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Logics of Eating in Alicante, Spain: Biosocial Relationships Connecting Migration, Food, Stress, and Health

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ABSTRACT

Logics of Eating in Alicante, Spain: Biosocial Relationships
Connecting Migration, Food, Stress, and Health

Although elevated stress and dietary change have each been associated with metabolic health decline for resettled populations in the Global North, considerably less attention is paid to the links between these two biosocial pathways. Addressing these linkages can elucidate interrelated diet and stress mechanisms that affect population health disparities over time, and works toward redressing food and health injustice for marginalized groups. This dissertation introduces the Migration, Stress, Food and Health Study (MCES: *Estudio de la Migración, la Comida, el Estrés, y la Salud*) to describe migration-related stress exposure, eating and diet change(s), and health among two generations of adults who emigrated from Latin America and resettled in Alicante, Spain. By working with Latin Americans who moved to this high-resource setting, MCES examines social logics that underlie ways of eating in Alicante through their comparative perspective. The project is also equipped to assess eating and stress reactivity that occurs after the major change of migrating to Spain.

Using baseline survey data from 85 participants (38 in the parent cohort; 47 in the child cohort), analysis presented herein aimed to (1) understand social-economic factors that influence eating habits, migration-related stress exposure, and health; (2) determine relationships between these three variables of interest; and (3) test for intergenerational trends. Statistical analysis prioritized descriptive and correlational analyses, and additional hypothesis-driven tests used bivariate and multiple linear regression models.

Participants in the sample mostly reported modest-to-low monthly incomes, and spanned a wide range of demographic, educational and occupational backgrounds. Having fewer material

assets (e.g., experiencing month-to-month financial difficulty) negatively influenced eating, stress, and health across multiple measures, while more resources and social support correlated with better health and health-related measures, i.e., less change in eating habits, better diet quality, less migration-related stress. Those who reported less-severe migration-related stress had less change in eating habits, better diet quality, and better health status. Participants' self-reported health status was strongly associated with their socio-economic conditions and their migration-related stress exposure, but not with diet change or diet quality. Experiencing food insecurity did show a strong negative influence on health in a pairwise correlation matrix; however, in a multivariate model, this relationship was less-robust than migration-related stress or experiencing financial difficulty, suggesting that socio-economic deprivation and discrimination have the strongest impact on health status. Finally, comparing responses between a subsample of matched parent-child pairs (n=64) showed that a parent's outcome predicted their child's across multiple measures of eating, migration-related stress exposure score, and self-reported health score. The findings from the MCES cohort suggest that a focus on diet habits and quality cannot adequately explain health inequity. Rather, the strongest leverage points for improving participants' health and advancing health equity in Alicante are to improve social and economic support for Latin Americans living there.

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You are a bolt of joy who brightens and betters
everything around you, me especially.

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Chapter 1

What are the social logics of eating in Alicante, Spain, and how do they impact health for people who immigrated there?

INTRODUCTION

In the summer of 2018, I led a series of interviews with international students at the University of Alicante, Spain to collect preliminary data for my dissertation. I began with open-ended questions like, “Where do you get your groceries?” or, “What do you like to cook/eat?” and conversations moved easily from there. I was surprised to discover that stress was a salient theme across most interviews. The people I spoke with described feeling scrutinized by what they did or did not eat, and they coped by changing how they ate in Spain. One summed up the difficulties of maintaining a halal diet in Spain by saying, “Since I don’t eat what my friends eat, I can’t go out to eat with them.” Several others focused on challenges to eating foods from their home country. They explained that the only way they could get these meals was to make them at home, but were limited by time constraints as full-time students.

Results of my preliminary analysis suggested that eating was a daily stressor for internationals living in Spain. These findings align with a growing body of research about the ways by which social pressure to “fit-in” can initiate dietary changes and induce elevated stress (Guendelman, et al. 2011; Llácer et al. 2009). Curiously, although many studies assess impacts of eating practices and stress on immigrants’ health independently, no work to date has examined how these two biosocial pathways interact with one another. Doing so can provide crucial insights for interpreting high chronic disease rates among immigrants and other minoritized groups in the US and Europe, and work toward health justice for these communities.

