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ORIGINAL PAPER

Stress and Sociocultural Factors Related to Health Status Among US–Mexico Border Farmworkers

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Abstract This study examines factors relating to farmworkers' health status from sociocultural factors, including stress embedded within their work and community contexts. A cross-sectional household survey of farmworkers (N = 299) included social-demographics, immigration status descriptors, and a social-ecologically grounded, community-responsive, stress assessment. Outcomes included three standard US national surveillance measures of poor mental, physical, and self-rated health (SRH). Logistic regression models showed that higher levels of stress were significantly associated (Ps $< .001$) with increased risk for poor mental health and poor physical health considering all variables. Stress was not associated with SRH. Regarding two of the three outcomes, mental health and physical health, stress added explanatory power as expected. For poor SRH, a known marker for mortality risk and quite high in the sample at 38 %, only age was significantly associated. Clinical and systems-level health promotion strategies may be required to mitigate these stressors in border-residing farmworkers.

Keywords Farmworkers · Sociocultural factors · Discrimination · Latinos · Stress and health

Introduction

In developed nations abundant fresh produce are available year-round. Most of these fruits and vegetables are planted, harvested and processed for shipping by largely invisible local and seasonal farmworkers. Many farmworkers reside in the southwest US, where the hot climate yields growing and harvesting times off-season from other regions. The State of Arizona generates $4 billion (USD) in annual agricultural sales, with Yuma County the largest producing county, accounting for 30 % of all output [1]. Yuma County is one particularly intense area for fall through spring farmwork, where lettuce is the dominant crop (the community has been termed "The Winter Lettuce Capital of the World"). Major destinations in 2005–2009 of the US lettuce crop (it is estimated that >85 % the US winter output originates from Yuma) include Canada, Mexico, Taiwan, Japan, Singapore, South Korea, the UK, Netherlands and Germany [2].

The median hourly rate for farmworkers in the Yuma metropolitan area is $8.64 (USD) per hour, about 50, 65 and 60 % less than that of the average worker in the County, State, and nation [3]. For slightly above the Arizona minimum wage (currently $7.80 per hour), these workers endure long hours, harsh climates, and report frequent work-related

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injuries [4]. Of note, major employers rely heavily on the federal H2A program, permitting foreign nationals (most of whom are from Mexico) entry into the US for temporary or seasonal agricultural work.

Mexican-descent immigrants receive fewer work-related benefits than the general US population [4]. Latino/Hispanic men and women also report low mental health services utilization [5, 6]. Studies have also shown farmworkers of Mexican descent are less likely to utilize preventive and other health care services, even when available [7]. Identified barriers include cultural beliefs and experiences, long work hours, inflexible health service delivery, fear related to immigration enforcement, and inadequate English language skills [8, 9].

Though Mexican-descent persons represent most farmworkers in the Western US (as well as increasingly in other US regions and Canada), understanding farmworker health is not merely an extension of understanding Latino immigrant health. In addition to the strenuous work environment, there are other unique dynamics affecting their health needs [8, 10]. As is common to these workers in many other rural communities, those residing in Southern Yuma County face a federally recognized shortage of primary care and mental health providers [11]. Further, this county is within a state besieged with anti-immigrant public discourse and high federal activity on border enforcement [12]. This may exacerbate structural discrimination-related stressors that have negative health effects [13] but that are rarely considered in population health studies.

The present study aims to extend knowledge of factors relating to farmworker health by examining sociocultural factors, including ecologically-based stress [14], in a survey of under-served and vulnerable farmworkers in Yuma, AZ. This work derived from a larger community-based participatory research partnership [15] including multiple academic units, a grassroots farmworker organization of promotor/as (community health workers), and a migrant-focused human rights organization. There was a common commitment to promoting farmworkers' health and welfare, and all of the community partners were instrumental in defining the factors under study, the data collection process, and data interpretation.

Stress was a primary health factor of interest identified in the partnership. Underlying the conceptual model of stress were some themes represented in prior research [16–21]; namely those linked to acculturation processes, discrimination, economic strain, and family separation. Additionally, two domains of stress emerged from the participatory process (with the current partnership as well as in another within an urban border community) that were not represented in the prior stress research [16, 18, 21] that most informed this project; these novel domains are stress tied to border enforcement practices and stress from barriers to health care [14].

Prior work has examined sociocultural factors–those addressing psychological, social, cultural, economic conditions, and their intersection–in relating to the wellness of farmworkers [10, 20–24]. Most of the work has been focused on stress measurement, or on its impact on mental health. Further, no prior study has examined the current context-specific stressors and socio-cultural factors in relation to the health of farmworkers within Arizona's largest agricultural region. This is despite evidence that perceived stressors relate to biomarkers of chronic inflammation and compromised immune function that have wide ranging and negative effects on mental and physical health [25–27]. As stress will be represented as the cumulative experience across broad social ecological contexts and consider subjective psychological intensity of the stressors [14, 16–18], we hypothesize that stress will be related to poorer health status independent from more commonly examined socio-cultural factors. Due to the potential distinct relations among socio-cultural variables with various mental and physical health status markers [13], the hypothesis will be tested within separate explanatory models.

