ann. behav. med. (2018) 52:186–193
DOI: 10.1093/abm/kax007

BRIEF REPORT

Worry About Deportation and Cardiovascular Disease Risk Factors Among Adult Women: The Center for the Health Assessment of Mothers and Children of Salinas Study

Jacqueline M. Torres, PhD, MPH[1] • Julianna Deardorff, PhD[2] • Robert B. Gunier, PhD[3] • Kim G. Harley, PhD[4] • Abbey Alkon, RN, PhD, CPNP[5] • Katherine Kogut, MPH, MSc[3] • Brenda Eskenazi, PhD[6]

Published online: 8 January 2018
© The Society of Behavioral Medicine 2018. All rights reserved. For permissions, please e-mail: journals.permissions@oup.com

Abstract

Background U.S. Latinos report high levels of concern about deportation for themselves or others. No previous research has tested the link between worry about deportation and clinical measures of cardiovascular risk.

Purpose We estimate the associations between worry about deportation and clinically measured cardiovascular risk factors.

Methods Data come from the Center for the Health Assessment of Mothers and Children of Salinas study. The analytic sample includes 545 Mexican-origin women.

Results In multivariable models, reporting a lot of worry about deportation was significantly associated with greater body mass index, greater risk of obesity, larger waist circumference, and higher pulse pressure. Reporting moderate deportation worry was significantly associated with greater risk of overweight and higher systolic blood pressure. Significant associations between worry about deportation and greater body mass index, waist circumference, and pulse pressure, respectively, held after correcting for multiple testing at $p < .05$.

Conclusions Worry about deportation may be an important cardiovascular risk factor for ethnic minority populations in the USA.

Jacqueline M. Torres
Jacqueline.Torres@ucsf.edu

[1] Department of Epidemiology & Biostatistics, University of California, San Francisco, 550 16th Street, San Francisco, CA 94143

[2] Division of Community Health and Human Development, UC Berkeley School of Public Health, Berkeley, CA

[3] Center for Environmental Research and Children's Health (CERCH), UC Berkeley School of Public Health, Berkeley, CA

[4] Center for Environmental Research and Children's Health (CERCH), Division of Community Health and Human Development, UC Berkeley School of Public Health, Berkeley, CA

[5] School of Nursing, University of California, San Francisco, CA

[6] Division of Community Health and Human Development; Center for Environmental Research and Children's Health (CERCH), UC Berkeley School of Public Health, Berkeley, CA

Keywords Body mass index • Hypertension • Blood pressure • Minority health • Social determinants of health

Introduction

Researchers and policy makers have become increasingly interested in the health impacts of immigration policies, including fear related to these policies [1–5]. Immigrant deportations in the USA have increased over the past decade, from an estimated 189,000 deportations in 2001 to a peak of 435,000 in 2013 to 333,000 deportations in 2015 [6]. Increased deportation, as well as greater collaboration between local law enforcement officers and federal immigration authorities (e.g., under the national Secure Communities program, 2008–2014) has contributed to widespread worry about deportation, including

among U.S.-born individuals [3, 7]. In a 2010 national survey, 46% of U.S.-born and foreign-born Latinos reported that they worried about the deportation of themselves, a family member, or close friend [8]. The results of a similar survey fielded between December 2016 and January 2017 suggest a persistently high prevalence of deportation worry—47% of both U.S.-born and foreign-born Latinos reported deportation worry, ranging from a third of U.S.-born Latinos to two-thirds of foreign-born Latinos who are not U.S. citizens [9].

Prior research has documented significant associations between worry about deportation and depression and anxiety [10, 11], poorer self-rated health [12, 13], and lower rates of health care utilization [5, 14, 15]. No quantitative research, to our knowledge, has examined associations between worry about deportation and clinically measured health outcomes that may be risk factors for cardiovascular disease and other chronic conditions. Qualitative studies, however, have suggested potential links between worry about deportation and cardiovascular risk factors. In focus groups, immigrant respondents in the northeastern USA reported elevated blood pressures, in addition to increased depression, anxiety, and sleep disturbances as the result of being targeted by immigration authorities [7, 16]. In in-depth interviews during a time of aggressive immigration enforcement efforts, Mexican-origin mothers in Arizona reported restricting travel for the purchase of healthy foods and limiting outdoor physical activity in order to avoid contact with authorities [3]. If sustained over time, these behavioral adaptations to the local political climate might contribute to increased cardiovascular risk. While Mexican-origin individuals are at lower risk for cardiovascular disease compared to other populations in the USA [17, 18], traditional cardiovascular risk factors such as overweight and obesity are associated with adverse cardiovascular outcomes among U.S. Latinos [19, 20].

