A Moving Paradox: A Binational Comparison of Residential Mobility and Health

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This paper takes a unique approach to the study of nativity differentials in overweight, obesity and self reported health. Mexican origin immigrants and US-born Spanish-speaking residents in one urban setting in the United States are compared to residents in a similar urban setting in Mexico. Our data allow for the test of standard indicators used to proxy acculturation (duration of residence in the United States), but we go beyond this to examine residential mobility among all three groups (Mexican-Americans, Mexican immigrants and Mexicans in Mexico). Thus, we can examine whether health differentials are mediated not only by immigration, but also by residential mobility. In other words, we ask if moving is bad for your health regardless of whether the move takes individuals across international borders. The results suggest that consequences of residential mobility for health is contingent on who is making the move (immigrants, US natives, or Mexican natives) and where that move occurs (US or Mexico).

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Introduction

Research on health disparities in the United States regularly finds considerable variation in health indicators among foreign and native born residents. The so called 'immigrant health paradox' is based on the repeated observation that immigrants, particularly Latino immigrants to the United States, evidence better health upon arrival when compared to longer resident immigrants or US born natives (Markides and Coreil 1986). This has spawned a series of investigations into the relative contribution of selective immigration (see Jasso et al., 2004; Palloni and Arias, 2004; Van Hook and Balistreri, 2007) and acculturation or assimilation to unhealthy behaviors in the receiving society (see Hunt et al., 2004; Frank, Cerdá and Rendón, 2007). In the case of selectivity, immigrants, particularly those coming to the United States for employment, may be healthier than those left behind in the country of origin. Or, looked at another way, those in poor health generally do not undertake voluntary migration. And, over time, health among immigrants may worsen through a natural progression of health conditions – a regression to the mean--when compared to the receiving population.[2]

In the case of acculturation, research has hypothesized that immigrants adopt behaviors or health practices that are associated with worsening health (Abraído-Lanza et al. 2006). This includes purposive actions like risk taking behaviors but also may involve structural barriers to healthy living or access to health care encountered by disadvantaged groups in the United States. Acculturative stress has been identified as another possible source of depression, substance abuse or even obesity (Gil, Wagner & Vega, 2000). Overall, the concentration of immigrant and co-ethnics and a slower adoption of cultural traits associated with non-immigrant communities in the United States are associated with better physical health and lower levels of obesity (Abraido-Lanza et al., 1999; Esbach et al., 2004). However, immigrant concentration is less beneficial if such co-ethnic communities are disadvantaged with few economic resources, social control or ties that can support positive educational or health outcomes (Frank et al, 2007).

[2] A related area of research has focused on selective out-migration as a possible source for health variation including differential adult and infant mortality (Hummer et al., 2007).

The focus of this paper is on nativity differentials in overweight, obesity and self reported health in one urban setting in the United States in comparison to levels of overweight, obesity and self-reported health in a matched urban setting in Mexico. Our data allow for the test of standard indicators used to proxy acculturation – duration of residence in the United States. But we go beyond this to examine residential mobility among all three groups (Mexican-Americans, Mexican immigrants and Mexicans in Mexico). Thus, we can examine whether health differentials are mediated by residential mobility. In other words, we ask if moving is bad for your health regardless of whether the move takes individuals across international borders?

Health among immigrants. Studies have looked at several different health outcomes when assessing the possible sources or explanations for differential health among immigrants and natives in the United States. These include measures ranging from self reported health status to chronic disease diagnosis to overweight and obesity. Examining prevalence of chronic health conditions by nativity status from the National Health Interview Survey, Jasso et al., (2004) suggested that, in general, the foreign born are less likely to experience these conditions. Looking at self-reported health, those with longer duration of residence in the United States, on average, report worse health than those who have been in the United States for shorter periods of time (Jasso et al., 2004). Of course, using self reported health may introduce confounding of immigrants' own perceptions of health and objective measurement of health status. There may be differences across countries in the levels of well-being considered to be 'good' health status. In this case, self reported health could change as immigrants become familiar with the health status of the receiving society. In other words, 'very good' health may be reported upon arrival in the United States and only 'fair' health reported many years later as immigrants adapt to different standards over time even if their actual level of well-being does not objectively change (Jasso et al., 2004).

Overweight and obesity are other health statuses noted for their differentiation by nativity and duration of residence in the United States (Hao and Kim, 2009; Sanchez-Vaznaugh et al., 2008). Much of this variation is accounted for by socioeconomic and demographic characteristics (Singh, Kogan and Yu, 2009). Yet here too selectivity and acculturation are identified as potential mechanisms for differences

across groups. Those who arrive in the United States at younger ages see obesity levels increase over time more than those who arrived at older ages (Roshania, Narayan & Oza-Frank, 2008). But there may also be an interaction between selection and duration in the receiving society that may help explain the very different outcomes across immigrant groups. Van Hook and Balistreri (2007) demonstrated that the rate of weight gain among children of immigrants in the United States varied by the level of economic development of the sending country. In other words, parents from low income countries, where resources were likely more limited before migration, may be more inclined to approve of or accept higher body mass index levels for their children (Van Hook and Balistreri, 2007).

