish using instruments standardized in Spanish. Participants fasted 12 hours prior to the onset of the study, including use of caffeine, alcohol, and tobacco products. Those who had not complied with the fast were rescheduled their appointment for another day.

## Measures

### *Demographic and Acculturation Variables*

Age, sex, education, income, and marital status were assessed. Questions were also asked about how long participants had lived in the United States and how comfortable they felt speaking English rated on a 5-point Likert scale, with 1 indicating not at all and 5 indicating completely.

### *Behavioral Variables*

Physical activity was measured using the International Physical Activity Questionnaire (IPAQ<sup>32</sup>). The IPAQ has participants rate everyday physical activities over the last seven days in terms of vigorous, moderate, and walking physical activities. The amount of time spent in each category is calculated and then the energy cost of the physical activities (metabolic equivalent) is calculated. The IPAQ has been shown to have good reliability and validity across studies and countries.<sup>32</sup> Tobacco use was assessed by asking participants if they were currently smoking which was answered on a yes/no scale.

### *Psychosocial Variables*

Depressive symptoms were measured using the Center for Epide-

miological Studies- Depression scale (CES-D).<sup>33</sup> The CES-D assesses depressed feelings during the past week, such as feelings of guilt and restlessness and depressed mood. The Spanish version of the CES-D has shown good reliability that matches the English version (Cronbach  $\alpha = .89$ ).<sup>34</sup> The 10-item Perceived Stress Scale (PSS) was used to measure current level of stress.<sup>35</sup> The PSS has shown good reliability ( $\alpha = .85$  in our study) and validity over a number of studies.<sup>35</sup> The Interpersonal Support Evaluation List (ISEL) 12-item version was used to assess perceived levels of social support.<sup>36</sup> The ISEL has demonstrated reliability ( $\alpha = .80$  to  $.90$ ) and validity across a number of students.<sup>36</sup> The Karasek Job Content Questionnaire (JCQ) was used to assess job stress. The JCQ assesses job strain using a demand and control model and has been shown to have good reliability and validity.

### *Physiological Variables*

Height and weight were measured to calculate BMI. Participants sat for 15 minutes to establish a resting baseline for blood pressure, following which systolic and diastolic blood pressures were assessed using a mercury sphygmomanometer and stethoscope. Blood pressure was taken four times at two-minute intervals with the first reading being discarded and the final three averaged together. After the blood pressure readings were completed, a phlebotomist performed a fasting blood draw. Blood samples were then sent immediately to Lab Corp for analyses.

High sensitivity C-reactive protein (CRP). CRP was measured

using a latex particle-enhanced immunoturbidimetric assay on the COBAS INTEGRA analyzer. Intra- and inter-assay variability of the assay were 1.3% and 3.1% respectively. It is recommended that concentrations higher than 10 mg/L should be disregarded because of likelihood of acute illness or other infectious process leading to temporary elevations in CRP.<sup>37</sup> Therefore values > 10 mg/L were excluded from analyses.

### *Lipid Analyses*

Lipid analyses were conducted by Lab Corp using established methods to measure lipid risk factors identified by NCEP ATP III guidelines. Measures of total cholesterol, triglycerides, LDL, HDL, and VLDL were obtained.

## Statistical Analysis

The SAS statistical program (versions 9.3) was used for conducting the statistical analyses. Hierarchical regression analyses were used controlling for relevant covariates. In the first step of the analyses, demographic and physical factors that are typically related to cardiovascular disease, namely age, sex, and BMI, were analyzed. Of these, sex and BMI were significant predictors and were included as covariates in subsequent models. In the second step of the analyses, the variables of interest, job stress, financial strain, and acculturation were entered into the model. Standardized coefficients were used to examine relative contributions of the variables to the outcomes of interest. To examine moderation between job stress and financial strain and acculturation, variables were