In the present study, we examine associations between self-reported worry about deportation and measured cardiovascular disease risk factors among a sample of primarily Mexican-origin women. We hypothesize that higher levels of worry about deportation are associated with higher values on key risk factors for cardiovascular morbidity and mortality, including body mass index (BMI), waist circumference, and blood pressure [21, 22].

Our sample comes from the Center for the Health Assessment of Mothers and Children of Salinas (CHAMACOS), a longitudinal birth cohort study of women and their children born in the Salinas Valley, an agricultural area located in the inland region of Monterey County, CA. Although Monterey County is one of the wealthiest counties in the state, the Salinas Valley is predominantly low-income and Latino. The "Secure Communities" (SCOMM) program was enacted in Monterey County in 2010. As of February 2015 there were 2,384 removals and returns under the program for a population of 431,300 (2014) (5.52 per 1,000 pop.); by comparison, there were 35,750 removals and returns in Los Angeles County during the same period for a population of 10.2 million (3.57 per 1,000 pop.) [23].

Method

Detailed information on the CHAMACOS study has been published elsewhere [24]. Briefly, the first cohort (CHAM1) of women was recruited during pregnancy from Salinas Valley community clinics between October 1999 and October 2000. Eligible women were >18 years of age, English or Spanish speaking, eligible for Medi-Cal (a state subsidized medical insurance plan), <20 weeks gestation, and had plans to deliver at the county hospital. From an initial sample of 1,130 pregnant women, 601 agreed to participate in the study and 531 remained in the study at the time of delivery. Women who declined to participate were more likely to be U.S.-born and English speaking, although they had similar age and parity compared to those who agreed to join. Participants were followed until their child reached 12 years of age. A second cohort of 305 mothers of 9-year-old children (CHAM2) was recruited to join the study between January 2010 and September 2011 when the CHAM1 children were 9 years of age. Eligibility criteria for new participants matched those of the initial cohort (i.e., during her pregnancy with the participating child the mother was >18 years, Spanish or English speaking, Medi-Cal eligible, and received prenatal care at a low-income health care provider in the Salinas Valley).

Although participants were assessed at multiple time points starting at baseline, data for the current analyses are from visits completed between March 2012 and August 2014, when mothers were first asked about worry about deportation. A total of 594 mothers (316 from CHAM 1 and 278 from CHAM 2) were surveyed as part of this visit, when participating children were 12 years old. Compared to women who enrolled at baseline, those who responded to the 12-year survey were significantly older (about 2 years) and less likely to speak Spanish at home, but were not different in terms of nativity, years spent in the USA (for foreign-born respondents), educational attainment, or poverty status. For our analyses, we also excluded 49 women who were pregnant or had unknown pregnancy status at time of their assessment for a total analytic sample of 545 mothers. There were no significant differences in level of deportation worry for those excluded from the analytic sample due to pregnancy status compared to those included.

The majority of assessments were completed in the research office, although about 8% of assessments were completed in participants' homes. Written informed consent was obtained from all women in the study. All

informed consent and study procedures were approved by the University of California, Berkeley's Committee for the Protection of Human Subjects.

Worry About Deportation

Mothers were interviewed in either Spanish or English by trained bilingual, bicultural staff members using structured surveys. Participants were asked the following question: "We know that many families are worried about deportation, either for themselves or for their family and friends. How much worry would you say this causes you?" Response categories were: "not too much worry," "a moderate amount of worry," or "a lot of worry".

Health Outcomes

BMI assessments were based on a single weight measurement taken principally using a digital Tanita bioimpedence scale (Tanita TBF-300A Body Composition Analyzer, Tanita Corporation, Arlington Heights, IL), although approximately 13% of the women had weight measured with a digital scale (Tanita Baby and Mommy 1582, Tanita Corporation) due to personal preference or assessment in the home. Barefoot standing height was measured with a wall-mounted stadiometer (Seca 222, Chino, CA). We analyzed a continuous BMI measure as well as a three-category measure indicating normal weight (BMI < 25), overweight (≥25 and <30), and obesity (≥30). No participants were classified as underweight (i.e., BMI < 18.5). Waist circumference was measured in triplicate by placing a measuring tape around the mothers' abdomen midway between the iliac crest and the inferior margin of the ribs, and parallel to the floor; the average of the three measurements was calculated and used in analyses.