Moving, Migration and Health. Further complicating the study of immigration and health is the difficulty in determining the appropriate reference groups for comparison. To assess the role of immigrant selectivity for explaining a health differential observed in the receiving context, the best comparison would be to those who did not migrate (Jasso et al., 2004). Thus, another problem assessing the 'acculturation' paradox in health studies is the lack of comparative data in the country of origin or an appropriate reference group in the receiving context. Few datasets allow for a comparison of health status in a binational context. Without binational data, it is difficult to assess whether immigrants would have experienced similar declines in health status over time had they merely remained in the country of origin. For example, comparisons between San Antonio, Texas and Mexico City reveal increases in obesity and diabetes in both contexts (Williams, Stern & Gonzalez-Villalpando, 2004).

In addition, few researchers disaggregate the 'native born' comparison groups in studies of immigrant health. Rather, immigrants' health status is usually compared to all those born in the receiving context with perhaps controls for basic demographic (age and sex) or socioeconomic status (education or income). But natives also vary by their own levels of residential mobility. Research on the effects of residential mobility and health often notes the selectivity of internal migration moves (Connolly, O'Reilly & Rosato, 2007; Pettit and McLanahan, 2003). Long distance moves are more likely among healthier adults than unhealthy adults. Not only does selectivity of mobility vary by age but the potential consequence of these moves also appears to depend on life course stage. Frequent moves in childhood, for

example, are noted as sources of psychological and physical distress (Jelleyman & Spencer, 2008). Moves in adolescence are associated with school dropout (South, Haynie and Bose, 2007). Moves in older age may be precipitated by good health among recent retirees or by bad health as individuals come to need more health care or instrumental assistance with daily living. Using a different Phoenix based sample than the one we analyze here, we also found residential instability to be associated with worse self reported health and symptoms (Yabiku et al., 2009).

Certainly those born in the United States may live geographically just as far from their birthplace as those born in border countries that have moved into the United States. Thus, to explain the mechanism behind the apparent health paradox, it may be useful to isolate the amount of differentiation due to residential mobility versus that due to selection of international migrants. So we can ask: Does residential mobility or stability help predict health status or changes in health over time? If so, is the 'health paradox' in part explained by the selectivity of individuals who move at all rather than international migration per se? To do this effectively data on residential mobility among natives in both sending and receiving communities are necessary.

In sum, while much progress has been made in describing and testing mechanisms of the immigrant paradox, several important questions remain unanswered. Most significantly, relatively little research effort has tried to reconcile the literature on immigration and health with that of mobility and health. Although there are caveats, the literature on immigration and health generally finds health advantages for some outcomes and some immigrant groups (Palloni and Arias 2004; Hummer et al. 2007). In contrast, the literature on mobility and health often finds that individuals who have greater residential mobility have worse health outcomes (Yabiku et al. 2009; Larson, Bell, and Young 2004; Magdol 2002). Thus, these two research literatures generally predict opposite health outcomes for population movement. Our research in this paper begins to examine this apparent "moving paradox."

Data and Methods

The data used to address the relationships between immigration, residential mobility and health come from the Southwest Migration Study (SWMS). The aims of the SWMS are to examine the interrelationships between migration, health, and the environment. The SWMS is a joint effort between investigators at Arizona State University and Universidad Autónoma de Sinaloa (UAS), in Culiacán, Mexico. This collaboration enables researchers to take advantage of the similarities in the two settings linked not only by shared geographic traits but also by migration. First, both Culiacán and Phoenix are large urban areas in a desert environment. Both metropolitan areas are the Capitals for their respective States (Sinaloa and Arizona). Second, both urban settings attract domestic migrants. Further, the Phoenix metropolitan area attracts both international and domestic migrants from several sources with most international migrants originating from Mexico. Mexican immigrants to Phoenix originate from several states but the two Mexican states that send the most immigrants to Phoenix are Sonora and Sinaloa. Thus, the two cities provide useful comparisons of their resident (non migrant) populations and allow linking the sending and receiving regions for longer distant migrants. The first stage of SWMS data collection is a small-scale pilot project designed to test data collection procedures in a two-country setting. We use the data from this stage for the current analyses.

In the Phoenix component, Census blocks were sampled from the eight most populous cities in Maricopa County (Phoenix, Tempe, Mesa, Chandler, Glendale, Scottsdale, Peoria, and Gilbert). These eight cities comprised approximately 88% of the entire population of Maricopa County. Blocks were eligible to be sampled if they were at least 25% Hispanic, based on the 2000 Census. Blocks were then sampled, proportionate to size, from all eligible blocks. Interviewers from UAS conducted face to face interviews at housing units in sampled blocks over a 10 day period in March, 2009. Interviewers went door to door, and an individual was eligible for interview if he or she was at least 18 years old and Spanish speaking. If multiple Spanish-speaking adults were in a household, interviewers asked to survey the eligible adult with the most recent birthday. The benefit of using interviewers from UAS was their very strong rapport with respondents—many of whom would have been less likely to participate in interviews with Anglo interviewers, or even with fluent US-born Mexican-heritage interviewers.