Methods

The current study reports on data from a population based survey (N = 299) that included qualitative and quantitative data on the health needs of farmworkers. This sample was drawn from randomly selected households of selected census blocks from communities that were low-income and located within the US–Mexico border region of south Yuma County. Participants' age ranged from 20 to 78 and 100 % reported a Mexican American or Mexican identity. All procedures were approved by the parent grant sponsor's federally-approved institutional review board.

The survey was conducted door-to-door during the peak agricultural season for lettuce and citrus. Interviewers articulated the purpose of their visit, stated they were conducting an anonymous survey of farmworkers and asked if someone in the household was at least 20 years of age and working (or had worked) in the fields during the past year. Household members that met the criteria were invited to participate. If more than one person in the household met the eligibility criteria, the interviewer would list each man on one list and each woman on another. Beginning with males, the interviewer would choose the one with the birth date closest to the interview date. If there were no males present in the household, then the woman with the birth date closest to the interview date would be invited to participate. Those who agreed to participate received a gift certificate worth $25.

All surveys were completed in Spanish, there were no requests for a English survey version or translation. The

overall response rate was 92.7 %, far superior to a related urban community-based survey using similarly sensitive instruments [14], and a consequence of the strong rapport of the interviewers. Standardized Spanish instruments were developed collaboratively with the community partners.

The survey was largely constructed from reliable and validated instruments in the California Agricultural Workers Health Survey [28], the Centers for Disease Control and Prevention's Behavioral Risk Factor Surveillance System Survey ("BRFSS") [29], and a community based survey of health and human rights violations implemented in an urban border community [14]. Those included in this study reflected close-ended questions on social-demographics, immigration status descriptors, the stress instrument, and health indicators. Selected socio-demographic variables for this study were age, sex, marital status, family income, and education level. Immigration status descriptors included the number of years a farmworker had resided in the United States, documentation status (yes–if they report having documents for employment; or no–if they don't report having such a document), and place of birth (US or Mexico). The latter variables are all potentially related to acculturation process [30, 31] though conceptually distinct from our stress measure.

Stress was measured through 23 items, all but two from the Border Community and Immigration Stress Scale [14]. This scale include questions on: community violence; immigration; acculturation; discrimination; economic strains; family separation; heightened local migration pressures (e.g., mistreatment from police, federal officials, or coyotes–persons who bring persons across the United States border from Mexico without authorization, who may be lone guides or be part of larger human smuggling organization); and, potential health care access barriers (health care access barriers have also been recognized in other recently published migrant or farmworker stress assessments [17, 19]). Additionally, two other items on the perceived negative impacts from border enforcement-related physical barrier construction and the increased presence of the military were included for this study (e.g., 2,400 National Guard troops stationed along the southern Arizona border during 2006–2007 in the US federal government's "Operation Jump Start").

As our focus was on examining relations of cumulative stress experienced by respondents to health, the total number of stressors experienced in the last 3 months was weighted by the average intensity [14, 18] of these stressors. For example, for each item experienced within the last 3 months, respondents were asked to rate the stressor (e.g., stress from "Encounters with immigration officials/Tener encuentros con autoridades migratorias) as "not all stressful", "a little stressful", "moderately stressful", "very stressful", or "extremely stressful". Total stress ranged from 0 to 89 ($\alpha = .89$; M = 34.52; SD = 20.35) in the sample.

Selection and coding of the outcomes of the study were based on the CDC's (2012) BRFSS [26]—the most regularly sampled comprehensive health surveillance instrument of US adults. *Mental health* was based on an answer to the question "Now thinking about your mental health…how many days during the past 30 days was your mental health not good?''; responses were coded into two categories (those who reported 0 days vs. those who reported any days of poor mental health). *Physical health* was based on an answer to the question: "Now thinking about your physical health…how many days during the past 30 days was your physical health not good?''; responses were coded into two categories (those who reported 0 days vs. those who reported any days of poor physical health). Lastly, *self-rated health* (SRH) was based on a response to the question, ''would you say that in general your health is?''(excellent, very good, good, fair, and poor). Responses were dichotomized into two categories (excellent/very good/good vs. fair/poor): this is the common standard coding for SRH and predicts mortality in Latino epidemiological studies [29].

