

**Feeling depressed in a foreign country:
Mental Health status of Mexican Migrants in Durham, NC¹**

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Abstract:

Of all Hispanic immigrants in the US, Mexicans have accounted for almost all the advantages of the epidemiological paradox. However, their mental health outcomes have shown to be less advantageous. We explore the link between migration and depressive feelings using a binational random survey of Mexicans in Durham, NC and sending communities in Mexico. Explanations for the link between migration and depression, such as acculturation stress, social environmental distance, and loss of cultural context are analyzed by comparing results for protective vs. risk factors between residents of Mexico and Durham, and among immigrants themselves. Results show little support for selection as an important source of the higher depression registered among migrants, and instead provide strong evidence that migration itself, and the disruption of social networks that it entails, heightens depression among migrants in Durham. Family separation, in particular is the strongest predictor of depressive feelings and accounts for a sizeable portion of the heightened depression among migrants. Understanding subjective experiences of migration is necessary to better integrate newcomers into host societies.

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Introduction

Latino, especially Mexican, immigrants in the United States present a puzzling paradox with respect to health. Based on their lower average incomes, disproportionate concentration in low-skill and physical demanding occupations, and restricted access to healthcare, one would expect their average health outcomes to be significantly worse than those of natives. And yet they average better global and physical health status than the populations of both sending and receiving areas (Akresh and Frank 2008; Jasso et al. 2001). Much of the research on this topic has centered on the degree to which positive selection into migration, or even negative selection into return migration, could explain this paradox. An additional puzzle, however, is that mental health outcomes tend to show the opposite pattern, with migrants faring less well than those in sending and receiving contexts (Deisenhammer et al. 2012). While the competing influences of selection and social context have been thoroughly examined for the physical health of immigrants, the same cannot be said of mental health, where the two have scarcely been tested together.

Mexicans are an interesting case to study. Within the health literature, of all Hispanic immigrants in the United States, they have accounted for almost all the positive health advantages of the epidemiological paradox. Nevertheless, the picture with respect to mental health is not as optimistic, with several studies suggesting negative effects of migration experience. Migration from Mexico to the United States has been found to increase the probabilities of subsequent onset of anxiety and mood disorders (Breslau et al. 2007), drug use and related disorders (Borges et al. 2011), and depressive disorders, including major depression and social phobia (Breslau et al. 2011). All these studies attempt to address migrant selectivity, specifically the higher propensity of migration among healthy individuals and those with better socioeconomic backgrounds, by comparing Mexicans in both sides of the border. However, the reference group chosen –non-migrant family members of households with at least one migrant –introduces potential biases as well, as non-migrant family members may opt of migration due to worse health status. In addition, a detailed analysis of the forces undermining immigrant health, such as acculturation stress, lack of social support, powerlessness or isolation, are often missing in these studies.

Accordingly, the aim of this paper is to fill some of the gaps in the literature by exploring the intertwined link between Mexican migration experiences, the stress of changing social and cultural environments, and mental disorders. We draw on a unique dataset - a binational random survey administrated to Mexicans in Durham, NC *and* Mexican communities – to address these issues. By asking the same questions on both sides of the border we increase comparability of indicators with respect to other sources. This data also contains information on characteristics of migration that have rarely been explored together, such as legal status, English proficiency, years lived in the U.S. and social support. Four specific objectives are pursued: first, we seek to disentangle the association between migration and other stressors for depression such as socioeconomic status, cultural perceptions, and pre-migration conditions (which include psychopathological and social contexts, and family background). A matched samples approach is used to measure differences in the probability of feeling depressed between people in Mexico and Durham. By comparing Mexican migrants to Mexicans residing in Mexico, we better address the association of migration with depression above and beyond the relationships between characteristics linked to both migration and depression, like

socioeconomic backgrounds. Second, we explore how changes in social environments transform the association between socio-demographic and economic factors and depressive feelings. Models predicting the probabilities feeling depressed are compared in terms of significance, magnitude and sign between Mexicans in Mexico and Durham. Third, we test hypotheses of acculturation stress, integration and protective environments, such as co-ethnic communities, among those living in the U.S. And finally, both migration and its impact on social context are highly gendered. We therefore pay particular attention to the ways in which the link between migration and mental health may differ between men and women.

Background and theoretical framework

The growing interest in health in the literature on immigrant incorporation has opened room to study subjective aspects of the migration experience. Migration is conceptualized as a test of the emotional resilience of individuals. To a certain degree, all migrants experience psychological distress associated with changes in social environmental conditions that could precipitate personal crisis after migration (Portes and Rumbaut 1996). Therefore, self-reported mental health outcomes offer a unique opportunity to advance our understanding of health responses to shocks, as well as the role of protective and risk factors when changing contexts.