The interview protocol consisted of three parts. First, a standard questionnaire asked a variety of closed-ended questions covering demographic, employment, health, and basic migration history (nativity, parental nativity, year of entry to the US). Second, a yearly life history calendar measured geographic location, employment status, and family events. Third, interviewers collected a set of biomarker measurements including height, weight, peak lung flow, and dried blood spots that were later assayed for diabetes risk (Hemoglobin A1c). The response rate of households that were found to have an eligible occupant present was 58%. This compares favorably with other studies of immigrant populations, such as the New Immigrant Survey (69% response rate). The sample size for the Phoenix survey was N=415.

In the Culiacán component, collaborators at UAS purposively chose neighborhoods within the city stratified by general socioeconomic status: low, middle, and high. In addition, a separate set of neighborhoods in the rural outlying areas surrounding Culiacán were also interviewed; these neighborhoods tended to be agricultural, poorer, and potentially more likely to expect migration to the US at some time in the future. The same interviewers from UAS that conducted the Phoenix survey in March, 2009, also conducted face to face interviews in Culiacán in a 5 day period spanning May and June, 2009. As much as possible, the Culiacán survey mirrored the procedures and content of the Phoenix survey (questionnaire, life history calendar, biomarkers), with two exceptions. First, the collection of biomarkers was limited in Culiacán to height and weight only. Dried blood spots and lung function were planned, but the timing of the data collection coincided with the Swine Flu scare in Mexico. It was decided to drop the blood spot and peak air flow measurements: these mildly-invasive procedures might have severely curtailed respondent participation; and with not enough advance time to inform local officials of the data collection, interviewers might have run the risk of creating misunderstandings with local health and government agencies. The second difference between the Culiacán and Phoenix survey was the addition in Culiacán of questions about migration expectations. Respondents in Culiacán were asked how likely it was they would migrate to the US, and where they would go (city, state). They were also asked if they had family members in the US, and where those family members were located. The sample size for the Culiacán sample was N=240.

Dependent variables: Self-reported health, overweight, and obesity. Individuals were asked how they currently rated their health on a scale, with options of excellent, very good, good, fair, or poor. Self-reported health was coded from 1 to 5, with higher values representing better health. Obesity was a dichotomous variable coded 1 if obese, 0 otherwise. The determination of obesity is based on a BMI greater than or equal to 30 BMI was calculated as weight in kilograms divided by height in meters squared. Overweight status was also dichotomous, based on a BMI cut point of 25 or greater. The measurements of height and weight came from the biomarker component of the survey; if the biomarker data was not available, then the respondents' self-reported height and weight was used.

Nativity, Acculturation, and Nationality. We created dummy variables to separate the sample into four relevant groups. We differentiated foreign born residents in Phoenix by a proxy measure of acculturation, due to the well-established health gradient that follows acculturation. Mexican immigrants in Phoenix were divided into those whose had been in the US 5 years or less versus more than 5 years. Thus, the four groups in the sample were 1) Phoenix US born, 2) Phoenix foreign born with a duration in the US 5 years or less, 3) Phoenix foreign born with a duration in the US of more than 5 years, and 4) Culiacán, Sinaloa.

Migration, Immigration, and Mobility. Recall that an important aim of our research is to separately examine the process of immigration from that of mobility. Our primary focus is on the role of past residential mobility in current health status. Thus in addition to measures of nativity, we include several measures of diverse forms of population movement. The life history calendars collected lifetime histories of movement, and we use these data to create multiple measures. First, we created a measure of total movement. This is the number of residential moves the respondent has reported, regardless of the distance of each move. An international crossing would increment this measure by one, but so would a move from side of a city to another side of the same city. Second, we classified moves by the scope of the movement: intra-city moves (moves within the same city), intercity moves (moves between cities, but within the same state), interstate moves (moves between states, but within the same country), and international moves (moves between Mexico and the United States). Third, we also differentiated moves

that took place in Mexico versus those that took place in the United States. Finally, we also look at the timing of moves in the life course by counting the number of moves that occurred prior to age 18.

Controls. Our initial models include some basic controls—gender, age, marital status, and education. Gender and marital status are dichotomous indicators. Age is continuous, and education is treated as continuous using a six point scale of attainment.

Method. We use ordered logit models to predict self-rated health. Using linear regression for the 5 point ordinal self-rated health scale would have introduced assumptions about the equal ordering of response categories. Ordered logit models (sometimes called proportional odds models) do not make these assumptions. We use logistic regression to predict the odds of obesity and overweight status. Given that these two outcomes are dichotomous, logistic regression is an appropriate strategy.