Blood pressure was measured with an automated oscillometric monitor (Dinamap XL 9300, Critikon Inc., Tampa, FL) that was calibrated annually. The monitor was placed on the left arm of participants after 2 min of rest. Three measurements were taken with 1 min rest between measurements and the average of the second two measurements was used for these analyses. We created a binary measure of hypertension, classifying maternal participants as hypertensive if they had a measured systolic blood pressure of >140 mm Hg, a diastolic blood pressure of >90 mm Hg, or self-reported ever having been diagnosed with hypertension by a doctor or currently taking antihypertensive medication. We additionally examined systolic and diastolic blood pressure, pulse pressure (systolic minus diastolic blood pressure), and mean arterial pressure (systolic plus three times diastolic blood pressure over three). There is evidence that each of these measurements is uniquely related to a wide range of cardiovascular endpoints [25], and that blood pressure measured on a continuous scale may provide information about cardiovascular risk obscured by binary measures [26].

Covariates

We controlled for respondents' age in years, marital status (married/living with partner vs. single/divorced/widowed), education (<6th grade, >6th but <12th grade, and ≥12th grade), and family income-to-poverty ratio. Given evidence that cardiovascular risk increases with longer time in the USA and/or birth in the USA (i.e., being second or third generation) [27], we included a composite measure of nativity and years of residence in the USA (<15 years in the USA, >15 and <20 years in the USA, >20 years in the USA, and U.S.-born). We also controlled for respondents' preferred language spoken in the home (either Spanish or English) to account for the possible contribution of acculturation factors above and beyond duration in the USA to cardiovascular risk. To protect the participants' safety and confidentiality, we did not ask about their citizenship or documentation status.

Statistical Analysis

Analyses were completed using STATA v.14. We first examined descriptive characteristics by levels of worry about deportation. We then estimated a series of multivariable models regressing each of the respective health outcomes on mothers' reported worry about deportation, adjusting for covariates. We completed a number of ancillary analyses. First, given the possibility that the association between deportation worry and health outcomes might vary by respondents' nativity, we tested interaction terms between deportation worry and nativity. Next, given the possibility that underlying depression might be driving both worry about deportation and cardiovascular risk factors [28], we re-estimated the models controlling for respondents' prior depression. Depressive symptoms were last measured among CHAMACOS respondents 3 years prior to being asked about worry about deportation, using the 20-item Centers for Epidemiologic Studies Depression (CESD) scale. We contrasted respondents who had scores of ≥16 on the CESD with those who had scores of <16 [29]. We nevertheless consider results without control for depression as those of primary interest. Although our data do not allow for us to accurately characterize the temporal order between depression and deportation worry, worry about deportation could predate depression, with depression serving as a potential mediator between deportation worry and

measured cardiovascular risk factors. Controlling for potential mediators of the primary association of interest would be over-control.

Finally, given the low prevalence of hypertension in the sample, we estimated the association between deportation worry and an outcome of prehypertension (i.e., systolic blood pressure > 120 mm Hg, diastolic blood pressure > 80 mm Hg, prior diagnosis of hypertension, or taking antihypertensive medication).

Ordinary least squares regression was used for continuous outcomes, logistic regression was used for the binary outcome of hypertension, and multinomial logistic regression was used for the three-category measure of weight status. Standardized mean differences by categories of worry about deportation were estimated for continuous outcomes [30]. Missing data on covariates were handled using multiple imputation with chained equations. A total of 10 imputed data sets were created and coefficients and standard errors were combined across all of the data sets using Rubin's rules [31]. We adjusted for multiple testing with the false discovery rate method [32].

Results

Just fewer than 28% of respondents reported "not too much" worry about deportation for themselves or others, 24% reported a moderate amount of worry, and nearly half of respondents reported a lot of worry about deportation (Table 1). Respondents were almost 40 years old on average and two-thirds were still living with or married to the father of their child. Among the overall sample, 88% of women were foreign-born and 12% were born in the USA. The majority of respondents spoke primarily Spanish in the home, ranging from 72% of women who reported not too much worry about deportation to 96% of women reporting a lot of worry about deportation. Two-thirds of women who reported not too much worry had completed a high school education or more, compared with 26% of those who reported moderate worry and 14% of women who reported a lot of worry about deportation. Those reporting not too much worry had a mean income-to-poverty ratio of 0.9 (±0.4) while those reported a lot of worry had a mean income-to-poverty ratio of 0.7 (±0.3).