**Table 1. Key variables compared by immigrant status**

	Newly Arrived Immigrants, (0 to 3 years), (n = 111)	More Established Immigrants, (4+ years), (n = 199)	P
<b>Demographics and Acculturation</b>			
Age	33.4 ± 13.1	37.6 ± 10.2	.002
Sex, % female	53	57	ns
Income, % > \$20,000	47	63	.01
Education, % > high school	62	44	.003
Marital status, % married	56	74	.002
Years lived in US	1.6 ± 1.5	11.4 ± 6.5	.0001
English language use, % moderate to high	44	54	ns
<b>Behavioral and Psychosocial Variables</b>			
Physical activity (MET)	3.54 (.62)	3.61 (.66)	ns
Tobacco, % currently smoking	7.90	6.50	ns
Job stress	-.70 ± .8	-.91 ± .7	.04
Demands	2.1 ± .5	2.1 ± .4	ns
Decision latitude	2.8 ± .6	3.0 ± .7	.02
Supervisor support	11.6 ± 2.7	11.4 ± 3.1	ns
Co-worker support	6.4 ± 1.2	6.1 ± 1.4	ns
Job instability	3.8 ± 1.6	4.0 ± 1.7	ns
Financial strain, % high	41	26	.01
Depressive symptoms	16.1 ± 9.2	17.5 ± 9.9	ns
Perceived stress	14.6 ± 6.2	15.9 ± 6.7	ns
Social support	38.7 ± 4.8	37.3 ± 6.9	ns
<b>Physiological Variables</b>			
Body mass index	26.7 ± 4.8	28.8 ± 5.2	.001
C-reactive protein	1.9 ± 2.1	2.4 ± 2.0	.04
Clinic SBP	116 ± 15	117 ± 14	ns
Clinic DBP	76 ± 12.3	78 ± 12	ns
Cholesterol	177 ± 42	185 ± 38	ns
Triglycerides	163 ± 117	178 ± 115	ns
HDL	40 ± 12	40 ± 11	ns
LDL	103 ± 32	110 ± 33	ns
VLDL	30 ± 17	33 ± 17	ns

a. Data are mean ± SD unless noted otherwise.

first mean centered and then interaction terms were created to be included in the regression models.

## RESULTS

### Effects of Acculturation and BMI on Outcome Variables

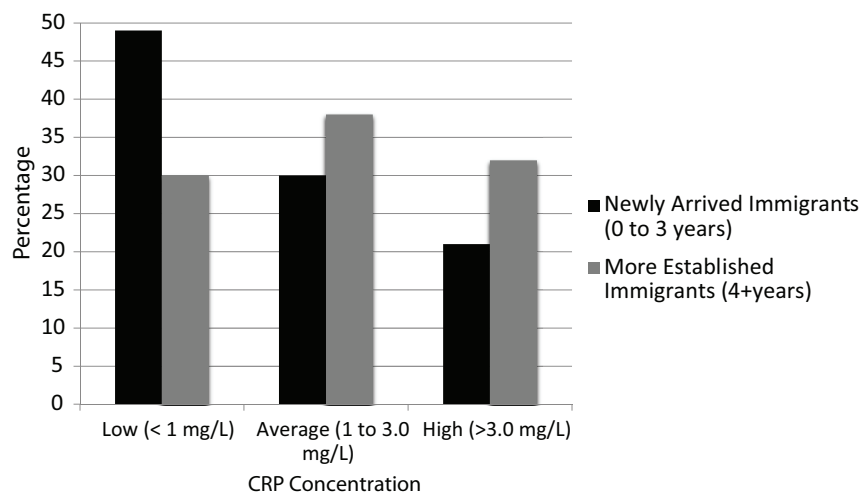
Sample characteristics are presented in Table 1 by acculturation level comparing newly arrived immigrants (0 to 3 years living in the

United States) with more established immigrants (4 or more years living in the United States). Table 1 is organized for convenience in presentation and because previous studies have found the largest effects of acculturation occur during the first three years after immigration<sup>7</sup>; the statistical analyses used the numeric form of years lived in the United States. Demographically, newly arrived immigrants were younger, had less income, had more education,

and were less likely to be married.

Newly arrived immigrants reported more job stress that was driven by less decisional control and were more likely to be experiencing financial strain (Table 1). More years lived in the United States was related to increased body mass index ( $r = .22, P < .001$ ) and higher levels of C-reactive protein ( $r = .21, P < .01$ ), similar to the study by Rodriguez et al.<sup>4</sup> Acculturation was not related to blood pressure or lipid levels. Figure 1 displays the relationship between level of acculturation and CRP categories, showing that newly arrived immigrants were more likely to be in the low risk category whereas the more established immigrants were more likely to be in the average risk category ( $\chi^2 = 7.33, P < .05$ ). There were no differences in psychological demands, supervisor or co-worker support, or job stability by acculturation group. Additionally, there were no differences in physical activity, tobacco use, depressive symptoms, perceived stress, or social support by acculturation.

Body mass index, sex, and age are typically predictors of C-reactive protein levels. Examining these three variables together, BMI ( $\beta = .44, P < .0001$ ) and sex ( $\beta = -.17, P < .01$ ) significantly predicted C-reactive protein but age did not ( $\beta = .04, P = .49$ ), such that those with higher BMI scores and women had higher levels of C-reactive protein. As stated previously, years lived in the United States was related to BMI ( $r = .22, P < .001$ ) and when controlling for BMI, the relationship between years lived in the United States and C-reactive protein was



**Figure 1. C-reactive protein levels by immigrant status. Newly arrived immigrants have significantly lower levels of C-reactive protein ( $\chi^2 = 7.33, P < .05$ )**

no longer significant ( $\beta = .05, P = .40$ ). When only controlling for sex, years lived in the United States remained a significant predictor of C-reactive protein ( $\beta = .13, P < .05$ ).