Results

We first compare the characteristics of respondents in the Phoenix sample to those in the Culiacán sample. These results are presented in Table 1. Overall, Phoenix respondents are a little younger than the Culiacán respondents but this varies by nativity. The youngest respondents are the born in the United States. Recall that all respondents are Spanish speakers so many of these US natives are likely second or third generation Mexican origin adults. There were more female respondents and more married respondents in the Culiacán sample than the Phoenix sample.

(Table 1 about here)

We also compare the levels of lifetime mobility among respondents in both samples. Overall, the US born respondents and the immigrants in the United States for more than five years report the greatest number of total lifetime moves. Recent immigrants in Phoenix also report more moves than those in Culiacán as expected since, by definition, all immigrants have moved at least once. We also examined the differences in the life course timing of moves (not shown). On average, US born respondents in the Phoenix sample report the greatest number of moves occurring prior to age 18 (2.2) with no difference in

early life course moves between the recent immigrants and the Culiacán sample (1.4 moves prior to age 18).

Research on mobility and health often focus on local moves (i.e. residential mobility within a community) as an indicator of fragmented social ties, insecure housing or other types of instability. We can compare the number of local 'residential' moves experienced by respondents as well. Overall, US born respondents still evidence the greatest level of residential mobility but, contrary to expectations, recent immigrants have actually experienced the fewest residential moves within metropolitan areas. Immigrants may not have moved much within Mexico prior to their international move to the United States. Once in the United States, residential mobility may become more frequent as suggested by the slightly higher number of residential moves by immigrants in the United States for more than five years.

The mobility and health literature has generally found negative associations between mobility and health, although these associations have not been extensively tested while simultaneously considering the role of nativity, acculturation, and nationality. Our multivariate strategy is to first examine our outcomes using the nativity and acculturation measures typically used in the immigration and health literature, supplemented by an overall measure of total movement. We then differentiate our measure of total movement to test if different aspects of population movement help to explain group differences in health outcomes.

(Table 2 about here)

Table 2 presents the three outcomes (self-rated health, overweight, obesity) for respondents in the Phoenix sample (by nativity/duration of residence) and in the Culiacán sample. There is very little difference in the self rated health reported in both samples. Only the longer resident immigrants report lower or worse health when compared to the Culiacán sample. Consistent with prior research, there are higher levels of overweight and obesity in the Phoenix sample and lower levels in Culiacán. In particular, over 40% of both the US born and the longer resident immigrant respondents are obese. The recent immigrants are only slightly less likely to be obese than the Culiacán sample but recent immigrants are also more overweight. Neither of these differences is statistically significant.

Our next step is to determine how much of the variation in health status by nativity and location is simply explained by the demographic differences in the samples. To this end, we pool the samples and conduct ordered logistic regression models of self rated health, overweight and obesity. The models in Table 3 are for self rated health. Comparing model 1 (nativity only) to model 2 (nativity with controls), suggests that immigrants report worse self rated health than respondents in Culiacán once we control for age, gender, marital status and education. Consistent with other studies, age and being female are associated with worse self rated health while education is associated with better self rated health. The models also show that immigrants have lower self-rated health than their counterparts in Culiacán who have not migrated. This finding may be consistent with an acculturation argument, in which immigrants experience worsening health once they enter the United States. However, the Phoenix native born Mexican-heritage individuals are not different than the Culiacán natives with regards to self-rated health. This then leads us to ask whether moving itself is associated with differential health outcomes regardless of which side of the border moves occur.

(Table 3 about here)

Model 3 addresses whether mobility in general is associated with self rated health and whether this helps mediate some of the nativity differences by adding a measure for total number of moves (regardless of type of move) reported by the respondent in the life history calendar. There is no significant association between number of moves and self rated health. We also examined whether the life course timing of moves matters (i.e. number of moves prior to age 18) and found no difference in this as well (results not shown). But number of lifetime moves includes all moves, long and short distance. Model 4 examines if residential (local) moves, as a rough indicator of residential instability, are associated with health. Restricting mobility to these types of moves is also not significantly associated with self reported health. Model 5 then adds interactions for nativity/location and number of local residential moves. Again there are no significant interactions.

The results thus far are consistent with the literature on negative assimilation and health with the exception of US born natives who report similar levels of health as the native population in Mexico. But,

we also do not find any significant variation by mobility. Self-rated health, however, may be a problematic indicator of health status in a binational study. All respondents in the study were interviewed in Spanish, and thus there are no language translation biases. Respondents in the US and Mexico, however, may have different reference points in mind when they report their self-rated health (Finch et al. 2002). There are different average levels of health and morbidity in the US and Mexico, and this may create differences in how a respondent in Culiacan perceives his health versus a respondent in Phoenix, even if there are no objective differences. Therefore, we next turn to models examining the directly observed health indicators: overweight and obese. The advantage of these indicators is that the same interviewers worked in both Phoenix and Culiacán and took the measures of height and weight of the respondents. Thus, these measures should be less influenced by respondents' own reference groups or context than self reports of health.