Mean (±*SD*) BMI was 30.9 (±6.6); just under 13% of respondents were classified as having a BMI in the normal range, 34.7% were categorized as overweight, and 52.7% were classified as obese. Respondents had a mean (±*SD*) waist circumference of 102 cm (±15.6). Nearly 20% of women were classified as having hypertension. The mean (±*SD*) systolic blood pressure was 113.6 (±14.8) mm Hg and the average diastolic blood pressure was 66.0 (±19.6) mm Hg. Mean (±*SD*) arterial pressure was 81.9 (±10.6) mm Hg and mean (±15.6) pulse pressure was 47 (±10.0) mm Hg for the sample.

There was a significant association between reporting a lot of worry about deportation and higher BMI (β: 2.07; 95% CI: 0.69, 3.45), adjusting for covariates. (Table 2) The results of multinomial logistic regression of deportation worry on BMI categories show that moderate worry about deportation was associated with significantly greater risk of being overweight relative to normal weight (RR: 2.39; 95% CI: 1.07, 5.33). Reporting a lot of worry about deportation was associated with significantly greater risk of obesity relative to normal weight (RR: 2.06; 95% CI: 1.06, 3.98), controlling for covariates. Reporting a lot of worry about deportation was associated with significantly larger waist circumference (β: 4.99; 95% CI: 1.70, 8.28) relative to reporting not too much worry, all else equal.

Reporting moderate worry about deportation was associated with significantly higher systolic blood pressure (β: 3.71; 95% CI: 0.06, 7.34) relative to reporting not too much worry. Reporting a lot of worry about deportation was significantly associated with greater pulse pressure (β: 3.20; 95% CI: 1.02, 5.39) relative to reporting not too much worry. There were no significant associations between worry about deportation and hypertension (or prehypertension, tested in ancillary analyses), diastolic blood pressure, or mean arterial pressure. The results of ancillary analyses suggest no significant interaction effects between deportation worry and nativity across the models. Significant associations between worry about deportation and continuous measures of BMI, waist circumference, and pulse pressure, respectively, held at $p < .05$ even after accounting for multiple testing.

Ancillary analyses show that prior depression was significantly associated with greater risk of reporting a lot of worry about deportation versus reporting not too much worry about deportation (Supplementary Appendix). Reported results held after controlling for respondents' prior depression in ancillary multivariate analyses (Supplementary Appendix). In this set of additional analyses, the association between worry about deportation and pulse pressure was statistically significant at $p < .05$ after accounting for multiple testing; the associations between worry about deportation and continuous measures of BMI and waist circumference, respectively, held at $p < .10$.

Discussion

This is the first study to our knowledge to empirically examine the association between worry about deportation and measured cardiovascular risk factors. We found that worry about deportation was significantly associated with higher BMI, greater risk of overweight and obesity, and significantly larger waist circumference

Table 1 Descriptive Statistics for Demographic Characteristics by Level of Worry About Deportation, Mexican-Origin Women in the Salinas Valley, CA: Center for Health Assessment of Mothers and Child of Salinas (CHAMACOS) Study, Salinas, CA, 2012–2014