Most of the frameworks of mental health outcomes go along with pathogenic perspectives (focus on risk factors) coming from the physical health research (Bécares et al. 2012; Deisenhammer et al. 2012; Lindert et al. 2009). However, sociological explanations have emphasized the importance of immigrant incorporation, sources of social support, experiences with discrimination, and alienation. Borrowed from the physical health literature, the healthy migrant hypothesis posits that more prepared and healthier individuals are more likely to migrate than those in worse conditions (Akresh and Frank 2008; Jasso et al. 2001). Preparedness and hardiness are shown in migrants' selectivity in both observable and unobservable characteristics with respect to their origin societies, meaning that migrants, on average, have better socioeconomic background and mental health status than those who remain at origin. However, very few studies are actually able to test the selection hypothesis directly, mostly due to the lack of comparative data in contexts of origin and reception and for different groups. In the case of Mexicans living in the U.S., however, mental health researchers have found more support for the acculturative stress hypothesis than for the importance of selection (Breslau et al. 2007; Breslau et al. 2011).

The acculturative stress hypothesis is a social-environmental explanation that links the tensions arising from living in a foreign culture to mental disorders. Migration is “liberating but contradictory social location” where individuals go “from amusement to despair, from stimulation to depression” (Portes and Rumbaut 1996:147). Upon arrival immigrants could experience inner turmoil, instability and restlessness due to the change in their social environment. The conflict of cultures and the distance between the social context of origin and reception marginalize immigrants' previous experiences and causes status loss which in turn weakens and even reverses the effects of protective social statuses associated with mental health.

Mental health research highlights four socio-demographic risk factors for depression: 1) low socioeconomic status (Portes and Rumbaut 1996); 2) female gender and 3) being unmarried (Rafful et al. 2012); and 4) undesired events in life (Ai, Pappas and Simonsen 2015;

Alegria et al. 2007) . These findings are rooted in the sociological concepts of powerlessness and alienation: the inability to reach personal goals and the lack of agency contribute to worse outcomes. Therefore, being married, male, and relatively high income are protective factors against depressive disorders. However, migration could exacerbate the effects of powerlessness and alienation, and alter the mechanisms by which protective factors influence mental health.² Reversals are more common among those in better social positions before migrating –i.e. compared to migrants with no education, better educated migrants may have higher levels of demoralization.

An additional group of factors associated with depression among migrants emerge from the social integration processes in receiving societies. In the U.S., higher stress has been found among those unable to speak English (Ding and Hargraves 2009; Schachter, Kimbro and Gorman 2012), women, younger, and unemployed individuals (Ornelas and Perreira 2011; Portes and Rumbaut 1996; Walker et al. 2012). The impact of social support variables is more controversial. Co-ethnic communities can exhibit positive and negative associations with depression feelings, as ethnic concentration might indicate segregated, deprived neighborhoods and discrimination. However, this concentration can also be a source of protection with buffering effects that enhance social cohesion, mutual social support and a stronger sense of community and belongingness which are factors that protect individuals from the direct or indirect consequences of discrimination and racial harassment (Bécares et al. 2012; Portes and Rumbaut 1996). Finally, migrants' legal status is central to the acculturation process as well as a reflection of social background (Portes and Rumbaut 1996). Being undocumented is associated with higher distress, as illegality intersects every aspect of immigrants' lives. It forces them to live under the shadows and engenders feelings of fear and uncertainty (Menjivar 2006). It also directly hinders migrants' opportunities of social mobility (Gonzales 2011) and heightens their exposure to unprotected, low-wage jobs and non standard work arrangements (Donato et al. 2008; Flippen 2012).

Both migration and incorporation into receiving societies are also highly gendered processes. Men and women face different opportunities and motivations for migrating (Hondagneu-Sotelo 1994). Compared to men, women are less likely to migrate without documents (Donato et al. 2008). In addition, migration could enhance gender equality as women's greater labor force participation in the United States could confer them greater leverage in household decision making (Parrado and Flippen 2005). Thus, Mexican women are, in general, more likely to be depressed than men, particularly during childrearing ages (Rafful et al. 2012). However, how migration may shape the gendered pattern of depression is unclear.

Reversal outcomes could also be expected based on the extensive evidence on women's migration experiences. For example, in terms of earnings and employment, upon migration women encounter stronger push to informal jobs and earn lower wages than men (Donato et al. 2008) and their husbands' dependence increases if they do not participate in economic activities (Hondagneu-Sotelo 1994). Studies have also found that the rise in labor force

² An example of the effects of changing contexts, though not equivalent, is the literature documenting different SES gradients for immigrant populations in physical health outcomes, i.e. Buttenheim, A., N. Goldman, A.R. Pebley, R. Wong, and C. Chung. 2010. "Do Mexican immigrants "import" social gradients in health to the US?" *Soc Sci Med* 71(7):1268-1276..

participation of Mexican migrant women did not translate into a more egalitarian household division of labor or more liberal gender attitudes (Parrado and Flippen 2005). Job opportunities for immigrant women show other forms of perpetuation of traditional gender roles outside of the domestic sphere (Parreñas 2005); for example, in Durham, NC, 38.8% of women were employed in cleaning and childcare activities compared to less than 1% of men (Flippen 2015). Intersections of immigrant women's precarious jobs and traditional gender roles change the ways in which protective and risk factors are associated to depression in comparison to men.

