

**ASSESSING THE ROLE OF ACCULTURATION, SOCIAL SUPPORT, AND STRESS ON BIRTH  
OUTCOMES AMONG HISPANIC WOMEN ENROLLED IN FAMILIAS SANAS**

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## **Abstract**

**Background:** Familias Sanas (Healthy Families), an educational intervention, randomized low income, immigrant Hispanic mothers to either a bicultural and bilingual 'prenatal partner' or usual care. Initial study findings demonstrated a significant increase in postpartum follow-up among patients in the intervention group. Patients completed assessments at the time of recruitment and postpartum in areas of socioeconomic status, demographic variables, acculturation, social support, and stress.

**Research Question:** Identify the associations between the predictor variables of acculturation, social support, and stress on maternal health and birth outcomes in the Familias Sanas study participants.

**Methods:** This cohort study (N=440) assesses the following: 1) Relationships between the three predictor variables; 2) Associations between each of the predictor variables to gestational age and birth weight; 3) Cumulative correlations between the three predictors and outcome variables.

**Results:** Based on linear regression, Hispanicism significantly predicted lower stress ( $p=0.02$ ,  $\beta=-0.134$ ) and Americanism significantly predicted higher stress ( $p<0.01$ ,  $\beta=0.239$ ). Both Hispanicism and Americanism are positively correlated with social support (Hispanicism:  $r=0.179$ ,  $p<0.01$ ; Americanism:  $r=0.154$ ,  $p<0.01$ ). Stress significantly predicted lower birth weight ( $p<0.05$ ,  $\beta=-.114$ ). Sobel test to detect the indirect effect of acculturation on birth weight through the mediator variable of stress was not significant.

**Conclusions:** Although there is strong evidence for the associations between acculturation and birth outcomes, the literature specific to the Hispanic population is limited in describing the role of social support and stress on these outcomes. Further research is warranted to fill gaps in knowledge regarding the associations between the predictor variables of acculturation, social support, and stress on birth outcomes.

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## INTRODUCTION

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There are many risk and protective factors that influence the maternal, infant, and child health targets defined by Healthy People 2020. Although the State of Arizona is currently meeting the Healthy People 2020 targets with respect to low birth weight, infant mortality, mothers who received early prenatal care, and preterm births<sup>2</sup>, health disparities are present between the racial/ethnic groups. Hispanics compose of the 29.6% of the Arizona population, with the highest general fertility rate at 9.2%.<sup>3</sup> Hispanic mothers are less likely to begin prenatal care in the first trimester (74.1% vs. 80.3% in all groups)<sup>3</sup>; however, the low birth weight rate among Hispanic mothers was 6.4%, which lower than the rate for the general population.<sup>3</sup> In addition, it is undisputed in the literature that low levels of socioeconomic status adversely impacts birth outcomes such as low birth weight and gestational age. Socioeconomic indicators such as occupational class and education have higher levels of statistical significance than income on adverse birth outcomes.<sup>4</sup> Given the progressively diverse population in the Southwest United States, an assessment of the impact of acculturation, social support, and stress among Latina women on obstetric and perinatal outcomes has implications for clinical and public health practice.

*Specific Aim #1: Hispanic women with low levels of acculturation will have better obstetric and birth outcomes, particularly with the low birth weight, gestational age, than women with higher levels of acculturation.*

Increased levels of acculturation among Hispanic women are associated with poor birth outcomes such as elevated smoking rates during pregnancy, low birth weight deliveries, preterm births, and increased maternal stress.<sup>5-8</sup> Protective cultural factors that support positive perinatal outcomes in less acculturated Hispanic women include: maintenance of indigenous diet, low levels of substance use, supportive family networks, spiritual and religious value systems.<sup>9, 10</sup> The rates for infant mortality and birth weight among Hispanic American women are comparable to those of Caucasian women; this 'Hispanic Paradox' is attributed to the protective effects of low acculturation and social networks of support.<sup>7</sup>