Table 4 replicates the same models as Table 3 but this time the dependent variable is a dichotomous indicator of overweight status. Here the higher observed overweight status among longer resident immigrants when compared to those in Culiacán in model 1 is explained by including controls in model 2. In models 3 and 4, the additional measures of mobility (lifetime moves and residential moves) are also not significant. However, our descriptive analyses suggesting the location of residential moves (US vs. Mexico) is important led us to continue to model the interactions of residential moves and nativity. Here the worse health outcomes (i.e. higher log odds of being overweight) are found for the longer resident immigrants who experience more residential moves. Once again, the results are suggestive that mobility is negatively associated with health among some respondents in the United States with a different outcome for mobility in Mexico.

(Table 4 about here)

Replicating these results for obesity in Table 5, the well-known gradient of health status and immigration/nativity appears even more strongly: Mexican immigrants in Phoenix with durations of less than 5 years in the US have no different risk of obesity compared to Culiacán natives. Mexican immigrants with more than 5 years duration in the US, however, have significantly higher odds of obesity

than Culiacán natives. Furthermore, the Phoenix native-born have even higher odds of obesity than immigrants with more than 5 years duration and this relationship becomes even more evident with controls in model 2. Once again, we examine the potential importance of mobility on health status. And once again, the main effects of mobility are not significant (models 3 and 4). But these models pool all moves regardless of whether they occur in Mexico or the United States. Interactions between residential mobility and nativity provide a test of differential effects of local residential moves by nativity and location (see model 5). The results provide suggestive evidence that that US born respondents with more residential moves have a greater likelihood of being obese than those who have moved less frequently and those in Culiacán.

(Table 5 about here)

The question remaining is whether residential mobility is mediating the nativity differences in obesity observed in Table 5. To examine this, we limit the sample to those respondents in Phoenix and compare a model predicting obesity that does not include local residential mobility to one that does. These results are presented in Table 6. Here the nativity pattern of obesity is consistent with our previous results such that recent immigrants are less likely to be obese than their US born counterparts (model 1). Adding a measure for residential mobility in the United States does somewhat mediate these results. These moves are positively associated with obesity suggesting that those who have made more frequent local moves are indeed the individuals more at risk for poor health outcomes.

(Table 6 about here)

So far, the analyses suggest that local residential moves (i.e. those within a city) are associated with poorer health outcomes, particularly in the case of US born respondents and those immigrants who have been in the United States for more than five years. But the results for the pooled sample that included respondents living in Culiacán offered more mixed evidence of an association between local mobility and health. Does this mean that residential mobility within the United States is associated with worse health but that this mobility would be associated with positive outcomes in Culiacán? We examine this possibility by comparing a model predicting obesity in Phoenix to the same model for respondents in

Culiacán. These results are shown in Table 7 and do suggest that residential mobility in the US is indeed associated with a higher likelihood of obesity. And, although not statistically significant, the coefficient for residential mobility in Culiacán is in the opposite (negative) direction suggesting, at the very least, that the association between mobility and obesity is different in the two contexts. We find similar results for the other outcomes (overweight and SRH) not shown here. When the sample is pooled again and a variable for location of local residential moves (Mexico vs. US) is included, the results are also in the opposite direction with worse outcomes for moves in the United States and better outcomes for movers in Culiacán and the difference in coefficients is statistically significant (results not shown).

(Table 7 about here)

Discussion

Overall, recent Hispanic immigrants in the United States are found to be healthier than their counterparts who have been in the United States for longer periods of time or the second generation (Finch et al. 2009). But much of the research on nativity and health is confined to those living in the United States giving rise to heated debate over the potential role of positive selection on observed health advantages among recent arrivals. In addition, immigrants are most often compared to their US born counterparts with little consideration of the residential history or mobility patterns among the US born that may also be associated with health. These limitations in the literature on immigration and health are matched by limitations in research focused on residential mobility, housing instability and health. This body of work has rarely considered the extent to which negative associations between mobility and health are similar across national contexts. This paper has brought these two research areas together in an effort to gain greater insight into the importance of international migration, lifetime mobility and local residential mobility for health outcomes. Using paired samples from two large metropolitan areas in the US and in Mexico with detailed data on place of birth and residential histories, the analyses presented here compared immigrants to both their US born counterparts and residents in the sending country. The analyses also examined the role of local residential mobility in both contexts.

Overall, the results are consistent with the 'immigrant health paradox' literature. The analyses demonstrate that the worse health outcomes are found among the US born respondents in Phoenix. Notably, their health outcomes are not only worse than their immigrant counterparts in Phoenix but US born respondents are also more obese than their urban resident counterparts in Mexico. Age, gender, education and marital status differences can help explain some of the variation but not all.