As mentioned above, we explore the hypotheses of selectivity, contributions and changes in associations of socio-demographic factors due to socially distanced contexts and social integration stress for depressive feeling states on Mexicans living in the U.S. Besides using a unique sample -Hispanics in Durham, NC -, that provides information on factors not previously analyzed (i.e. legal status), we apply a three-step methodological approach that combines different statistical techniques to test all hypothesis in the same population.

Data

Data for the analysis are drawn from a mixed-methods study among Hispanics in Durham, NC. The study is a three-pronged approach based on community collaboration, targeted random sampling, and in-depth interviews and field research. It includes detailed information on demographic characteristics, migration and employment histories, social support, family structure and health-related attitudes and behaviors. Data collection occurred in two phases, from April 2002 to July 2003 and then from May 2006 to December 2007 among Latin American immigrant men and women aged 18 to 50 years of age in Durham, NC.³ The same questions were asked in eight sending communities in the Mexican states of Veracruz, Puebla, Michoacan, Hidalgo, Guerrero and Guanajuato during the same time periods. To maintain comparability, we restricted our sample to people born in Mexico (Men's N=1,793, Women's N=1,217).

Durham, NC, is an interesting setting to examine migrants' adaptation processes and health outcomes. Latino migration to Durham is part of the new and larger trend of increasing diversity in migrant destinations in recent decades throughout the U.S. Southeast. The early stage formation of Latino communities in this area offers the opportunity to better understand the effects of social context, particularly the relatively nascent co-ethnic community that is far less consolidated than in more "traditional" receiving areas.

Immigrants in Durham, though not representative of the Mexican population living in the U.S., offer several advantages to study immigrants. No other data sources are specifically designed to study immigrants, including both legal and undocumented populations and recently arrived newcomers (Flippen and Parrado 2012). Also as the project drew on extensive qualitative research and used a questionnaire that was specifically tailored to the immigrant experience, by collecting several characteristics of context of origin and reception (Flippen 2012), specifically legal status, English proficiency and a major depression scale that will allow testing some of the hypotheses of the mental health literature.

³ A detail description of the sample design can be found in Parrado, E.A., C. McQuiston, and C.A. Flippen. 2005. "Participatory survey research - Integrating community collaboration and quantitative methods for the study of gender and HIV risks among hispanic migrants." *Sociological Methods & Research* 34(2):204-239.

Model specification

The dependent variable in the analysis is derived from the ten-item scale version of the screening depression scale proposed by the Center for Epidemiologic Studies Depression. This scale has been validated in different populations and has proven to be especially useful among populations with low levels of education (Irwin, Artin and Oxman 1999), as it is the case for our sample. For each individual, the answers to questions about feeling depressed are coded as dummy indicators (1 if the answer indicates a depressed feeling, 0 otherwise) and then added into a summary index that runs from 0 –not depressed at all– to 10 –very depressed (questions and proportions of positive answers by sex are reported in Appendix 1). Finally, a dummy indicator of feeling depressed is established according to the optimal cutoff proposed by Irwin et al. (1999). For the purpose of this paper, individuals whose summary index adds up to 4 or above are considered as feeling depressed.⁴

Independent variables in the analysis include socio-demographic, economic, and migration-specific characteristics theorized to shape depression. First, sampled subjects were classified into two groups according their place of residence, and a dichotomous variable indicated whether the individual was living in Mexico or in the U.S. In addition, we control for sociodemographic characteristics, including age (discrete variable) and education (dichotomous variable indicating if the individual completed primary education). Two variables are used to measure family structure: marital status (divided into three mutually exclusive categories: single; divorced, separated or widowed; and married) and living arrangements (divided into six groups according to combinations of individual's marital status (married and unmarried) and residence of children aged under 18 years (no children, at least a child coresiding, and all children living in Mexico)). Marital status is included in models that compare respondents in Mexico and in the U.S., while living arrangements are used in models that only include immigrants because child separation from parents is a frequent consequence of migration but relatively rare in Mexico. Social background is measured with respondents' reports on each parent's years of schooling. Socioeconomic characteristics include earnings and employment. Earnings is defined by a continuous variable for weekly labor income in dollars. For people living in Mexico, this variable was converted to the U.S. dollar equivalent using the Purchasing Power Parity over GDP (PPP) from the Penn World Table v.7.1 for both years 2003 and 2007.⁵ Employment indicates whether the person was or not working at the time of the survey.

Migration associated characteristics, which are included only in the final models designed for immigrants, are measured by six variables. Social support is measured by an index that ranging from 0 to 5 and indicates whether the individual has at least one person for following situations: 1) to talk and be listened to, 2) to trust, 3) to help them to understand and solve problems in the U.S., 4) to help with procedures and paperwork, and 5) to drive them when needed. The remittance indicator measures whether the individual sends money to Mexico. We use two indicators to measure the time spent in the U.S.: a dichotomous variable that shows if the individual has traveled at least once to Mexico since they came to the U.S., and the cumulative number of years lived in the U.S. net of the time spent abroad. Legal status

⁴In addition, all analyses were run with ordinal and discrete specifications of the depression indicator. Results were consistent regardless of the variable specification.