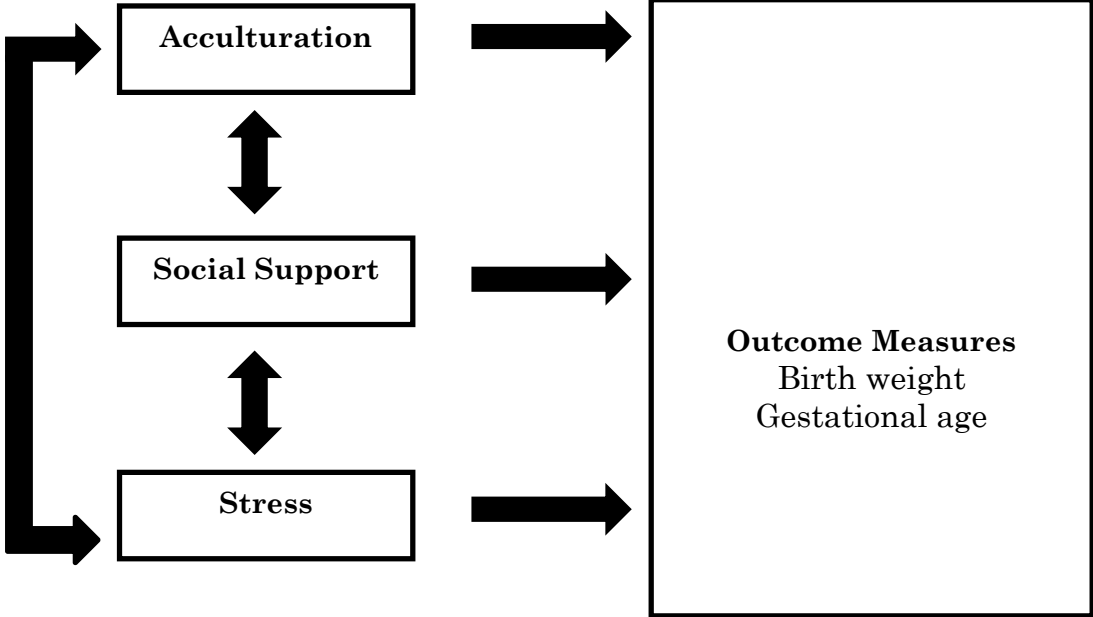
*Specific Aim #2: Hispanic women with high levels of social support will have better obstetric and birth outcomes, particularly with the measures of low birth weight, preterm birth, and breastfeeding, than women with low levels of social support.*

In addition to identifying risk factors that may lead to poor birth outcomes, it is important to assess how Latina women perceive their social support from friends, family, and significant others in order to learn more about protective mechanisms during pregnancy. Women with lower levels of perceived social support are more likely to experience low birth weight deliveries<sup>11</sup> and preterm births<sup>11, 12</sup>; in addition, they have a reduced intention to breastfeed<sup>13</sup>. In addition, women who have a combination of high levels of social support and increased maternal stress do not have an increased risk for preterm birth.<sup>12</sup>

*Specific Aim #3: Hispanic women with increased levels of perceived stress will have poorer obstetric and birth outcomes than women with lower levels of stress.*

Although associations between acculturation and birth outcomes are well documented in the Hispanic population, there is limited literature on the role of maternal stress. Studies conducted in the African-American population indicate that high levels of life stressors, discrimination, and racism lead to poorer outcomes in birth weight<sup>14</sup>, preterm birth<sup>15</sup>, and maternal stress.<sup>15</sup> Although there is strong evidence for the associations between acculturation and birth outcomes, the literature specific to the Hispanic population is limited in describing the role of social support and stress on these outcome measures. Prior analysis of the Familias Sanas data indicates a significance in social support from friends among women with higher levels of acculturation reported; acculturation was not associated to social support from family or significant others.<sup>1</sup> This project will analyze data from the Familias Sanas study in the hopes to fill gaps in knowledge regarding the associations between acculturation, social support, and stress and the effects of these predictors on obstetrical and perinatal outcomes (Figure One).