	Total (n = 545)	Not too much worry (n = 151)	A moderate amount of worry (n = 129)	A lot of worry (n = 265)	Test of significant difference
Age, years, $M \pm SD$	39.0 ± 5.3	38.3 ± 5.3	39.3 ± 5.5	39.3 ± 5.3	$F = 1.9$, NS
Currently married/living with partner, n (%)	376 (69.0)	97 (64.2)	92 (71.3)	187 (70.6)	$\chi^2 = 2.2$, NS
Educational attainment, n (%)					
<6th grade	233 (42.8)	49 (32.5)	44 (34.1)	140 (52.8)	
7–12th grade	185 (33.9)	47 (31.1)	51 (39.5)	87 (32.8)	
>12th grade	127 (23.3)	55 (36.4)	34 (26.4)	38 (14.3)	$\chi^2 = 34.7$, $p < .001$
Family income-to-poverty ratio, $M \pm SD$	0.8 ± 0.4	0.9 ± 0.4	0.8 ± 0.3	0.7 ± 0.3	$F = 14.9$, $p < .001$
Years in the USA/nativity, n (%)					
<15 years	170 (31.3)	28 (18.5)	37 (28.7)	105 (39.8)	
16–20 years	153 (28.1)	32 (21.2)	41 (31.8)	80 (30.3)	
>21 years	156 (28.7)	50 (33.1)	36 (27.9)	70 (26.5)	
U.S.-born	66 (12.0)	41 (27.2)	15 (11.6)	10 (3.4)	$\chi^2 = 66.7$, $p < .001$
Speak primarily Spanish in the home, n (%)	475 (87.2)	109 (72.2)	113 (87.6)	253 (95.5)	$\chi^2 = 46.6$, $p < .001$
Body mass index, $M \pm SD$	31.4 (6.5)	30.9 (6.6)	30.9 (6.0)	31.9 (6.6)	$F = 1.76$, NS
Body mass index categories, n (%)					
Normal weight	69 (12.7)	27 (17.9)	13 (10.1)	29 (10.9)	
Overweight	189 (34.7)	45 (29.8)	57 (44.2)	87 (32.8)	
Obese	287 (52.7)	79 (52.3)	59 (45.7)	149 (56.2)	$\chi^2 = 11.0$, $p < .05$
Waist circumference, cm, $M \pm SD$	101.9 ± 15.6	100.7 ± 16.6	101.0 ± 14.0	103.1 ± 15.6	$F = 1.5$, NS
Hypertension, n (%)	107 (19.6)	28 (18.5)	24 (18.6)	55 (20.8)	$\chi^2 = 0.4$, NS
Systolic blood pressure, mm Hg, $M \pm SD$	113.6 ± 14.8	112.1 ± 14.0	115.3 ± 15.8	113.7 ± 14.8	$F = 1.7$, NS
Diastolic blood pressure, mm Hg, $M \pm SD$	66.0 ± 9.6	66.1 ± 9.9	67.5 ± 9.6	65.1 ± 9.4	$F = 2.7$, NS
Mean arterial pressure, mm Hg, $M \pm SD$	81.9 ± 10.6	81.4 ± 10.6	83.5 ± 11.0	81.3 ± 10.3	$F = 1.9$, NS
Pulse pressure, mm Hg, $M \pm SD$	47.6 ± 10.0	45.9 ± 8.9	47.8 ± 10.3	48.5 ± 10.5	$F = 3.3$, $p < .05$

among a sample of Mexican-origin adult women in California's Salinas Valley. The significant associations between a lot of worry about deportation and continuous BMI and waist circumference measures, respectively, held after accounting for multiple testing.

We did not observe significant associations between deportation worry and hypertension or continuous measures of diastolic blood pressure and mean arterial pressure. However, deportation worry was associated with higher systolic blood pressure, which has been linked to congestive heart failure, myocardial infarction, and stable angina, as well as higher pulse pressure, which has been shown to be a significant predictor of congestive heart failure and peripheral arterial disease [25, 33]. The relationship between deportation worry and higher pulse pressure remained significant even after accounting for multiple testing.

We note that findings held even when controlling for measures of socioeconomic status and, importantly, time spent in the USA and nativity. Furthermore, we found no evidence of significant interactions between deportation worry and measures of nativity or time in the USA, although the sample may have been too small to extensively explore interactions. Alternatively, the lack of significant interactions may reflect the possibility that worry about deportation similarly affects the health of U.S.-born individuals who are concerned about family members at risk for deportation [5, 6].

Although past research on the health effects of worry about deportation has been limited, the broader literature on the health impacts of psychosocial stress in general sheds light on a number of potential mechanisms driving the association between worry about deportation and cardiovascular risk factors. Societal stressors that persist over time may impact cardiovascular disease risk by way of chronic activation of the stress response system, including faster heart rate, inflammation, and heightened immune response to pathogens already present in the body [34, 35]. Stress may also be linked to cardiovascular risk through adverse impacts on sleep duration and quality [36, 37] and reduced physical activity [38]. Worry about deportation could also compound the adverse cardiovascular impacts

Table 2 Regression Results for Cardiovascular Risk Factors by Level of Worry About Deportation, Mexican-Origin Women in Salinas Valley, CA (n = 545): Center for Health Assessment of Mothers and Child of Salinas (CHAMACOS) Study, Salinas, CA, 2012–2014