⁵ Data is publicly available online at https://pwt.sas.upenn.edu/php_site/pwt71/pwt71_form.php

is dichotomous variable that shows whether or not the individual is authorized to reside in the U.S. Finally, English proficiency indicates that migrants report speaking English well or very well.

Methods and analytic strategy

Our analytic strategy has three steps that follow our specific objectives. All our models in our strategy are sex-specific, and include a fixed effect for survey wave and robust corrections to the standard errors. In addition to logistic models, ordinal logistic and OLS regression specifications for ordinal and discrete definitions of the depression scale were tested. Results were not sensitive to changes in the dependent variable definition, which suggests that the cutoff of the depression scale works for our sample.

First, to test the association between depression feelings and migration, variation in other socio-demographic and economic factors that relate to feeling depressed is reduced by comparing Mexicans in Durham to their counterparts in Mexico with similar characteristics. Propensity score matching techniques are used to simulate a natural experimental design based on a treatment group –migrants living in the U.S.- and a control group –individuals living in Mexico. Three matching schemes were tested (N nearest neighbors, one -to-one, and kernel) to obtain a balanced sample on covariates for both groups. Our results correspond to a 5-nearest neighbors scheme with replacement, which means that more than one individual can be used to construct the counterfactual group (Caliendo and Kopeinig 2008). The selection of our final match strategy was based on obtaining the best balance for each covariate (Table 3) and a mean bias lower than 5% (Rosenbaum 2002). On the matched sample, a logistic regression was estimated to obtain the mean effect of migration on the odds of feeling depressed.

Second, to test how changes in social environments are associated with depression feelings, logistic regression models by place of residence (the U.S. and Mexico) were estimated. Pooled models by place of residence were also estimated including interactions between all covariates and an indicator for migration. The results were consistent with those of the separated models; the latter were preferred for interpretation purposes. The models include age, education, marital status and father's years of schooling. The rest of the covariates were excluded from this analysis because their values could have changed as consequence of migration. The coefficients of models are compared between models for individuals living in the U.S. versus individuals living in Mexico, paying special attention to changes in direction and significance. The comparison helps to understand whether a higher educational level or being married, for example, have the same protective associations against feeling depressed in different social environments (the U.S. *versus* Mexico).

Next, a third set of logistic models was estimated only for migrants in the U.S. In addition to socio-demographic covariates, these models included characteristics related to the migration experience like English speaking proficiency, living arrangements, time spent in the U.S., remittances behavior, social support, and legal status. These models test hypotheses of social incorporation stress (first five indicators), isolation (social support) and marginality (legal status).

Results

Figure 1 shows the distribution of the depression feelings scale by sex for Mexicans living in the U.S. and in Mexico. Men living in Mexico feel in general less depressed: 27.8% of them report

no depression feelings compared to 10.5% of those living in Durham (2.7 times higher). For the latter, the decline in the number of positive answers for depression feelings is not as steep as for men in Mexico. These results also agree with the distribution of the dichotomous definition of the scale (see Table 1): slightly above one in four men in Mexico feel depressed compared to one in two migrants in Durham.

Regardless of their place of residence, women feel more depressed than men and their distributions more closely resemble the distribution of men in the U.S. than of men in Mexico (see Figure 1). Only 15.3% of women in Mexico report no depression feelings (27.8% for men) compared to 9.8% of women in the U.S. (10.5% men). Still, women in Durham feel significantly more depressed than their counterparts in Mexico: according to the depression scale cutoff, the proportion of women in Durham feeling depressed is 20 percentage points higher (see Table 1).

Differences in depression feelings between people in the U.S. and in Mexico could be partially explained by migrants selectivity in sociodemographic, economic and background characteristics. Table 1 shows that men and women in Mexico and Durham differ significantly in several indicators. Men in Durham have significantly less advantageous educational levels and backgrounds; 60.9% of them have completed primary education, compared to 76.3% of those in Mexican communities, and their parents' average schooling is around a year lower. In terms of age and marital status no-significant differences are observed. Different from the men's case, the distribution of marital status among women is significantly distinct: 81.6% of women in Durham are married compared to 64.3% of women in Mexico, and being single is less common in Durham (8.2 vs 28.5%). Women in Durham have also lower educational levels than women in Mexico; the proportion with completed primary is 9.7 percentage points lower, but both groups have similar social backgrounds. Overall, these results suggest that compositional differences could explain the higher proportions of migrants with depression feelings.

To test migrants selectivity, propensity score matching (*psm*) procedures were applied to generate balanced samples by place of residence in terms of age, education, marital status, and father's and mother's years of schooling. With this procedure, variation in variables associated with depression feelings between people in Mexico (control) and Durham (treated) are reduced to not-significant levels. In the matched samples, differences in depression feelings are exclusively associated to three terms: the place of residence, error, and unobservable pre-migration characteristics linked to the outcome and vary between those in Durham and Mexico.