Figure One: Expected Relationships between Predictor and Outcome Variables





## RESEARCH MATERIALS AND METHODS

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This project will utilize a cohort study design to assess any associations between the predictor measures of acculturation, social support, and stress and the outcome variables. The baseline and postpartum assessment data from the Familias Sanas project has been collected and compiled in an SPSS database. The Familias Sanas sample size is 440 (intervention: N = 221; control: N= 219). Frequencies and mean values will be assessed for demographic variables such as age, Mexican heritage, US born Hispanic, generation of immigration, income, marital status, and parity (N= 437).

The first step of data analysis will be to determine the sample size available for each of the birth outcome data. This information will influence the type of analysis conducted due to considerations of statistical power. Although data for fourteen outcome measures have been collected, the primary focus for analysis will be placed on the variables of birth weight and gestational age due to clinical and public health relevance.

Baseline assessment data on acculturation, social support, and perceived stress will be utilized to address the three specific aims. The two measures of acculturation collected include linguistic acculturation (average of language use with family, friends, and media, ranging from 1=Spanish only to 3=Spanish and English equally to 5=English only) and time lived in United States in years.<sup>1</sup> The 12 item Multidimensional Scale of Perceived Social Support<sup>19</sup> (Figure Two) was utilized to collect data for support from family, friends, and significant others and a dichotomous variable was constructed (0 = low support, 1 = high support).<sup>1</sup> As outlined in Figure Two, the Multidimensional Scale of Perceived Social Support asks four questions each to determine levels of support amongst family, friends, and significant others.

The participants' degree of stress was determined by utilizing the 10 item Perceived Stress Scale (Figure Three).<sup>20</sup> This scale asks study participants about levels of stress and their ability to cope with this stress. The validity and reliability of the acculturation and social support measures have been demonstrated in prior studies.<sup>19-22</sup>

**Figure Two: Multidimensional Scale of Perceived Social Support <sup>19</sup>**

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

**Figure Three: Perceived Stress Scale<sup>20</sup>**

1. In the past month, how often have you been upset because of something that happened unexpectedly?
2. In the past month, how often have you felt unable to control the important things in your life?
3. In the past month, how often have you felt nervous or stressed?
4. In the past month, how often have you felt confident about your ability to handle personal problems?
5. In the past month, how often have you felt that things were going your way?
6. In the past month, how often have you found that you could not cope with all the things you had to do?
7. In the past month, how often have you been able to control irritations in your life?
8. In the past month, how often have you felt that you were on top of things?
9. In the past month, how often have you been angry because of things that happened that were outside of your control?
10. In the past month, how often have you felt that difficulties were piling up so high that you could not overcome them?

Contingency tables and chi-squared analysis will be developed to evaluate any associations between predictors and outcome variables. Since contextual factors such as marital status and socioeconomic status are predictors of social support and acculturation<sup>23</sup>, the data analysis will need to be adjusted for these confounding variables. In addition, linear regression may be utilized for continuous outcome measures such as birth weight and gestational age. Multivariate model may be utilized to assess associations between the three predictor measures and any cumulative correlation to the outcome variables.