My dissertation knits together biosocial perspectives on food and eating to explore how international migration impacts human stress physiology and eating practices to shape health inequality in the global North. I work with Latin Americans who moved to the Alicante province of Spain because, in doing so, I can examine foodways in Alicante from their cross-cultural perspective, and I can assess eating and stress reactivity that occurs after the major change of immigrating to Spain. While rooted in biological anthropology, my dissertation reflects strong training across the anthropological subfields and in public health, food studies, sociology, and psychology. In this introductory chapter, I review anthropological and related scholarship from which my dissertation builds, and summarize aims and design of my dissertation project. I then outline each of the subsequent chapters.

BACKGROUND

Anthropology shows the significance of food and eating

As Mintz and DuBois quipped in their 2002 paper in the *Annual Review of Anthropology*, "Next to breathing, eating is perhaps the most essential of all human activities, one with which much of social life is entwined" (Mintz and Du Bois 2002: 102). Studies of food and eating are a hallmark of anthropological research (Bourdieu 1977), and foundational to our understandings of commodity, identity, and evolution. Many scholars have pointed out how our dependence on food imbues food systems with tremendous power, which thereby sets the foundation for social and political organization. Furthermore, the "commodification of food and cooking exemplifies how dominant forces, typically the 'Global North' and/or middle-class segments of a population, desire to consume what they perceive as the authentic culture of the Other" (Strand 2023). Author and activist bell hooks' essay "Eating the Other: Desire and

Resistance" is central to this view (hooks 1992). Other writers that have productively exposed economic imperialism through foodways include: Aiysha Galvez exposing the destructive policy, food environment, and health impacts of NAFTA in Mexico (Gálvez 2018); Sidney Mintz's historical exposition showing the significance of the colonial product sugar in the growth of world capitalism (Mintz 1986), and Anna Tsing tracing globalized commodity chains of valuable and elusive matsutake mushrooms (Tsing 2015).

Anthropologies of food and eating also play a significant role for understanding identity, diaspora, and social movements (Holtzman 2008). Authors who explore these themes locate food in relation to memory so as to examine changes between past and present; to reveal identities and shifts thereof; and follow with the movement of people across international borders (Chan 2010). Food memories also point to epochal transformations like war, nation-building, or globalization (Anderson 2010), and/or they can represent acts of resistance to those projects (Strand 2023). Finally, food can be an act of remembering home for diasporas who navigate new food systems, attitudes, and ways of eating. Eating is both an intimate and/or communal way for migrated people to bridge between their new and old homes, and can cultivate relationships that distinguish diasporas around the world (Codesal 2010).

Finally, biological anthropologists have long been interested in how diet shapes human biological variation. At the core of this work is a focus on the evolutionary significance of human dietary diversity (Leonard and Robertson 1994), which led to monumental work exploring evolutionary trade-offs between brain and body (Leonard, Snodgrass, and Robertson 2007). Authors demonstrate that high brain- size to body-size, which is a defining physiological feature of the human species, requires significant caloric and metabolic demands (Kuzawa et al. 2014). Using a combination of paleoarchaeological, ethnographic, and human energetic

evidence, biological anthropology contributed strong evidence that innovations in tool use and cooking released vastly higher nutritional densities, which, through accelerated brain growth, are hypothesized to precipitate our species-defining adaptations of bipedalism and culture (Leonard and Robertson 1992; Aiello and Wheeler 1995; Wrangham and Conklin-Brittain 2003). Closely related to this body of work are adjacent literatures that position food as an indispensable locus for human sociality, particularly via food sharing and raising young (Hrdy 2007). In sum, authors contend that in order to meet intense demands of a large and metabolically-costly brain, humans had to expand what we would eat, cooperate, and biologically adapt to maximize caloric intake (Alcock, Franklin, and Kuzawa 2012; Leonard 2014). Subsequent studies proposed a mismatch between our evolutionary past and globalizing future, one where malnutrition is expressed in overconsumption of industrially-processed foods, as bodies crave the nutrients required for brain function (Brooks, Simpson, and Raubenheimer 2010; Hicks and Leonard 2014).

Biocultural analyses of eating have grappled with the health consequences of neoliberal policies and globalization, and they produce important context-driven work. For example, Leatherman and Goodman (2005) paired ethnographic insights from living with and interviewing Mayan communities in the Yucatan with historic food purchasing data and micronutrient profiles to show how the arrival and dispersal of Coca Cola to these villages predicted worse eating and health patterns. Their results tie in with other damning examples of "Coca-colonization" that expose the deliberate work Coca Cola (and other soft drink and food conglomerates who follow) put in to weaken nutritional standards, manipulate obesity science, and push their intensely-processed and potentially-addictive products to new consumers (Greenhalgh 2019a; 2019b; Gálvez 2018).