The propensity score matching was based on a logistic model that controls for the variables mentioned above, which are either associated with migration or depression feelings. After obtaining the propensity scores, several matching options were tested looking for a balanced and unbiased sample for both dichotomous and discrete specifications of the depression scale. Results of the matching procedure for the dichotomous indicator are shown in Table 2 and are based on five neighbors with replacement and no common support matching.⁶ Balance was reached for all characteristics included ($p > 0.05$, Table 2) except for

⁶ Hereinafter, I will only refer to the dichotomous indicator of feeling depressed, but all estimations were obtained also for the summary index of the depressive scale to test for sensitivity to the cutoff point. These estimations were obtained using both linear and ordinal regression and are available upon request. None of the models for both indicators showed contradictory results.

mothers' education in the case of men, which still presents a significant difference of 0.40 years of schooling. The variable was kept in the analysis because its inclusion shifted the distribution bias of covariates to lower levels. Table 2 shows that mean and median bias for both men and women are lower than 5% and distribution maximums did not exceed 7%, which ensures that the matching performed did remove to a significant extent the differences in the explanatory variable distributions. Finally, using the balanced samples, the association between place of residence and depression feelings was estimated with a logistic regression using the weights provided by the *psm* procedure. On average, odds of feeling depressed for men in Durham are 2.2 times higher than those for men in Mexico, and the odds for women in Durham double those of their counterparts in Mexico. These figures before balancing the samples were 2.6 and 2.3, respectively (results not shown). Reductions in odds for depression feelings were sizeable, but there is still a significant difference in depression feelings between people in Durham and in Mexico, therefore we moved from pre-migration centered explanations to test other theoretical hypotheses.

The change in social environments could alter the associations between depression feelings and, socio-demographic and socioeconomic characteristics. For this hypothesis, separated logistic regression models by place of residence, for women and men, are presented in Table 3. We first discuss results for men, then for women. Among men, significant changes in associations with feeling depressed are observed for earnings, age and marital status. Earnings protect men in Durham from feeling depressed while do nothing for men in Mexico. In contrast, each additional year is associated with a 4.2% in the odds of depression for men in Mexico, but does not significantly change the odds for those living in Durham. The most interesting result is for marital status. According to previous findings, married people are less depressed than those unmarried. Although for men in both places being married is associated with a decrease in the likelihood of feeling depressed (0.37 Mexico *versus* 0.72 Durham, Table3); this protective association is significantly lower for men in Durham and implies a discount in the odds ratio of 55.8% ($1 - (1 - .37) / (1 - .72)$). Education and an advantageous social background should protect individuals from feeling depressed, although the latter shows up significant for men in Mexico, it does not significantly differ from the results of men in Durham.

Women have a different story. Most covariates have similar associations between Durham and Mexico's residents. Earnings, age and father's years of schooling do not significantly differ and have very similar magnitudes for both groups. Being married, though not significant between the groups, is protectively associated with feeling depressed for women in Durham and lowers the odds by 41.7%. The only significant difference between migrant women and those in Mexico is for education. While having at least primary education is associated a decrease in the odds of feeling depressed for women in Mexico (OR=0.573, table 3) as suggested by the depression literature, this association is not significant for women in Durham.

Men and women's results show support for the hypothesis of changes in protective associations due to changes in social contexts. When moving to the U.S. education acquired in Mexico loses status power and, to some extent, its relationship to class status weakens. Also, after migration, marital status could no longer ensure social stability to individuals, probably due to isolation and family separation. We explore in-detail these changed associations among migrants in Durham with models that include characteristics that derive from migrating.

The last and complementary theoretical hypothesis analyzed refers to the stress derived from the pressure to acculturate to new context that migrants could experience. Tables 4a and 4b logistic regression models of feeling depressed exclusively for migrants and incorporates variables that measure social integration. The set of covariates included differs between men and women (detail explanations provided in the next paragraphs), and interpretations for results in common are given first, then specific interpretations per factor are presented, beginning with men. The models include indicators for social support, remittances, time spend in the U.S., legal status, English proficiency and a detailed definition of immigrants' living arrangements. English proficiency and legal status were significantly correlated for women (polychoric correlation of 0.578). Therefore, two model specifications are shown, each one including one of these two indicators (model 1 is used for interpretation proposes, except when stated the opposite).

Age, education and remittances were not significantly associated with feeling depressed among Mexican immigrants in Durham. Earnings were not significantly associated with depression feelings only for men. For women, the variable was left out of the analysis because being employed was strongly correlated with some living arrangements categories; 79% of unmarried women were working compared to 48% of married women. Other studies have found similar associations between marital status and employment (Flippen 2015), which in turn suggests that gender roles are perpetuated because childcare is unaffordable for these low-income families and perhaps for traditional gender norms as well.