### *Power Analysis*

A conservative approach to estimating the statistical power for the proposed study (Hsieh et al., 1998) suggests performing a Chi-square test of homogeneity (two sample proportion) and then adjusting for covariate effects (e.g. age, acculturation, pre-natal risk factors) by employing a variance inflation factor for the intervention effect. Using the Hsieh et al. (1998) method, the planned sample size of 400, divided equally into intervention and control groups, is adequate to detect an effect size of .3 with .80 power and .05 significance level, which falls between Cohen's (1988) definition of a small (.2) and medium (.5) effect size. To arrive at this estimate we assumed that the relationship among the covariates as indicated in prior studies (Bryant, Haas, McElrath, & McCormick, 2006; Coonrod, Bay & Balcazar, 2004; Moore, Bay, Balcazar, Coonrod, Brady, & Russ, 2005) is modest, such that an R<sup>2</sup> of .30 would be a conservative overestimate, and the maximum variance inflation factor (VIF) would thus be  $1/(1 - R^2) = 1.43$ . Prior to adjusting for covariates, to obtain a .3 effect size both the intervention and control groups would each require an N=140; employing the VIF adjustment we obtain  $140 * 1.43 = 200$ , the planned sample size in each group. This calculation is based on study hypotheses with the largest number of explanatory variables. Power would be somewhat for less complex hypotheses or for detecting a medium effect size (.5).

### *Research Compliance*

The baseline and postpartum assessment data from the Familias Sanas project has been collected and compiled in an SPSS database located at the Southwest Interdisciplinary Research Center. The database does not contain any patient identifiers such as name, social security number, address, telephone number, driver's license number. Individual records in the Familias Sanas database have unique identification numbers that are not linked to the patient information at MIHS. The master list that connects individual patients with their respective unique identification numbers is only available to the Principal Investigator, Dr. Dean Coonrod; access to this information by the Principal Investigator has been granted by prior IRB approval by the MIHS IRB. A data use agreement has been completed prohibit the student from accessing any personal identifying information. Informed consent was obtained from all patients at the time of study enrollment and reviewed under existing MIHS IRB for Familias Sanas.

Form 309 Human Research Determination and data use agreement were submitted to the University of Arizona IRB in May 2012 to determine the necessity of IRB review. In addition, Shruti Bala has been added to existing IRB at Arizona State University and Maricopa Integrated Health Systems for the Familias Sanas Project.

## RESULTS

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The secondary data analysis on the cohort of women enrolled in Familias Sanas revealed a study population with an age range of 18-43, primarily first generation in the United States (88%) and of Mexican heritage (81%). 44% of the women completed between 7 to 12 years of education and 78% earned an income of less than \$20,000. Approximately half of the participants were enrolled in family assistance programs such as food stamps and Women, Infant, and Children (WIC). Approximately 35% of the women had been pregnant more than four times and 82% of the women reported no prior pre-term births.

As detailed by the conceptual model, this study aims to identify the associations between acculturation, social support, and stress and the effects of these predictor variables on obstetrical and perinatal outcomes (Figure One). The first step was to identify the relationship between each of the predictor variables.

The acculturation variable was determined by Linguistic acculturation (average of language use with family, friends, and media) and time lived in United States in years. Based on these characteristics, the acculturation variable was measured as Americanism and Hispanicism. Americanism indicates that the study participant predominantly uses the English language and has a greater time lived in the United States; Hispanicism indicates that the study participant predominantly utilizes the Spanish language and has spent less time in the United States. When analyzing the correlation between acculturation and stress, the data showed that Hispanicism predicted lower stress ( $p=0.02$ ,  $\beta=-0.134$ ) and Americanism significantly predicted higher stress ( $p<0.01$ ,  $\beta=0.239$ ). Both acculturation measures were positively correlated with social support (Hispanicism:  $p<0.01$ ; Americanism:  $p<0.01$ ), indicating that if the patient associated with a cultural group, there was stronger levels of social support. Social support was negatively correlated with stress ( $p<0.01$ ,  $r=-.285$ ), indicating that higher levels of social support are correlated with lower stress. There was no statistical difference based on the type of social support – friends, family, or significant other – indicating that as long as the cumulative social support was present, this predicted lower levels of stress and monoculturalism to either Hispanicism or Americanism.