Strong evidence from biocultural work points to the destruction of local systems by industrial powers as a driving force of social and health inequalities around the globe. The central mechanism is a population change in eating habits, which was mobilized via pressures to globalize and "modernize" society. Often coined the "nutrition transition," the specific diet-change-with-development paradigm involves highly-processed, nutrient-poor foods originating in American fast food culture supplanting local food systems around the globe (Goodman and Leatherman 1998; Popkin, Adair, and Ng 2012). While the globalizing pressures and industrial food powers wreak havoc on local economies, the food wreaks havoc on bodies. Concomitantly, health outcomes stratify along axes of inequality: race, class, gender.

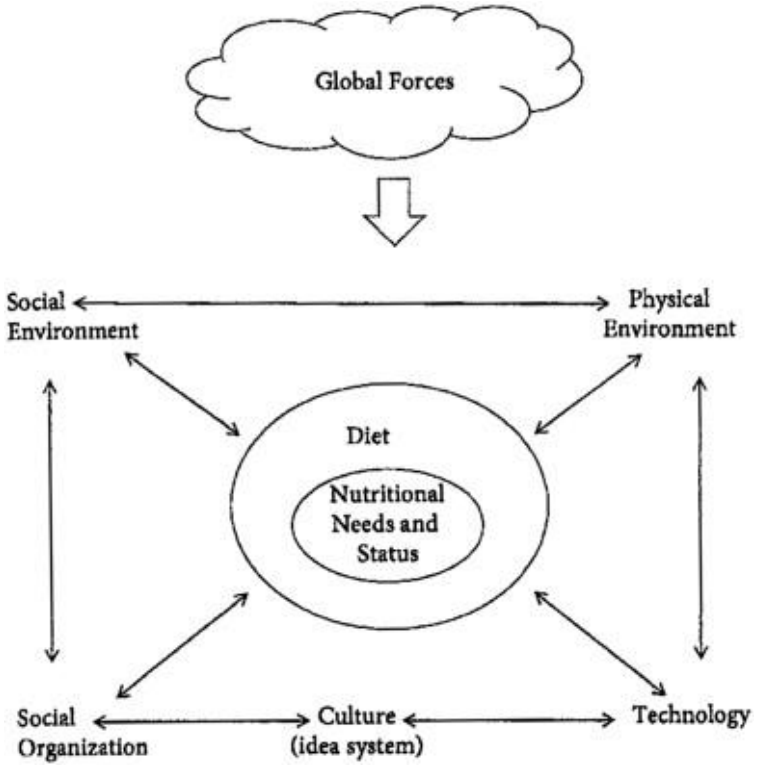


Figure 1.1. An ecological model of food and nutrition (Pelto 2000; adapted from Himmelgreen 2014) outlining nutritional responses to migration/globalization and nutrition This model highlights the biocultural significance of eating in inequitable contexts.

Figure 1.1 illustrates the entangled relationships between globalization, food, and human biology from Pelto et al.'s (2000) "Ecological model of food and nutrition." This model conveys the biocultural significance of eating via bidirectional pathways between eating and multi-faceted social and physical conditions. All are shaped by global forces, rendered here as a blunt force consummately altering all facets of everyday life and eating.

Figure 1.1 succinctly portrays central tenets of biocultural work on food and nutrition, which I take up in my dissertation as well. Subsequent studies have used a biocultural framework to trace parallels between increased social inequality and widening disparities in nutritional quality and/or health outcomes. For example, Worthman and Kohrt reviewed articles exploring the relationships between resource precarity and health, concluding that the negative health impacts of experiencing material deprivation extended well beyond simply not having sufficient resources (Worthman and Kohrt 2005). More recently, Leatherman and colleagues reviewed trends in biocultural research over the past thirty years and demonstrated a shift to integrate critical perspectives on history, political economy, and biology in order to understand social and environmental context(s). Authors clarified that critical biocultural anthropology endeavors to "link structures of inequality, constrained agency, and pathways to embodiment within historically and ethnographically grounded contexts, lived experience, and local biologies" (Leatherman, Hoke, and Goodman 2016: 52) . My dissertation aligns squarely with this analytic goal, focusing the biological consequences of eating in an unjust food system.