### Effects of Job Stress and Financial Strain on Outcome Variables

It was hypothesized that job stress and financial strain would be significant predictors of C-reactive protein, lipids, and clinic blood pressure in Mexican immigrants. Given that BMI and sex were related to the outcome variables, these variables were included as covariates in these analyses. Job stress and financial strain did not significantly predict lipids or blood pressure levels. Using hierarchical regression analyses with BMI and sex included first in the model, it was found that financial strain ( $b = .16, P < .01$ ) and higher perceived job instability ( $b = .13, P < .05$ ) predicted increased C-reactive protein. Psychological

demands and decision latitude were not related to C-reactive protein.

The last hypothesis was that job stress and financial strain would moderate the effects of acculturation on C-reactive protein. It was found, however, that job stress (interaction  $\beta = -.04, P = .73$ ) and financial strain (interaction  $\beta = .09, P = .30$ ) did not interact with acculturation in predicting the outcomes. Instead, the only variable that affected acculturation was BMI, with BMI completely mediating the relationship between acculturation and C-reactive protein.

## DISCUSSION

Acculturation is a cardiovascular disease risk factor for immigrants, with more acculturated individuals having higher levels of inflammation, lipids, and blood pressure.<sup>1-8</sup> Given that job stress and financial strain predict cardiovascular disease risk and are related to acculturation,

it was hypothesized that these variables would be related to inflammation, lipids, and blood pressure in a sample of Mexican immigrants.<sup>9-14</sup> We found that number of years lived in the United States was related to increased C-reactive protein as well as increased BMI, and the effect of years lived in the United States on C-reactive protein disappeared when controlling for BMI. Financial strain and job instability predicted higher C-reactive protein, with this effect remaining after controlling for BMI and sex. Examining the effects of job instability, financial strain, and BMI, only BMI was found to mediate acculturation and inflammation, with job instability and financial strain demonstrating independent relationships.

There are two key implications from this study. First, job instability and financial stressors are important stressors for Mexican immigrants. These are the top stressors in the United States and play an important role in the wellbeing of immigrants. The results of this study are in line with previous research demonstrating that job instability and financial strain predict increased C-reactive protein in non-immigrant populations. For example, Emeny et al<sup>38,39</sup> found that C-reactive protein played a key role in the relationship between job stress and heart disease, and Janicki-Deverts et al<sup>13</sup> found that unemployment stress predicted C-reactive protein over time. Similarly, C-reactive protein is an important marker in immigrant health and appears to play a role in the effects of immigrant stress on cardiovascular disease.<sup>4,5</sup>

The second implication is that job instability and financial strain do not explain the effects of acculturation on C-reactive protein. Job instability and financial strain were significant stressors for both newly

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arrived immigrants and more established immigrants, with these factors remaining significant stressors even as immigrants acculturated over time. Given that newly arrived immigrants experience significant job related stress it is perhaps not surprising that acculturation was not a factor.<sup>11,12</sup> Body mass index, however, did significantly increase with time lived in the United States and BMI mediated the relationship between acculturation and C-reactive protein. Obesity has been significantly related to both acculturation and C-reactive protein levels so this is inline with previous studies.<sup>18,19,21-23</sup> Physical activity did not differ by level of acculturation; it is

possible that dietary changes underlie the relationship between acculturation, BMI, and C-reactive protein.

### Study Limitations

There are two key limitations to this study. First, the study was cross-sectional in design so no statements can be made about causality. In addition to examining the effects of job stress on C-reactive protein over time for immigrants in their new country, it would be interesting to examine immigrants before migrating as well as during their time in the new country. Future research studies could build upon these findings by conducting longitudinal research examining the impact of immigration stress on physiological wellbeing at different points during the migration process. Second, only immigrants were studied. It would also be interesting to look at those born of immigrant parents to examine the effects of cultural change on successive generations over time, as well as compare findings to other ethnic groups such as Anglos and African Americans.

### CONCLUSION

Job instability and financial stress predict increased levels of C-reactive protein in a sample of Mexican immigrants living in the United States. Acculturation predicted levels of C-reactive protein with those living longer in the United States having higher levels. BMI showed the strongest relationship with C-reactive protein and when controlling for BMI the relationship between acculturation and C-reactive

protein disappeared indicating that BMI is a key pathway through which acculturation affects health.

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#### CONFLICT OF INTEREST

No conflicts of interest to report.

#### AUTHOR CONTRIBUTIONS

Research concept and design: Steffen. Acquisition of data: Walker, Meredith, Anderson. Data analysis and interpretation: Steffen, Walker, Meredith, Anderson. Manuscript draft: Steffen, Walker, Meredith, Anderson. Statistical expertise: Steffen. Acquisition of funding: Steffen. Administrative: Steffen, Walker, Meredith, Anderson. Supervision: Steffen, Walker, Meredith, Anderson

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