<b>Table One: Demographic Data for Women Enrolled in Familias Sanas</b>				
	N	%	Mean	Range
Age	408		27 (SD = 6.08)	18-43
<20	41	(10%)		
20-34	312	(76%)		
>35	55	(13%)		
Mexican heritage	356	(81%)		
Guatemala	19	(4%)		
Other Hispanic countries	12	(3%)		
US born Hispanic heritage	53	(12%)		
1st Generation	370	(88%)		
2nd	21	(5%)		
3rd	17	(4%)		
4th	9	(2%)		
Unknown	6	(1%)		
Education				
0 to 6 years	39	(25%)		
7 to 12 years	194	(44%)		
13 + years	34	(8%)		
Missing	173	(23%)		
Income	416			\$0-\$130,000
< \$20,000	323	(78%)		
\$20,000-\$50,000	86	(20%)		
>\$50,000	7	(2%)		
Missing	24			
Marital Status				
Single	204	(46%)		
Married	122	(28%)		
Partner	71	(16%)		
Separated	16	(4%)		
Missing	27	(6%)		
Family Assistance Programs				
Food Stamps	177	(40%)		
WIC	230	(53%)		
Rent (Section 8)	4	(1%)		
TANF	22	(5%)		
Alcohol: yes	84	(21%)		
No	324	(79%)		
Cigarettes: yes	11	(3%)		
No	398	(98%)		
Drugs: yes	3	(1%)		
No	404	(99%)		
Working status				
Yes	86	(20%)		
No	336	(77%)		
Missing	18	(3%)		

<b>Table Two: Baseline Maternal Health Demographics</b>	
	<b>N %</b>
<b>Gravidity</b>	408
One	65 (16%)
Second	95 (23%)
Third	104 (26%)
>Four	144 (35%)
Missing	32
<b>Prior Term Births</b>	408
None	90 (22%)
One	112 (26%)
Second	112 (26%)
>Three	94 (23%)
Missing	32
<b>Prior Pre-Term Births</b>	408
None	361 (82%)
One	38 (9%)
>Two	9 (2%)
Missing	32
<b>Prior Spontaneous/Induced Abortions &amp; Ectopic Pregnancies</b>	408
None	306 (75%)
One	69 (17%)
Two	24 (6%)
Three	9 (2%)
Missing	32
<b>Number of Living Children</b>	408
None	77 (19%)
One	112 (28%)
Two	114 (28%)
Three	58 (14%)
>Four	47 (12%)
Missing	32



<b>Table Three: Maternal Health Characteristics for Current Pregnancy</b>			
<b>Gestational Age at Delivery</b>	335	38.6 (SD = 2.53)	19.5-42.3
< 32 weeks (Very Pre-term)	8 (2%)		
32-36 weeks (Moderately Pre-Term)	41 (12%)		
34-36 weeks (Late Pre-Term)	7 (2%)		
< 37 weeks (Preterm)	49 (17%)		
>37 weeks	279 (83%)		
Missing	105 (24%)		
<b>Birth Weight at Delivery</b>	440		
<2500 grams (Low birth weight)			
>2500 grams			
> 4000 grams (Macrosomia)			
Missing	108 (25%)		
<b>Delivery Route</b>	335		
Vaginal or Assisted	263 (79%)		
Cesarean	72 (22%)		
Missing	105		

**Table Four: Linear Regression Assessing the Impact of Predictor Variables on Gestational Age**

	Unstandardized		Standardized	t	Significance
	B	SE	Beta		
<b>Constant</b>	3521.79	2737.1		12.9	.000
<b>Americanism</b>	10.95	36.35	.022	.301	.76
<b>Hispanicism</b>	11.39	45.12	.018	.252	.80
<b>Social Support</b>	-74.96	66.01	-.081	-1.14	.26
<b>Stress</b>	-.015	.019	-.044	-.78	.43

**Table Five: Linear Regression Assessing the Impact of Predictor Variables on Birth Weight**

	Unstandardized		Standardized	t	Significance
	B	SE	Beta		
<b>Constant</b>	39.45	1.28		30.58	.000
<b>Americanism</b>	.23	.17	.09	1.25	.21
<b>Hispanicism</b>	-.12	.21	-.04	-.56	.57
<b>Social Support</b>	-.25	.31	-.06	-.79	.42
<b>Stress</b>	-8.41	4.21	-.114	-2.0	.046