The syndemic relationship between industrially-processed food systems, social marginalization, and poor nutrition is considered a driving force behind rising rates of obesity and other chronic conditions around the globe (Himmelgreen et al. 2022; Wells 2012). In high-resource countries like those of Europe, marginalized groups including People of Color (POC)

and immigrants are most likely to adapt to poor diets for two reasons: availability and marketing (Alvidrez et al. 2019). That is, healthy foods usually cost more, so people with less money may not be able to afford a healthy diet (Rao et al. 2013). The work of Adam Drewnowski and colleagues was foundational for illustrating the economics of healthy eating (Drewnowski and Specter 2004). Through their epidemiological studies, these researchers showed that energy-dense processed foods were the lowest-cost food option, and that income and education predicted diet quality (Darmon and Drewnowski 2008; Drewnowski and Darmon 2005). In addition to the economic gradient of diet quality, industrially-processed, nutrient-poor foods (IPFs) are often strategically marketed to low-income communities, which predominantly include immigrants and POC (Luan, Minaker, and Law 2016). For instance, IPFs are presented as a time-saving, or cost-effective option. As a result of these two socio-economic pressures, marginalized groups are most likely to experience the negative associated health outcomes, such as diabetes, obesity, heart disease and similar conditions (Marmot 2015; Drewnowski and Darmon 2005).

Biosocial models illustrate health and eating inequities

Biosocial perspectives on health align strongly with the foodways scholarship outlined above, but extend beyond anthropology to tackle transdisciplinary questions about health and illness. My work builds from Harris and McDade's 2018 definition of biosocial as, "a broad concept referencing the dynamic, bidirectional interactions between biological phenomena and social relationships and contexts, which constitute processes of human development over the life course." (Harris and McDade 2018: 2). Figure 1.2 presents a model of the hierarchical social and biological influences on human biology and health over the life course. In this model, the boundaries between biological and social worlds are blurred, and the body is the site of co-constitutive biological and social forces that flow through it—one cannot be understood without

the other. This figure highlights how layers of nested social context interact with the individual's genetics and physiology throughout their life to shape variation in biological function and health. Conversely, this model also demonstrates how human biological variation may (re)shape social context.