Among men, associations between feeling depressed and unmarried people are positive, not being married implies a 52.9% of increase in the odds of depression feelings compared to the odds of married men with children in the U.S. Among unmarried men, coresidence with children did not have significant differential associations with depression feelings (see table 4a). However, children's residence changes the protective association between marriage and depression: the odds married men with all children in Mexico more than double (2.176, table 4a) the odds of feeling depressed than those with children in the U.S. The first finding supports previous findings of protective associations of marriage for depression (Portes and Rumbaut 1996). Having a partner provides stability and support. A plausible explanation for the second result is related to integration to receiving societies. In most cases, when minors reside with their father at least one was born in the U.S., which in turn could change future expectations of establishing in the U.S. Those who have all their children in Mexico live dual lives: their expectations are either returning to reunify their families or bring their children to the U.S.; they are also more likely to have pressures for sending remittances back. Both situations are potential sources of stress and sadness.

For women, being unmarried and any family separation could increase their odds of depression feeling (coefficients greater one, model 1, table 4b). Significant associations are observed for unmarried women with coresiding children and for unmarried with all their children living in Mexico. For the former, the odds of depression more than triple, and for the latter increase by 5.8 times compared to married women with at least a child living with them. Pressures of single motherhood in terms of income, care, emotional energy, among others, are factors of distress that increase depressive feelings, which seem to exacerbate when children are separated from their mothers.

Having support from family members, coworkers, friends and other sources is associated with decreases in depression feelings for men and women. For the former, odds are discounted by 15.7% and for the latter by 26.7% compared to their respective counterparts that lack support. These results support explanations that loneliness and social isolation increase chances for depression. However, based exclusively on this indicator, it is difficult to make conclusions for the effects of coethnic communities. A next step in this paper is to include neighborhood indicators to test for this factor. For men, returning back to Mexico is significantly associated with increases in chances for depression feelings (1.585, table 4.a), but is not significant for women (table 4b). Differences in these results might be related to engendered migration processes. Women have different motivations for migrating, family reunification reasons are more common among them (Hondagneu-Sotelo 1994), and compared to men, women are less likely to migrate without documents (Donato et al. 2008). Thus, motivations to travel back to Mexico and the associated risks of crossing are different for men and women already residing in the U.S. As previously found by other studies (Portes and Rumbaut 1996), over time, mental health of immigrants improves. Our results suggest that the greater the amount of years spend in the US, the lower the odds for feeling depressed. Decreases are faster for men than for women, for whom a quadratic function fitted better, and slowed the pace of the linear coefficient (table 4b).

Neither legal status nor good English had significant associations with depressive feelings for men. In contrast, both factors decreased the odds for depression feelings for women. Holding legal status halves the odds of feeling depressed and speaking English well reduces them by close to a third (0.350, model 2, table 4b). Results support that documented status and English speaking are factors easing acculturation processes (Portes and Rumbaut 1996). On one hand, holding legal status increases the possibilities of social mobility through better employment conditions (Donato et al. 2008; Flippen 2012; Gonzales 2011); it also provides more emotional stability and reduces fear and uncertainty of deportation and discriminative situations associated with undocumented status. In addition, it could also be related to living arrangements; in our sample all women with legal status had at least a child living with them. On the other hand, being able to communicate with others reduces migrants' isolation; it also increases their chances of getting better jobs and improving living conditions as it heightens their power status. In the specific case of women, it could also be reducing their husbands' dependence through employment and their ability to function in the U.S. environment, like communicating in school with teachers.

Preliminary conclusions

In this paper three different theoretical hypotheses to explain feelings of depression among Mexican immigrants to the U.S. were analyzed. While selection biases in observables accounted for some, but not all the differences in the probabilities of feeling depressed among Mexicans in Mexico and in Durham other explanations were needed to understand how migration is associated to feeling depressed. Acculturative stress and social environmental distance were some of the explanations that were given to the findings. Family separation accounts for a sizeable portion of the heightened depression among migrants.

Though being innovative, this paper has also some limitations. Physical health status has showed to be a significant predictor of mental health status. The lack of information on physical

health in the sample used is certainly a weakness of the study. Also, we do not have information on prior depression status and there is the possibility that migrants could be feeling depressed before migrating. However, the groups more prone to be depressed, the unhealthiest and unhappiest, are the less likely to migrate as a good mental and physical health status is needed to endure the difficulties of migration. Studies in the physical health literature have showed that on average migrants are healthier than populations at origin places (healthy migrant evidence (Akresh and Frank 2008; Jasso et al. 2001)). Therefore, the migrants' sample might be have overrepresentation of people with good physical and mental health status prior to migration which in turn could be decreasing changes of depression feelings and making our estimates conservative in any case.

A broad and new research agenda in the area of mental health and migration is emerging. Several of the hypotheses and paradoxes analyzed within the physical health literature could be tested and the results could serve as feedback for both areas. Mental health studies for migration urge to understand the subjective experiences of the process as well as to ease the integration process of newcomers in receiving societies.