## DISCUSSION

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The goal of this study was to identify the associations between acculturation, social support, and stress and the effects of these predictor variables on the birth outcomes of gestational age and birth weight. The primary results indicate that Hispanicism predicted lower stress and Americanism significantly predicted higher stress; and, higher levels of stress was significantly correlated with lower birth weight. Low birth weight, typically defined as less than 2500 grams, is commonly caused by preterm delivery or infants that are small for gestational age. There are many well documented risk factors that contribute to low birth weight including multiple pregnancies, previous low birth weight infants, poor nutrition, heart disease, drug abuse, smoking, or insufficient prenatal care. Low birth weight itself is associated with significant infant mortality and morbidity due to inhibited growth and cognitive development. The study results add to the current literature on the impact of acculturation and stress on birth weight in the Hispanic population.

The Hispanic Paradox, an epidemiologic paradox, notes more favorable health and mortality outcomes for Hispanics relative to non-Hispanic whites in the United States is the subject of considerable research. The paradox centers on the observation that, whereas the socioeconomic profile of some Hispanic groups with regard to educational attainment, income, and health insurance coverage, closely resembles that of non-Hispanic blacks, this group as a whole consistently experiences lower mortality rates by comparison.<sup>28</sup> One of the most interesting patterns in among those of Mexican origin living in the United States – these individuals have mortality rates similar to non-Hispanic whites and their mortality is much lower than those of non-Hispanic blacks.

The Hispanic Paradox is prevalent in the arena of maternal and child health, as evidenced by the results of this study. There are numerous studies that indicate that Mexican-origin women who maintained Mexican-oriented cultural values, beliefs, practices, and lifestyles, experienced lower rates of low birth weight (infant birth weights < 2500g) than their counterparts with a US-orientation. There are many risk and protective factors such as

acculturation, strong networks of family and social support, and low levels of maternal stress that can influence outcomes of birth weight. Moreover, understanding the impact of these predictor variables on birth outcomes can help with the design and implementation of evidence based interventions that address the influence of acculturation and stress in prenatal and preconception care.

## **FUTURE DIRECTIONS**

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The results from this study reflect the experience of Hispanic women at one clinic within a large metropolitan area in the Southwest United States. These patients had a very specific demographic profile and the findings from this study can be only generalized to similar populations. The study participants were primarily first generation in the United States and predominantly of Mexican heritage. Most of the women had not completed any education past the high school level and lived in low income households. Any future studies that aim to confirm or replicate these results should include multisite designs to allow for the inclusion of various Latino subgroups in addition to Mexican heritage participants, a greater geographic representation, and a greater variance in terms of socioeconomic status and acculturation status. The results from this study should be generalized with caution until more broad and diverse studies are conducted.

In addition, another main limitations and difficulties with using a continuous variable when running analyses for birth weight and gestational age in this study is the factor that low birth weight could have been a result of preterm delivery itself due to obstetrical complications such as preeclampsia, hypertension, or maternal diabetes. One area of future study would be to determine if the variables of acculturation and social support impact these areas of maternal obstetrical morbidity. Given the diverse minority population in the southwestern United States, further research studying the impact of acculturation, social support, and stress among Latina women on obstetric and perinatal outcomes is warranted and may have implications for clinical and public health practice.

## CONCLUSION

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### *Implications for Clinical Practice*

This assessment of acculturation, social support, and maternal stress on perinatal outcomes can enable physicians and healthcare providers to target and practice culturally appropriate care that accurately identifies risk and protective factors. Significant findings may support the utilization of an interdisciplinary approach to prenatal care visits, by incorporating health educators, like the prenatal partners in Familias Sanas.<sup>1</sup> One method is to address the factors of acculturation, social support, and maternal stress during physician prenatal visits or nurse home visits. Utilizing evidence based models to improve prenatal and preconception counseling can help improve birth outcomes in this population. Moreover, an understanding of the sociocultural context can help ensure culturally appropriate care that emphasizes trust and communication in the patient doctor relationship.