	Body mass index, continuous		
	β	95% CI	Standardized mean difference
Not too much worry	Ref	Ref	Ref
A moderate amount of worry	0.79	−0.73, 2.32	d = 0.12
A lot of worry	2.07**§	0.69, 3.45	d = 0.30
	Overweight vs. normal weight		
	RR	95% CI	
Not too much worry	Ref	Ref	
A moderate amount of worry	2.39*	1.07, 5.33	
A lot of worry	1.54	0.77, 3.11	
	Obese vs. normal weight		
	RR	95% CI	
Not too much worry	Ref	Ref	
A moderate amount of worry	1.70	0.78, 3.68	
A lot of worry	2.06*	1.06, 3.98	
	Waist circumference, cm		
	β	95% CI	Standardized mean difference
Not too much worry	Ref	Ref	
A moderate amount of worry	2.27	−1.40, 5.95	d = 0.15
A lot of worry	4.99**§	1.70, 8.28	d = 0.30
	Hypertension		
	OR	95% CI	
Not too much worry	Ref	Ref	
A moderate amount of worry	0.94	0.49, 1.79	
A lot of worry	1.10	0.62, 1.94	
	Systolic blood pressure, mm Hg		
	β	95% CI	Standardized mean difference
Not too much worry	Ref	Ref	
A moderate amount of worry	3.71*	0.06, 7.34	d = 0.24
A lot of worry	2.90	−0.30, 6.10	d = 0.18
	Diastolic blood pressure, mm Hg		
	β	95% CI	Standardized mean difference
Not too much worry	Ref	Ref	
A moderate amount of worry	1.54	−0.86, 3.94	d = 0.15
A lot of worry	−0.30	−2.40, 1.80	d = 0.03
	Mean arterial pressure, mm Hg		
	β	95% CI	Standardized mean difference
Not too much worry	Ref	Ref	
A moderate amount of worry	2.26	−0.37, 4.89	d = 0.20
A lot of worry	0.77	−1.53, 3.06	d = 0.07
	Pulse pressure, mm Hg		
	β	95% CI	Standardized mean difference
Not too much worry	Ref	Ref	
A moderate amount of worry	2.17	−0.28, 4.61	d = 0.21
A lot of worry	3.20**§	1.02, 5.39	d = 0.29

Controlling for respondents' age, education, whether married or living with child's father, time in the USA/nativity, preference to speak Spanish in the home, and family income-to-poverty rate.

*p < .05, **p < .01, §p < .05 after correcting for multiple testing with the false discovery rate.

RR relative risk ratio.

of other acute and chronic stressors, including financial and occupational strain and discrimination [39].

There are several limitations to consider. For one, the sample is geographically limited to a particular agricultural region of California and is comprised of very low-income, primarily Mexican-born women, which restricts the generalizability of the results to other regions and to other immigrant and U.S.-born groups. Second, the analysis is cross-sectional, which limits our ability to establish a causal relationship between deportation worry and cardiovascular risk factors. We attempted to address the possibility that prior depression might be driving both levels of worry and cardiovascular risk factors, thereby confounding the results. In ancillary analyses, we did find that prior depression was significantly associated with worry about deportation. However, the results linking worry about deportation and measured cardiovascular outcomes largely held even when controlling for prior depression. Another limitation is that the exposure measure is a single item and its psychometric properties are unknown. There was no valid, reliable measure of worry about deportation available at the time this wave of data was collected, although the question is similar to one utilized by the Pew Research Center in national surveys [8, 9].

Conclusion

Researchers and policy makers have expressed concern about the impact of immigration policies and worry about deportation on the health and well-being of immigrants and their family members. While prior research has examined the association between worry about deportation and self-reported outcomes, this is the first study to our knowledge to test the association between deportation worry and measured cardiovascular risk factors. Among a sample of Mexican-origin women in California's Salinas Valley, we found that worry about deportation was significantly associated with cardiovascular risk factors, including BMI, waist circumference, and continuous measures of systolic and pulse pressure, after controlling for potential confounders. These findings should be viewed in light of policy efforts that may either exacerbate or alleviate the burden of worry about deportation among immigrants and their family members. Policies that mitigate worry about deportation might have potentially beneficial consequences for the cardiovascular risk profiles of individuals who are themselves undocumented or have undocumented family and community members. In contrast, policies that lead to increased worry about deportation may have adverse downstream impacts on cardiovascular risk.

Supplementary Material

Supplementary material is available at *Annals of Behavioral Medicine* online.

Acknowledgements: We thank the Center for the Health Assessment of Mothers and Children of Salinas (CHAMACOS) staff, students, community partners, and participants and families. We would like to thank Megan Johnson, Mienah Sharif, and William Martinez for their comments on earlier drafts of this manuscript. This work was funded by research grant numbers P01 ES009605 and R01 ES015572 from the National Institute for Environmental Health Sciences (NIEHS) (B. Eskenazi, PI) and R 82670901, RD 83171001, and RD 83451301 from the U.S. Environmental Protection Agency (EPA) (B. Eskenazi, PI). J. M. Torres was supported by the Robert Wood Johnson Foundation Health & Society Scholars program while carrying out the analyses. The contents are solely the responsibility of the authors and do not necessarily represent the official views of the funders.