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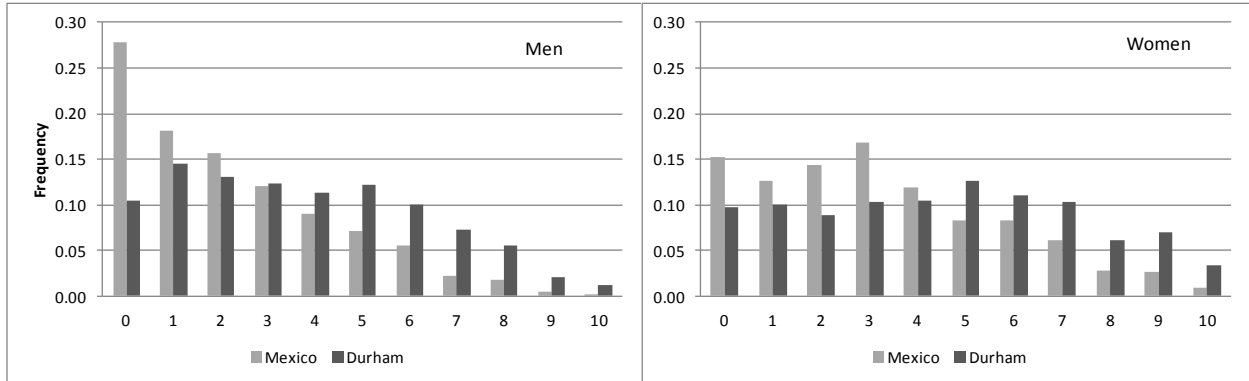
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Tables and Figures

Figure 1. Distribution of depression scale by migration status and sex



Source: Hispanics in Durham dataset 2003, 2007

Table 1. Descriptive statistics by migration status and sex

<i>Variables</i>	Men		Women	
	<i>Mexico</i>	<i>Durham Diff.</i>	<i>Mexico</i>	<i>Durham Diff.</i>
Depression Scale Score	2.3 (2.2)	3.7 * (2.6)	3.3 (2.5)	4.5 * (2.9)
Feeling depressed (score >3) %	26.5	49.6 *	40.9	60.9 *
<i>Sociodemographic characteristics</i>				
Age	30.7 (8.8)	30.5 (8.0)	31.2 (8.5)	30.5 (7.7)
Completed primary education %	76.3	60.9 *	68.6	58.9 *
<i>Marital status</i>				
Married or consensual union %	63.0	61.1	64.3	81.6 *
Single %	32.6	32.4	28.5	8.2
Separated, divorced or widowed %	4.4	6.4	7.3	10.2
<i>Living arrangements</i>				
Unmarried, no children %		32.6		8.9
Unmarried, children coresiding %		2.9		8.0
Unmarried, all children in Mx %		3.4		1.5
Married, no children %		8.3		13.7
Married, children coresiding %		32.4		63.1
Married, all children in Mx %		20.5		4.7
<i>Background characteristics</i>				
Father's years of schooling	5.4 (3.8)	4.3 * (2.9)	4.2 (3.5)	4.1 (3.2)
Mother's years of schooling	4.9 (3.8)	4.1 * (2.9)	3.8 (3.4)	3.6 (3.3)
<i>Socioeconomic characteristics</i>				
Employed %	86.0	96.9 *	39.4	53.8 *
Weekly earnings (US\$)	\$ 135.97 (227.0)	\$ 483.84 * (176.5)	\$ 40.55 (83.2)	\$ 189.08 * (211.2)
<i>Migration associated characteristics</i>				
Social support index		3.9 (1.4)		4.0 (1.3)
Sends remittances %		79.2		54.3
Ever visited Mexico %		18.3		7.9
Cumulative years spent in the US		7.3 (5.7)		7.0 (4.9)
Holds legal status %		5.1		5.7
Good English %		8.2		6.7
<i>Year</i>				
2003 %	50.0	33.5	50.0	22.0
2007 %	50.0	66.5	50.0	78.0
<i>Sample size</i>	800	993	800	717

Notes: Standard deviations in parenthesis. T and Chi-square tests for differences of discrete and categorical variables, respectively, between people in Mexico and Durham.

* p<0.05

Source: Hispanics in Durham dataset 2003, 2007

Table 2. Differences in sociodemographic and background characteristics between people in Durham (treated) and Mexico (control) after propensity score matching procedure

Variables	Men				Women			
	Treated	Control	T-test	p> t	Treated	Control	T-test	p> t
<i>Sociodemographic characteristics</i>								
Age	30.45	30.54	-0.24	0.813	30.47	31.13	-1.60	0.110
Education (Less than primary, ref. cat.)								
Completed primary education	0.61	0.61	-0.25	0.804	0.59	0.60	-0.42	0.675
Marital status (Separated, divorced or widowed, ref. cat.)								
Single	0.32	0.32	0.18	0.855	0.08	0.08	0.49	0.624
Married or consensual union	0.06	0.07	-0.25	0.800	0.10	0.10	-0.05	0.958
<i>Background characteristics</i>								
Father's years of schooling	4.33	4.15	1.25	0.211	4.11	4.20	-0.48	0.631
Mother's years of schooling	4.06	3.66	2.73	0.006	3.62	3.60	0.14	0.890
<i>Year (2007, ref. cat.)</i>								
2003	0.34	0.36	-0.99	0.322	0.22	0.20	0.81	0.416
Mean bias	3.7				3.0			
Median bias	1.2				2.5			