Culturally tailored programs can positively impact access to healthcare, adherence to medications and health promotion behaviors, and overall clinical outcomes. One evidence based model utilized in Latino communities on the US-Mexico border region is *promotoras de salud* (health promoters); this model has been proven efficacious to prevent and treat a variety of diseases and conditions including communicable and chronic diseases<sup>16</sup> as well as maternal and child health<sup>17,18</sup>. Such programs are tailored to the values of the Latino community; they are responsive to Latino spiritual and cultural beliefs related to health, such as the importance and influence of social support from family and friends,<sup>24,25</sup> and beliefs in the power of faith over illness, and/or about the supernatural roots of illness.<sup>26</sup> Research related to ideas about the roots of illness and family support among Latinos suggests that these factors are associated to health promotion behaviors.<sup>27</sup>

### *Implications for Public Health Practice*

Evaluations of sociocultural factors such as acculturation, social support, and stress influence the development of prenatal and interconception interventions and overall maternal and child health policy. From a broad spectrum approach, educational materials to improve the health literacy of mothers who do not speak English as their first language could improve knowledge about pregnancy and interconception care and overall understanding of how important health care is for women and their children.<sup>1</sup> In addition, the establishment of community health centers for migrant families and families in poverty would provide these families access to the health care needed. Moreover, a better understanding of the sociocultural context can influence strategies for positive behavior change and health promotion during pregnancy.



## REFERENCES

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1. Marsiglia FF, Bermudez-Parsai M, Coonrod D. Familias Sanas: an intervention designed to increase rates of postpartum visits among Latinas. *J Health Care Poor Underserved*. 2010;21(3 Suppl):119-131.
2. The Healthy Communities Network. Healthy Arizona :: Healthy People 2020 : Progress Tracker. *Arizona Health Matters*. Available at: <http://www.arizonahealthmatters.org/index.php?module=Trackers&func=display&tid=1>. Accessed March 6, 2012.
3. Mrela C, Torres C. Arizona Health Status and Vital Statistics 2009 Report. 2010.
4. Detjen MG, Nieto FJ, Trentham-Dietz A, Fleming M, Chasan-Taber L. Acculturation and cigarette smoking among pregnant Hispanic women residing in the United States. *Am J Public Health*. 2007;97(11):2040-2047.
5. Ruiz RJ, Dolbier CL, Fleschler R. The relationships among acculturation, biobehavioral risk, stress, corticotropin-releasing hormone, and poor birth outcomes in Hispanic women. *Ethn Dis*. 2006;16(4):926-932.
6. Ruiz RJ, Saade GR, Brown CEL, et al. The effect of acculturation on progesterone/estriol ratios and preterm birth in Hispanics. *Obstet Gynecol*. 2008;111(2 Pt 1):309-316.
7. Rosenberg TJ, Raggio TP, Chiasson MA. A further examination of the "epidemiologic paradox": birth outcomes among Latinas. *J Natl Med Assoc*. 2005;97(4):550-556.
8. Zambrana RE, Scrimshaw SC, Collins N, Dunkel-Schetter C. Prenatal health behaviors and psychosocial risk factors in pregnant women of Mexican origin: the role of acculturation. *Am J Public Health*. 1997;87(6):1022-1026.
9. Balcazar H, Krull JL, Peterson G. Acculturation and family functioning are related to health risks among pregnant Mexican American women. *Behav Med*. 2001;27(2):62-70.
10. Callister LC, Birkhead A. Acculturation and perinatal outcomes in Mexican immigrant childbearing women: an integrative review. *J Perinat Neonatal Nurs*. 2002;16(3):22-38.