Compliance with Ethical Standards Statements

Authors' Statement of Conflict of Interest and Adherence to Ethical Standards: Authors Jacqueline M. Torres, Julianna Deardorff, Robert B. Gunier, Kim G. Harley, Abbey Alkon, Katherine Kogut, and Brenda Eskenazi declare that they have no conflicts of interest. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Authors' Contributions: B. Eskenazi, A. Alkon, K. G. Harley, and K. Kogut all contributed to the original study design and data collection; J. M. Torres, J. Deardorff, R. B. Gunier, K. G. Harley, A. Alkon, and B. Eskenazi all contributed to the approach and statistical methods for the present analyses; J. M. Torres and R. B. Gunier cleaned the data and J. M. Torres carried out the statistical analyses; all co-authors contributed to the interpretation of the results; J. M. Torres drafted the manuscript with critical revisions from all co-authors.

Ethical Approval: All informed consent and study procedures were approved by the University of California, Berkeley's Committee for the Protection of Human Subjects.

Informed consent: Informed consent was obtained from all individual participants included in the study.

References

1. Viruell-Fuentes EA. Beyond acculturation: immigration, discrimination, and health research among Mexicans in the United States. *Soc Sci Med*. 2007;65(7):1524–1535.
2. Castañeda H, Holmes SM, Madrigal DS, Young ME, Beyeler N, Quesada J. Immigration as a social determinant of health. *Annu Rev Public Health*. 2015;36:375–392.
3. Hardy LJ, Getrich CM, Quezada JC, Guay A, Michalowski RJ, Henley E. A call for further research on the impact of state-level immigration policies on public health. *Am J Public Health*. 2012;102(7):1250–1254.