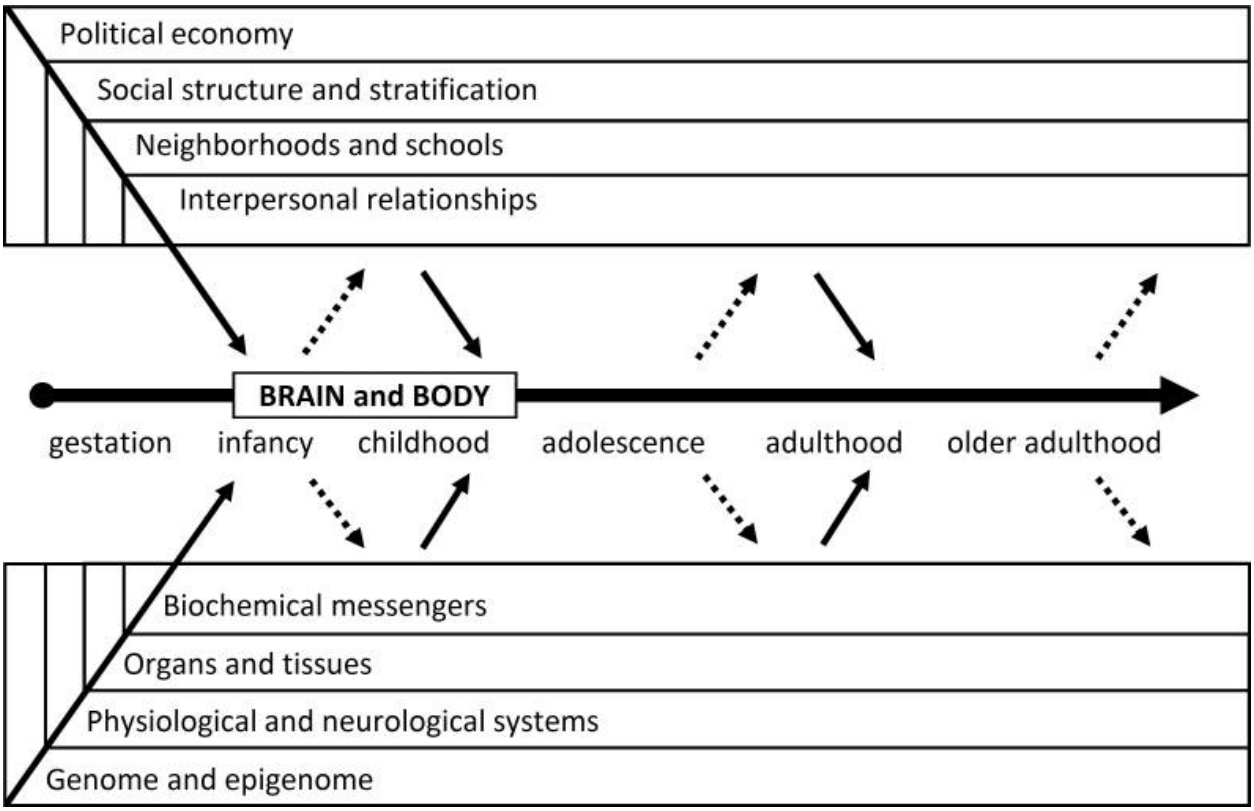


Figure 1.2. Harris and McDade's (2018) biosocial framework involves a series of nested social contexts at the top that ceaselessly interact with an individual's brain and body throughout their life, thereby continually impacting nested, multi-system biological processes. This figure also importantly models those human biological adaptations that (re)shape social worlds

Biosocial work is distinguished by its emphasis on transdisciplinary research and inequality over the life course (McDade and Harris 2022; McClure et al. 2020; Bailey, Feldman, and Bassett 2021). Scholars with backgrounds in anthropology, psychology, public health, medicine, demography and sociology often deploy a biosocial framework for tackling broad

questions on health that require methods across the biological, medical, behavioral, and social sciences (Harris and McDade 2018). Biosocial perspectives have been especially productive in advancing promising new research on the microbiome and (post)genomics; for example, by illustrating the role that race/racism plays in guiding scientific discovery in these emerging fields (Benezra 2020; Finlay et al. 2021; Meloni 2022).

A biosocial approach is a useful heuristic to understand eating, as well as health. In keeping with biosocial models, I position food as a theoretical keystone that embeds our social and biological realities. Authors who take up this view include Hanna Garth and Maggie Dickinson, whose books situated body and food relationships in welfare systems in Cuba and the US, respectively (Garth 2020; Dickinson 2019). Food in/security research often uses biosocial framings to illustrate the conditions that modulate food access and utilization (Hadley and Crooks 2012; Patterson et al. 2020). These and many related works meticulously describe foodways' social, historical, political, and economic pillars, and they elucidate the embodied processes that occur through eating in an unjust system. In my dissertation and in my continued work, I strive to contribute additional understanding to this powerful evidence base.

Biosocial framings additionally can help to address a lingering question in nutritional anthropology: how do we keep assessing processes of dietary change amid the dizzying heterogeneity in a global-industrial food system? (Himmelgreen et al. 2014). Nutrition transition studies in particular gained traction because they demonstrated, using a population model, the devastating biological consequences of food economic capitalism (Moreno, Sarría, and Popkin 2002; Popkin, Adair, and Ng 2012). However, this population-level focus was also a shortcoming, as it could not adequately address finer-grained transitions in food and nutrition that occur within populations. Critics of the nutrition transition paradigm thereby contend that it

applied a one-size-fits-all model to a myriad of site-specific engagements with globalization (Himmelgreen et al. 2014). Related work evaluating links between food cost, diet quality, and health demonstrated that social inequality stratifies diet quality (Aggarwal et al. 2011), which suggests multiple and unequal nutrition transitions within a population that differentially affect health to this day (Drewnowski and Specter 2004). As evidence continues to accrue on the negative health effects of the industrially-processed foods, results from multigenerational studies suggest that processes of diet change are ongoing and unpredictable. Through my dissertation, I strive to engage with these complicated dynamics by focusing on a context-specific measure of change in eating patterns among people who migrated to Spain.

International migration necessitates navigating a new food system

Studies with populations who immigrated to the Global North can contribute important perspectives for this inquiry. International migration represents an acute dislocation: an abrupt change in migrants' "sensory world of everyday experience" (Ahmed 1999) p 341. Upon resettlement in a new country, immigrants adjust to unfamiliar groceries, new mealtimes, and a different set of day-to-day customs. Contact with food through eating, cooking, buying, sharing, etc. can help to ease the change, but this depends heavily on context of migrancy and social conditions in the new residence (Codesal 2010). Immigrants are also often unable to access the foods they used to regularly eat (Tovar et al. 2013). Out of these processes, they may develop new tastes (Popkin, Duffey, and Gordon-Larsen 2005; Lytle and Sokol 2017). Furthermore, measuring how much an immigrant's eating habits have changed can serve as evidence of social integration in the receiving region (Allen et al. 2014).