11. Feldman PJ, Dunkel-Schetter C, Sandman CA, Wadhwa PD. Maternal social support predicts birth weight and fetal growth in human pregnancy. *Psychosom Med*. 2000;62(5):715-725.
12. Ghosh JKC, Wilhelm MH, Dunkel-Schetter C, Lombardi CA, Ritz BR. Paternal support and preterm birth, and the moderation of effects of chronic stress: a study in Los Angeles county mothers. *Arch Womens Ment Health*. 2010;13(4):327-338.
13. Insaf TZ, Fortner RT, Pekow P, et al. Prenatal stress, anxiety, and depressive symptoms as predictors of intention to breastfeed among Hispanic women. *J Womens Health (Larchmt)*. 2011;20(8):1183-1192.
14. Dominguez TP, Dunkel-Schetter C, Glynn LM, Hobel C, Sandman CA. Racial differences in birth outcomes: the role of general, pregnancy, and racism stress. *Health Psychol*. 2008;27(2):194-203.
15. Giscombé CL, Lobel M. Explaining disproportionately high rates of adverse birth outcomes among African Americans: the impact of stress, racism, and related factors in pregnancy. *Psychol Bull*. 2005;131(5):662-683.
16. Balcázar H, Alvarado M, Cantu F, Pedregon V, Fulwood R. A promotora de salud model for addressing cardiovascular disease risk factors in the US-Mexico border region. *Prev Chronic Dis*. 2009;6(1):A02.
17. Keller C, Records K, Ainsworth B, et al. Madres para la Salud: design of a theory-based intervention for postpartum Latinas. *Contemp Clin Trials*. 2011;32(3):418-427.
18. Lewin S, Munabi-Babigumira S, Glenton C, et al. Lay health workers in primary and community health care for maternal and child health and the management of infectious diseases. In: The Cochrane Collaboration, Lewin S, eds. *Cochrane Database of Systematic Reviews*. Chichester, UK: John Wiley & Sons, Ltd; 2010. Available at: <http://doi.wiley.com/10.1002/14651858.CD004015.pub3>. Accessed March 5, 2012.
19. Dahlem NW, Zimet GD, Walker RR. The Multidimensional Scale of Perceived Social Support: a confirmation study. *J Clin Psychol*. 1991;47(6):756-761.
20. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Soc Behav*. 1983;24(4):385-396.

21. Marsiglia FF, Kulis S, Wagstaff DA, Elek E, Dran D. Acculturation Status and Substance Use Prevention with Mexican and Mexican-American Youth. *J Soc Work Pract Addict*. 2005;5(1-2):85-111.
22. Chen MJ, Grobman WA, Gollan JK, Borders AEB. The use of psychosocial stress scales in preterm birth research. *Am. J. Obstet. Gynecol*. 2011;205(5):402-434.
23. Sagrestano LM, Feldman P, Rini CK, Woo G, Dunkel-Schetter C. Ethnicity and social support during pregnancy. *Am J Community Psychol*. 1999;27(6):869-898.
24. Eyler AA, Brownson RC, Donatelle RJ, et al. Physical activity social support and middle- and older-aged minority women: results from a U.S. survey. *Soc Sci Med*. 1999 Sep;49(6):781-9.
25. Keller C, Allan J, Tinkle MB. Stages of change, processes of change, and social support for exercise and weight gain in postpartum women. *J Obstet Gynecol Neonatal Nurs*. 2006 Mar-Apr;35(2):232-40.
26. Kittler PG, Sucher KP. Food and culture in America: a nutrition handbook. 2nd ed. Wadsworth; Belmont, CA: 1998.
27. Derogatis LR, Fleming MP, Sudler NC, et al. Psychological assessment. In: Nicassio PM, Smith TW, editors. Managing chronic illness: a biopsychosocial perspective. American Psychological Association; Washington, DC: 1995.
28. Powers DA. Paradox revisited: a further investigation of racial/ethnic differences in infant mortality by maternal age. *Demography*. 2013;50(2):495-520.