Binary logistic regression models were used to test relationships between all explanatory variables simultaneously with each outcome (with poorer health coded higher for all outcomes). Stress and income were standardized prior to the analysis because of their distributions and response formats (age and education were not transformed; each unit change represents a year). The other covariates were discrete: sex, years in the US greater than 20 (coded to avoid confounding with age), place of birth, documentation status and marital status. The hypothesis would be supported if the lower bound of 95 % confidence intervals for the adjusted odds ratios for stress (adjusted for all covariates) were above one. To verify our focus on main effects, we tested for interactions between stress and all other study covariates in improving the explanatory capability of the models. None of the interactions significantly improved the model ($Ps > .05$).

Results

Sample Characteristics

Ages ranged from 20 to 78 (M = 44.32; SD = 11.06), family income ranged from <$10,000 to $75,000 (M = $21,014; SD = $9,828) and education from <1 to 12 years (M = 5.81; SD = 2.39). Years lived in the US ranged from <1 to 59 years (M = 21.22, SD = 11.73). Table 1 shows sex was relatively balanced; the majority of participants were married (81 %) and born in Mexico (96 %). About 48 % have resided in the US less ≤20 years and >90 % report having documentation to work legally in the US. Also, 33 and 31 % of the respondents reported a

Table 1 Sex, marital status and immigration descriptors of the farmworker respondents

Variables	Number (n)	%	Total
Sex			
Female	143	47.8	
Male	156	52.2	299
Marital status			
Married	238	80.5	
Single/other	58	19.5	296[a]
Years in the US			
≤20 years	137	47.6	
>20 years	151	52.4	288[a]
Place of birth			
US born	12	4.0	
Mexican born	287	96.0	299
Documentation status			
Yes	273	92.5	
No	23	7.5	296[a]

[a] Total <299 because of missing values

day or more in the past month of poor mental health and physical health, respectively. About 38 % of the participants indicated poor SRH.

Logistic Regression Models Testing the Study Hypothesis

Summaries of the multivariable logistic regression models predicting the health outcomes are in Table 2. In explaining mental health, the hypothesis was supported. Stress was significantly related to the likelihood of poor mental health (AOR = 1.799, $P < .001$), respondents one standard deviation higher in stress were at about 80 % additional risk to report a day or more of poor mental health within the last month. Additionally, the overall model was significant ($P < .001$) and males were about half as likely as females to report poor mental health (AOR = 0.408; $P = .007$).

Next, the model explaining poor physical health was examined (Table 2). Supporting the hypothesis, stress was significantly related to likelihood of poor physical health (AOR = 1.694, $P < .001$). Respondents' one standard deviation higher in stress were almost 70 % additional risk for reporting a day or more of poor physical health. The overall model ($P < .001$) as well as family income were also significant. For each unit higher in the income the risk for poor physical health was greater (about 35 %), though the significance level was modest ($P = .039$).

A multivariable model explaining SRH health is also presented in Table 2. The hypothesis that stress would be related to poor SRH was not supported (AOR = 1.006; $P = .426$). The overall model however was significant ($P = .049$); age was the lone significant covariate from this model (AOR = 1.039; $P = .013$). For each year of age respondents were about 4 % more likely to report poor SRH.

Discussion

These farmworkers were of very low income, very low education status, and the vast majority were born in Mexico, consistent with studies in other states and regions of the US [8, 10, 19–24]. The hypothesis that the contextually-relevant stress measure would relate to poorer health reports considering other sociocultural factors simultaneously was in part supported. Stress was the strongest relative explanatory factor for reporting poor mental health

Table 2 Logistic regressions of poor mental, poor physical and poor self-rated health

Covariate	Mental health AOR (95 % CI)	Physical health AOR (95 % CI)	Self-Rated health AOR (95 % CI)
Social ecological stress	**1.799 (1.329, 2.435)**	**1.694 (1.262, 2.276)**	1.006 (0.767, 1.319)
Age	1.024 (0.992, 1.058)	1.032 (0.999, 1.065)	**1.039 (1.008, 1.070)**
Males (reference: females)	**0.408 (0.2240, 744)**	1.442 (0.797, 2.607)	1.194 (0.683, 2.087)
Income	0.912 (0.670, 1.242)	**1.349 (1.016, 1.792)**	1.012 (0.770, 1.319)
Education	1.010 (0.678, 1.146)	1.003 (0.888, 1.134)	0.946 (0.842, 1.063)
>20 Years in US (ref: ≤20)	0.787 (0.402, 1.543)	0.960 (0.489, 1.883)	0.892 (0.478, 1.665)
Born in Mexico (ref: US born)	0.313 (0.033, 2.974)	1.192 (0.112, 12.713)	0.394 (0.106, 1.460)
No documentation (ref: yes)	1.627 (0.549, 4.816)	0.907 (0.300, 2.740)	0.368 (0.128, 1.054)
Married (ref: single/other)	0.775 (0.374, 1.607)	0.712 (0.334, 1.518)	0.647 (0.323, 1.293)
(Model $\chi^2_{(9)}$, P value)	(28.13, $P = .001$)	(24.34, $P = .004$)	(16.93, $P = .049$)
(Number of cases in model)	(n = 273)	(n = 276)	(n = 277)