There is also variation in health of respondents according to their level of mobility in both contexts. Obesity tends to be higher among respondents who report more local residential mobility in the United States than those with fewer moves. The opposite pattern appears in the case of respondents in Culiacán who not only have moved less frequently but for whom moves are negatively associated with the probability of being obese. Clearly local residential mobility means something quite different in these contexts. At this point, we can only speculate about the underlying mechanisms behind these differences.

On the one hand, residential mobility in the United States may indeed be indicative of insecure housing and limited resources. However, in Mexico, such local mobility may be associated with key life course events such as marriage or associated with upward economic mobility. However, recall that we did not find that the timing of these moves (i.e. moving before age 18 or after) alters the relationship and the effect of age did not differ much by context when the analyses are conducted separately for the Phoenix sample versus the Culiacán sample.

An alternative explanation is that the relationship between moves and resources is the same in Phoenix as in Culiacán. In this case, respondents with fewer resources may move more frequently than those with more resources. However, it may be that those who have fewer resources in Mexico also have less access to cheap, calorie rich foods and thus are less likely to be obese than their poor counterparts in Phoenix. This would be consistent with Van Hook and Balistreri's (2007) work as well other studies examining the importance of low socioeconomic status and exposure to fast food outlets in developed urban areas (see Reidpath et al., 2002 for example). Individuals with lower resources and insecure housing in Culiacán may not be as exposed to these food outlets as mobile residents in Phoenix.

The analyses presented here were based on a unique albeit small binational pilot study. This yields several limitations, in addition to the relatively modest sample size. For example, the analyses could not consider the association between mobility and health for non-Spanish speaking natives in Phoenix. While limiting the analyses to Spanish speaking respondents removes some of the 'noise' that may be present in studies with self-reported health outcomes, the US born respondents are likely more proximate to the migration experience (i.e., in the second generation) than others in the Phoenix area. A significant limitation is the lack of non-Mexican heritage individuals in the dataset. To more fully separate the influence of immigration/nativity on health from that of residential mobility on health, we need to examine the residential mobility and health patterns of the non-Hispanic native US population. This additional comparison group will allow us to test if the process linking residential mobility in the US and worse health outcomes is common to all groups, or rather is contingent on Mexican heritage and/or the immigration experience. In addition, it would be useful to consider the community context in which these groups are located. Residential segregation and neighborhood amenities also vary by nativity and national context and neighborhood characteristics may be important for health outcomes as well (Iceland and Scopilliti, 2008; Sampson, Morenoff & Gannon-Rowley, 2002).

In sum, our work has several implications. First, when examining health outcomes, it is important to distinguish different types of population movement: the processes of immigration and residential mobility likely have different motivations, selection processes, and associations with health. Second, it is important to consider the context in which population movement occurs. The reasons for and consequences of residential mobility in a sending community (Mexico) may be very different than residential mobility in a receiving community (US). Aggregating all types of movement on both sides of the border will obscure and collapse important variation. Our pilot study has collected innovative data that is able to begin exploring these issues, but there is much more work to done.

References:

Abraido-Lanza, Ana F., Adria N.Armbrister, Karen R. Florez and Alejandra N. Aguirre. 2006. "Toward a Theory-Driven Model of Acculturation in Public Health Research." *American Journal of Public Health*, 96 (8): 1342-1346.

Connolly, S., O'Reilly, D. and Rosato, M. 2007. Increasing inequalities in health: Is it an artifact caused by the selective movement of people? *Social Science and Medicine*. 64: 2008-2015.

Escbach, K.; Ostir, G.V.; Patel, K.V.; Markides, K.S. & Goodwin, J.S. 2004. Neighborhood context and mortality among older Mexican Americans: Is there a barrio advantage? *American Journal of Public Health*, 94: 1807-1812.

Finch, Brian K., Diem Phuong Do, Reanne Frank, and Teresa Seeman. 2009. "Could 'Acculturation' Effects Be Explained by Latent Health Disadvantages Among Mexican Immigrants?" *International Migration Review*, 43(3): 471–495.

Finch, Brian K., Robert A. Hummer, Maureen Reindl, and William A. Vega. 2002. "Validity of Self-rated Health among Latino(a)s." *American Journal of Epidemiology*, 155: 755-759.

Frank, R.; Cerdá M. & Rendón, M. 2007. Barrios and Burbs: Residential Context and Health-Risk Behaviors among Angeleno Adolescents. *Journal of Health and Social Behavior*, 48: 283-300.

Hao, L; Kim, J. 2009; Immigration and the American obesity epidemic. *International Migration Review*, 43: 237-262.

Hummer, R. A.; Powers, D.A.; Pullum, S.G.; Frisbie, W.P.. 2007. Paradox found (again): Infant mortality among the Mexican-origin population in the United States. *Demography*, 44: 441-457.