4. Morris JE, Palazuelos D. The health implications of deportation policy. *J Health Care Poor Underserved*. 2015;26(2):406–409.
5. Rhodes SD, Mann L, Simán FM, et al. The impact of local immigration enforcement policies on the health of immigrant Hispanics/Latinos in the United States. *Am J Public Health*. 2015;105(2):329–337.
6. Gonzalez-Barrera A, Hugo Lopez M. *U.S. Deportations Fall to Lowest Level Since 2007*. Washington, DC: Pew Research Center; 2016.
7. Hacker K, Chu J, Leung C, et al. The impact of Immigration and Customs Enforcement on immigrant health: perceptions of immigrants in Everett, Massachusetts, USA. *Soc Sci Med*. 2011;73(4):586–594.
8. Hugo Lopez M, Taylor P, Funk C, Gonzalez-Barrera A. *On Immigration Policy, Deportation Relief Seen as More Important Than Citizenship: A Survey of Hispanics and Asian Americans*. Washington, DC: Pew Research Center: Hispanic Trends; 2013.
9. Pew Research Center. *Latinos and the New Trump Administration*. Washington, DC: Pew Research Center; 2017.
10. Valdez CR, Padilla B, Valentine JL. Consequences of Arizona's immigration policy on social capital among Mexican mothers with unauthorized immigration status. *Hisp J Behav Sci*. 2013;35(3):303–322.
11. Yoshikawa H. *Immigrants Raising Citizens: Undocumented Parents and Their Young Children*. New York, NY: Russell Sage Foundation; 2011.
12. Finch BK, Vega WA. Acculturation stress, social support, and self-rated health among Latinos in California. *J Immigr Health*. 2003;5(3):109–117.
13. Cavazos-Rehg PA, Zayas LH, Spitznagel EL. Legal status, emotional well-being and subjective health status of Latino immigrants. *J Natl Med Assoc*. 2007;99(10):1126–1131.
14. Heyman JM, Núñez GG, Talavera V. Healthcare access and barriers for unauthorized immigrants in El Paso County, Texas. *Fam Community Health*. 2009;32(1):4–21.
15. Maldonado CZ, Rodriguez RM, Torres JR, Flores YS, Lovato LM. Fear of discovery among Latino immigrants presenting to the emergency department. *Acad Emerg Med*. 2013;20(2):155–161.
16. Hacker K, Chu J, Arsenault L, Marlin RP. Provider's perspectives on the impact of Immigration and Customs Enforcement (ICE) activity on immigrant health. *J Health Care Poor Underserved*. 2012;23(2):651–665.
17. Aguilar M, Bhuket T, Torres S, Liu B, Wong RJ. Prevalence of the metabolic syndrome in the United States, 2003-2012. *JAMA*. 2015;313(19):1973–1974.
18. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of childhood and adult obesity in the United States, 2011-2012. *JAMA*. 2014;311(8):806–814.
19. González HM, Tarraf W, Rodríguez CJ, et al. Cardiovascular health among diverse Hispanics/Latinos: Hispanic Community Health Study/Study of Latinos (HCHS/SOL) results. *Am Heart J*. 2016;176:134–144.
20. Kaplan RC, Avilés-Santa ML, Parrinello CM, et al. Body mass index, sex, and cardiovascular disease risk factors among Hispanic/Latino adults: Hispanic Community Health Study/Study of Latinos. *J Am Heart Assoc*. 2014;3(4):1–12.
21. Danaei G, Ding EL, Mozaffarian D, et al. The preventable causes of death in the United States: comparative risk assessment of dietary, lifestyle, and metabolic risk factors. *PLoS Med*. 2009;6(4):e1000058.
22. Janssen I, Katzmarzyk PT, Ross R. Body mass index, waist circumference, and health risk: evidence in support of current National Institutes of Health guidelines. *Arch Intern Med*. 2002;162(18):2074–2079.
23. U.S. Immigration and Customs Enforcement. *ICE's Use of IDENT/IAFIS Interoperability: Monthly Statistics Through February 28, 2015*. Washington, DC: U.S. Department of Homeland Security/U.S. Immigration and Customs Enforcement; 2015.
24. Eskenazi B, Harley K, Bradman A, et al. Association of in utero organophosphate pesticide exposure and fetal growth and length of gestation in an agricultural population. *Environ Health Perspect*. 2004;112(10):1116–1124.
25. Rapsomaniki E, Timmis A, George J, et al. Blood pressure and incidence of twelve cardiovascular diseases: lifetime risks, healthy life-years lost, and age-specific associations in 1·25 million people. *Lancet*. 2014;383(9932):1899–1911.
26. Basu S, Hong A, Siddiqi A. Using decomposition analysis to identify modifiable racial disparities in the distribution of blood pressure in the United States. *Am J Epidemiol*. 2015;182(4):345–353.
27. Koya DL, Egede LE. Association between length of residence and cardiovascular disease risk factors among an ethnically diverse group of United States immigrants. *J Gen Intern Med*. 2007;22(6):841–846.
28. Lewis TT, Cogburn CD, Williams DR. Self-reported experiences of discrimination and health: scientific advances, ongoing controversies, and emerging issues. *Annu Rev Clin Psychol*. 2015;11:407–440.
29. Radloff LC. The CES-D scale, a self-report depression scale for research in the general population. *Appl Psychol Measure*. 1977;1(3):385–401.
30. Wilson DB. *Practical meta-analysis effect size calculator [online calculator]*. Available at https://www.campbellcollaboration.org/escalc/html/EffectSizeCalculator-Home.php. Accessibility verified April 10, 2017.
31. Royston P, White IR. Multiple imputation by chained equations (MICE): implementation in STATA. *J Stat Softw*. 2011;45(4):1–20.
32. Benjamini Y, Hochberg Y. Controlling the false discovery rate: a practical and powerful approach to multiple testing. *J R Stat Soc Series B*. 1995;57(1):289–300.
33. Haider AW, Larson MG, Franklin SS, Levy D; Framingham Heart Study. Systolic blood pressure, diastolic blood pressure, and pulse pressure as predictors of risk for congestive heart failure in the Framingham Heart Study. *Ann Intern Med*. 2003;138(1):10–16.
34. Steptoe A, Kivimäki M. Stress and cardiovascular disease. *Nat Rev Cardiol*. 2012;9(6):360–370.
35. Aiello AE, Diez-Roux A, Noone AM, et al. Socioeconomic and psychosocial gradients in cardiovascular pathogen burden and immune response: the multi-ethnic study of atherosclerosis. *Brain Behav Immun*. 2009;23(5):663–671.
36. Buxton OM, Marcelli E. Short and long sleep are positively associated with obesity, diabetes, hypertension, and cardiovascular disease among adults in the United States. *Soc Sci Med*. 2010;71(5):1027–1036.
37. Knutson KL. Sociodemographic and cultural determinants of sleep deficiency: implications for cardiometabolic disease risk. *Soc Sci Med*. 2013;79:7–15.
38. Vásquez E, Strizich G, Gallo L, et al. The role of stress in understanding differences in sedentary behavior in Hispanic/Latino adults: results from the Hispanic Community Health Study/Study of Latinos Sociocultural Ancillary Study. *J Phys Act Health*. 2016;13(3):310–317.
39. Gallo LC, Roesch SC, Fortmann AL, et al. Associations of chronic stress burden, perceived stress, and traumatic stress with cardiovascular disease prevalence and risk factors in the Hispanic Community Health Study/Study of Latinos Sociocultural Ancillary Study. *Psychosom Med*. 2014;76(6):468–475.