Parameters in bold were statistically significant ($P < .05$)

Results are from logistic regression models that include all the above covariates

AOR adjusted odds ratio estimate, *CI* confidence interval of estimate

and poor physical health. In both models the significance levels suggest a robust relationship (e.g., $Ps < .001$) and those one standard deviation higher in stress were well over 60 % additional risk for indicating poor health in each outcome. These relations were evident after adjusting for multiple other socio-demographic factors–including two socioeconomic indicators that are robust predictors of health outcomes, and commonly used acculturation markers [17, 19, 22, 23]. Stress was not significantly related to SRH, a finding consistent with that observed in a smaller Southeastern farmworker sample [23].

On balance the findings suggest stress, measured in a new scale responsive to current geopolitical dynamics affecting the border region, is an important factor relating to the health status of these farmworkers. The current findings on poor mental health experienced in the last 30 days, coupled with prior research showing the BCISS relations with depressive symptoms in two samples [14], suggest the instrument may have particular utility in understanding farmworkers' and other Latinos' mental health. Barriers to access to health care (assessed in the BCISS [14] and two other instruments developed since this project began [17, 19]) and immigration enforcement stressors may be particularly unexplored elements of stress that relate to migrating workers' health status throughout the US and to other nations as well.

There were three other significant relations among the study variables. Males were less likely to report poor mental health, a finding consistent with large Latino epidemiology studies [10, 33]. Greater income was related to poor physical health in our model. This may have been a result of those with greater income having greater access to care where a physical health problem could be identified, though given the modest probability value estimate replication of this finding is particularly warranted. Consistent with prior literature on self-rated health, greater age was associated with poorer health [32].

Also notable is that about 38 % of the community representative sample indicated poor SRH. This prevalence is far higher than that estimated for US adults (14.9 %), residents of Arizona (17.3 %), and Hispanic/Latino residents of Arizona (24.4 %) over comparable data collection years [29]. While poor SRH predict future mortality across acculturative groups of Latinos, there is evidence that for persons less acculturated (as apparent in our sample) the relations are weaker [32]. Additional research on the interpretation and meaning of the response categories for SRH should likely be undertaken in this, and other, less acculturated populations. Future work may also seek to identify whether total stress or specific domains of stressors are uniquely related to SRH over time and to risk behaviors suggestive of later health problems [22].

These findings and others [5, 8, 10, 17, 20–24, 34] highlight the need for preventive, assessment and treatment services for Mexican-descent farmworkers residing at the border. Multiple sources of cultural and social stressors that contribute negatively to health conditions may also be subject to policy intervention–for instance Fernald and Gunnar found that a family poverty alleviation program in Mexico resulted in lowering the salivary cortisol levels of child participants followed years later [35].To provide a sufficiently effective health promotion approach for these workers, educational and clinical [36] efforts to mitigate individuals' specific stressors may need to be combined with community and policy-level efforts that directly reduce structural sources of stressors. Based on participatory responses noted in our work and from evidenced-based prevention efforts conducted in other border communities [37, 38], fundamental roles for promotores/as in these efforts are likely key to their effectiveness.

There are multiple methodological strengths of this work. Primary strengths include: the outstanding response rate for random household survey of a vulnerable population; the utilization of new, community-responsive and context-sensitive measure of stress with other socio-cultural factors; and, the relatively large sample of farmworkers for research using comparably detailed assessments. The study also employed health indicators consistent with larger US adult health surveillance efforts.

It should be noted however that all data presented are from cross-sectional self-reports, brief outcome assessments were used, and causal relations cannot be tested. Also recognized is the limitation that the survey was conducted during the peak season. Our community partners suspect that had the survey been conducted during the 6 month period where most farmworkers apply for unemployment or are employed in other activities, the percentage of farmworkers indicating poorer mental, physical and self-rated health may have been even higher. Reported documentation status may also have undercounted those without US authorization for employment. Self-reports on documentation were as specific as possible with regard to categories of legal documents (in attempts to be as accurate as possible in noting documentation status), but to maintain rapport interviewers were instructed to not probe on this issue nor verify documents.

In conclusion, these farmworkers undergo challenging occupational and societal conditions yet harvest and prepare produce consumed throughout North America and the globe. Stress measured with responsiveness to contemporary social ecological conditions explained poor mental health and physical health experienced above and beyond socio-economic, demographic, and immigration-related descriptors. With perhaps additionally intense effects in rural and border settings, many of these sources of stress may have negative health implications for foreign and minority low wage workers increasingly migrating to other destinations.

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