Hunt, L.M.,; Schneider, S., & Comer, B. 2004. Should 'acculturation' be a variable in health research? A critical review of research on US Hispanics. *Social Science and Medicine* 59: 973-986.

Iceland, J. and Scoplilliti, M. 2008. Immigrant residential segregation in US metropolitan areas, 1990-2008. *Demography*, 45: 79-94.

Jasso, Massey Rozsenzweig and Smith. 2004. Immigrant Health Selectivity and Acculturation chapter in Anderson, NB; Bulato, R.A. and Cohen, B. (eds.). *Critical perspectives on racial and ethnic differences in health in late life*. Washington DC: The National Academies Press.

Jelleyman, T; Spencer, N. 2008. Residential mobility in childhood and health outcomes: a systematic review. *Journal of Epidemiology and Community Health*, 62: 584-592.

Larson, Ann, Martin Bell, and Anne Frances Young. 2004. "Clarifying the relationships between health and residential mobility." *Social Science & Medicine*, 59: 2149–2160.

Magdol, Lynn. 2002. "Is Moving Gendered? The Effects of Residential Mobility on the Psychological Well-Being of Men and Women." *Sex Roles*, 47 11/12: 553-560.

Markides, K.S., J. Coreil. 1986. "The Health of Hispanics in the Southwestern United States:An Epidemiologic Paradox." *Public Health Reports*, 101:253-265.

Ott, J.J.; Winkler, V.; Kyobutungi, Laki, J. & Becher, H. 2008. Effects of residential changes and time patterns on external-cause mortality in migrants: Results of a German cohort study. *Scandinavian Journal of Public Health*, 36: 524-531.

Palloni, A. & Arias E. 2004. Paradox lost: Explaining the Hispanic adult mortality advantage. *Demography*, 41: 385-415.

Park, Y.; Neckerman, K.M.; Quinn, J.; Van Hook, J.; Balistreri, K. 2007. Immigrant generation, socioeconomic status and economic development of countries of origin: A longitudinal study of body mass index among children. *Social Science and Medicine*, 65: 976-989.

Pettit, B. & McLanahan, S. 2003. Residential mobility and children's social capital: Evidence from an experiment. *Social Science Quarterly*, 84: 632-649.

Reidpath, D.D.; Burns, C., Garrard, J., Mahoney, M. and Townsend, M. 2002. An ecological study of the relationship between social and environmental determinants of obesity. *Health and* Place, 8: 141-45.

Roshania, R.; Narayan, KMV & Oza-Frank, R. 2008. Age at arrival and risk of obesity among US immigrants. *Obesity*, 16: 2699-2675.

Sampson, R.J., Morenoff, J.D. & Gannon-Rowley, T. 2002. Assessing "neighborhood effects": Social processes and new directions in research. *Annual Review of Sociology*,28: 443-478.

Sanchez-Vaznaugh, E.V.; Kawachi, I.; Subramanian, S.V.; Sanchez, B.N. & Acevedo-Garcia, D. 2008. Differential effect of birthplace and length of residence on body mass index (BMI) by education, gender and race/ethnicity. *Social Science and Medicine*,67: 1300-1310.

Singh, GK; Kogan, MD & Yu, SM. 2009. Disparities in obesity and overweight prevalence among US immigrant children and adolescents by generational status. *Journal of Community Health*, 34: 271-281.

South, SJ; Haynie, DL & Bose, S. 2007. Student mobility and school dropout. *Social Science Research*, 36: 68-94.

Yabiku, S.T.; Glick, J.E.; Wentz, E.A.; Haas, S.A. & Zhu, L. 2009. Migration, health and environment in the desert southwest. *Population and Environment*, 30: 131-158.

Table 1. Descriptive Statistics, Phoenix and Culiacán Sample

	Phoenix, Arizona			Culiacán
	Recent Immigrants (< 5 years)	Immigrants in US 5+ years	US natives	
Age	30.53 (10.96)	37.66 (11.97)	29.77 (13.07)	39.45 (14.65)
Male	39.1	34.6	29.2	21.9
Female	60.9	65.4	70.8	78.1
Education (1-6)	3.3	3.2	3.7	3.9
Percent Currently Married	46.9	50.6	43.8	61.0
Number of Total Lifetime Moves	2.1	3.0	2.9	1.4
Number of residential (intracity) moves	0.5	0.9	1.5	0.7

Source: Southwest Migration Study, Pilot Data (2009); n = 615

Note: residential moves refer to moves within the same metropolitan areas.