Source: Hispanics in Durham dataset 2003, 2007

Table 3. Odds-ratios from logistic regression models of feeling depressed by migration status

Variables	Men				Women			
	Mexico		Durham		Mexico		Durham	
	Odd ratio	Sig.	Odd ratio	Sig.	Odd ratio	Sig.	Odd ratio	Sig.
<i>Socioeconomic characteristics</i>								
Weekly earnings (US\$)	1.001		0.999	**	1.001		1.000	
<i>Sociodemographic characteristics</i>								
Age	1.042	***	1.012		1.014		1.012	
Education (Less than primary, ref. cat.)								
Completed primary education	0.725		0.867		0.573	***	1.005	
Marital status (Unmarried, ref. cat.)								
Married or in consensual unions	0.375	***	0.724	**	0.877		0.583	**
<i>Background characteristics</i>								
Father's years of schooling	0.947	**	0.980		0.957	*	0.993	

* p<0.10, ** p<0.05, ***p<.001

Bolded coefficients indicate statistically significant differences between migration status at p<0.05. Fixed effects for survey year included.

Source: Hispanics in Durham dataset 2003, 2007

Table 4a. Odds-ratios from logistic regression models of feeling depressed for Mexican immigrants in Durham, NC: Men

<i>Variables</i>	<i>Odd ratio</i>	<i>Sig.</i>
<i>Socioeconomic characteristics</i>		
Weekly earnings (US\$)	1.000	
<i>Sociodemographic characteristics</i>		
Age	1.016	
Education (Less than primary, ref. cat.)		
Completed primary education	0.874	
<i>Living arrangements (Married, children coresiding, ref. cat.)</i>		
Unmarried	1.529	**
Married, no children	0.842	
Married, all children in Mx	2.176	***
<i>Migration associated characteristics</i>		
Social support index	0.843	***
Sends remittances	1.306	
Ever visited Mexico	1.585	**
Cumulative years spent in the US	0.925	***
Holds legal status	1.408	
Good English	0.825	

* p<0.10, ** p<0.05, ***p<.001

Fixed effects for survey year included

Source: Hispanics in Durham dataset 2003, 2007

Table 4b. Odds-ratios from logistic regression models of feeling depressed for Mexican immigrants in Durham, NC: Women

<i>Variables</i>	Model 1		Model 2	
	<i>Odd ratio</i>	<i>Sig.</i>	<i>Odd ratio</i>	<i>Sig.</i>
<i>Sociodemographic characteristics</i>				
Age	1.012		1.005	
Education (Less than primary, <i>ref. cat.</i>)				
Completed primary education	1.145		1.231	
<i>Living arrangements (Married, children coresiding, ref. cat.)</i>				
Unmarried, no children	1.074		1.232	
Married, no children	1.226		1.315	
Unmarried, children coresiding	3.096 ***		3.186 ***	
Unmarried, all children in Mx	5.818 *		6.273 *	
Married, all children in Mx	1.269		1.337	
<i>Migration associated characteristics</i>				
Social support index	0.733 ***		0.728 ***	
Sends remittances	1.265		1.237	
Ever visited Mexico	1.090		1.074	
Cumulative years spent in the US	0.923 *		0.942	
Cumulative years spent in the US Squared	1.004 *		1.004 *	
Holds legal status	0.504 **			
Good English			0.350 ***	

* p<0.10, ** p<0.05, ***p<.001

Fixed effects for survey year included

Source: Hispanics in Durham dataset 2003, 2007

Appendix 1. Depression screening questions from the Hispanics in Durham Study, percentage of Mexican participants answering Yes by migration status and sex.

In the past six months, have you:	Men		Women	
	<i>Non-mover</i>	<i>Migrant</i>	<i>Non-mover</i>	<i>Migrant</i>
felt depressed?	32.3	44.5	53.8	57.9
felt that everything you did was an effort?	27.3	53.8	37.4	51.0
felt that your sleep was restless?	34.4	38.8	41.1	52.7
been a happy person?	83.5	71.3	84.4	70.4
felt lonely?	25.9	51.6	50.1	51.2
felt that people were unfriendly?	14.3	28.7	21.0	48.0
enjoyed life?	84.6	73.8	83.0	73.5
felt sad?	41.5	61.0	65.1	64.3
felt that people disliked you?	13.0	19.1	15.0	31.4
felt that you could not get going?	7.4	17.6	12.6	35.3

Source: Hispanics in Durham dataset 2003, 2007