Table 2. Health Status of Spanish Speaking Respondents in Phoenix and Culiacán

	Phoenix			Culiacán
	Recent Immigrants (< 5 years)	Immigrants in US 5+ years	US natives	
Self-Rated Health (1-5)	2.56	2.49 *	2.85	2.78
Percent Overweight	74.5	75.1 *	73.8	66.7
Percent Obese	23.6	43.4 *	47.6 *	26.8
Number of Cases	64	272	47	226

Source: Southwest Migration Study, Pilot Data (2009)

* Significant difference from the Culican Sample ($p < .05$)

Table 3. Ordered Logistic Regression Models Predicting Self Rated Health, Phoenix and Culiacan, 2009

	Model 1	Model 2	Model 3	Model 4	Model 5
Nativity/Place of residence (vs. Culiacan)					
Recent Immigrant	-0.39	-0.61 **	-0.54 *	-0.61 **	-0.64 *
Immigrant, 5+ years	-0.64 **	-0.58 **	-0.43 **	-0.56 **	-0.64 **
US native	0.07	-0.25	-0.10	-0.21	-0.50
Age		-0.03 **	-0.03 **	-0.03 **	-0.03 **
Female (vs. Male)		-0.54 **	-0.56 **	-0.55 **	-0.53 **
Currently Married (vs. Unmarried)		-0.13	-0.12	-0.13	-0.13
Education		0.36 **	0.37 **	0.37 **	0.37 **
Number of Total Lifetime Moves			-0.08		
Number of residential (intracity) moves				-0.04	-0.15
Residential moves*Recent Immigrant					0.04
Residential moves*Immigrant, 5+ years					0.12
Residential moves*US native					0.26

Source: Southwest Migration Study, Pilot Study

* p< .10; ** p <.05

Table 4. Logistic Regression Models Predicting Overweight Status, Phoenix and Culiacan, 2009

	Model 1	Model 2	Model 3	Model 4	Model 5
Nativity/Place of residence (vs. Culiacan)					
Recent Immigrant	0.37	0.46	0.44	0.46	0.42
Immigrant, 5+ years	0.40 *	0.32	0.29	0.32	0.02
US native	0.34	0.55	0.52	0.55	0.39
Age		0.02 **	0.02 **	0.02 **	0.02 **
Female (vs. Male)		-0.21	-0.21	-0.21	-0.18
Currently Married (vs. Unmarried)		0.29	0.29	0.29	0.31
Education		-0.18 **	-0.18 **	-0.18 **	-0.16 *
Number of Total Lifetime Moves			0.02		
Number of residential (intracity) moves				-0.01	-0.22
Residential moves*Recent Immigrant					0.09
Residential moves*Immigrant, 5+ years					0.41 *
Residential moves*US native					0.24
Intercept	-0.99 **	-1.23 **	-1.26 **	0.53 **	0.53 **

Source: Southwest Migration Study, Pilot Study

* p< .10; ** p <.05

Table 5. Logistic Regression Models Predicting Obesity, Phoenix and Culiacan, 2009

	Model 1	Model 2	Model 3	Model 4	Model 5
Nativity/Place of residence (vs. Culiacan)					
Recent Immigrant	-0.18	-0.04	-0.07	-0.04	-0.33
Immigrant, 5+ years	0.72 **	0.75 **	0.69 **	0.73 **	0.60 **
US native	0.89 **	1.24 **	1.19 **	1.20 **	0.73
Age		0.02 **	0.02 **	0.02 **	0.02 **
Female (vs. Male)		0.46 **	0.48 **	0.48 **	0.53 **
Currently Married (vs. Unmarried)		0.53 **	0.54 **	0.54 **	0.54 **
Education		-0.32 **	-0.32 **	-0.32 **	-0.32 **
Number of Total Lifetime Moves			0.04		
Number of residential (intracity) moves				0.05	-0.18
Residential moves*Recent Immigrant					0.51
Residential moves*Immigrant, 5+ years					0.23
Residential moves*US native					0.44 *
Intercept	-0.99 **	-1.23 **	-1.26 **	-1.25 **	-1.18 **

Source: Southwest Migration Study, Pilot Study

* p< .10; ** p <.05

Table 6. Logistic Regression Models Predicting Obesity,
Mediating effects of mobility, Phoenix sample only

	Phoenix, Arizona	
	Model 1	Model 2
Nativity (vs. US born)		
Recent Immigrant	-1.30 **	-1.16 **
Immigrant, 5+ years	-0.53	-0.45
Age	0.02 **	0.02 **
Female (vs. Male)	0.77 **	0.84 **
Currently Married (vs. unmarried)	0.62 **	0.64 **
Education	-0.25 *	-0.27 **
Number of residential (intracity) moves		0.14 *
Intercept	-0.60	-0.80

Source: Southwest Migration Study, Pilot Sample, 2009

* p< .10; ** p <.05

Table 7. Logistic Regression Models Predicting Obesity,
Phoenix and Culiacan Separately, 2009

	Phoenix	Culiacán
Age	0.02 **	0.01
Female (vs. Male)	0.88 **	-0.30
Currently Married (vs. unmarried)	0.62 **	0.32
Education	-0.25 *	-0.39 **
Number of residential (intracity) moves	0.19 **	-0.11
Intercept	-1.45 *	0.01

Source: Southwest Migration Study, Pilot Sample, 2009