Given all this, it is clear that food and eating changes for resettled people have significant social and ecological meaning. Metrics of dietary change are additionally important for

interpreting why migrants' health deteriorates in high-resource settings of the Global North (Holmboe-Ottesen and Wandel 2012). Studies conducted in the US and Europe consistently find that people who migrated there from low- and middle-income countries bear such a high chronic disease burden (Restrepo-Mesa et al. 2015; Quesada, Hart, and Bourgois 2011; Sousa et al. 2010). However, in the context of food and migration, there has been a notable preference for researching food in relation to health concerns (Holmboe-Ottesen and Wandel 2012; Popovic-lipovac and Strasser 2015). This can overlook vital context, such as the role that societal norms and pressures in the Global North play in requiring adaptations by those who migrate (Viruell-Fuentes 2007; Acevedo-Garcia et al. 2012). Comparative work also emphasizes that the size and age of a diaspora significantly alters how people engage with food upon resettlement (Codesal 2010), as does the presence of other diasporic groups (García 2017). In other words, a focus on immigrants' diet patterns that does not consider why they change has the unfortunate effect of suggesting that immigrants' poor health is the result of their poor food choices (Yates-Doerr 2015). Measuring effects of societal norms and/or pressures on eating habits will add crucial perspective for understanding connections between migration and health.

Stresses associated with migration negatively impact health

Although research on embodied stress extends well beyond migration, the dislocation(s) that occur with migration continue to afford a productive analytic space for illustrating biopsychosocial stress processes. The process of integrating into a new society can be stressful: it may involve uncomfortable experiences like not knowing what is going on or feeling out-of-place. Related challenges can include incongruent cultural values and practices, language difficulties, and discrimination (Gil and Vega 1996). Stress of this kind is common for people who migrated, and can also persist in later generations when youth feel "caught in the middle"

between longstanding family dynamics and new social expectations (Mena, Padilla, and Maldonado 1987; Crockett et al. 2007). These sorts of stressors associated with migration have embodied consequences, and have been linked to increased severity of depression and anxiety, and elevated metabolic risk (Katsiaficas et al. 2013; Bhowmik, Cheung, and Hue 2018). Specific biological outcomes that showed biological sensitivity to migration-stress exposure include body-mass index and waist circumference, as well as blood chemistry profiles: fasting glucose, insulin, and C-reactive protein concentrations (Fang et al. 2014; Tull et al. 2003).

The cross-cutting theme is that experiences of migration increase stress reactivity and elicit behavioral changes as part of a suite of coping strategies. However, although researchers assessing migration-related stress acknowledge that navigating new foodways can be challenging for people who migrate (Guendelman, Cheryan, and Monin 2011), to date no study has directly assessed the relationship between migration-related stress and dietary change.

Summary of gaps in the literature

My research framework builds from rich anthropologies of food and eating and integrates discrete literatures on immigrants' migration stress exposure and diet change processes to measure their direct and indirect effects on health. In doing so, my dissertation study addresses three gaps in current understanding: (1) What is the effect of migration-related stress on immigrants' eating habits? (2) Does diet change influence the relationship between migration-related stress and metabolic health outcomes? And, (3) how are migration-related stress levels and diet practices impacted by the social conditions and inequities engaged in high-resource settings like Alicante, Spain?

WHY DO PEOPLE EAT WHAT THEY EAT? DEPLOYING *LOGICS OF EATING*

Before outlining the aims and techniques in my dissertation project, I would like to describe the way I conceptualize links between society, food, and health: that is, the *logics of eating*. Akin to invoking social ecologies of eating, I seek to convey that each person's idiosyncratic and fluctuating way of eating is always and absolutely entrenched in social logics. These may be deep-set logics like household dynamics or ephemeral ones like late-night cravings. One's logics of eating reflect their unique assemblage of lived and learned experiences with food, their curated process of like and dislikes, and always the material goods available to them.

Understanding the social logics of eating in a place-based context is vital for evaluating individual metrics of experiences of eating. I am, here, echoing a longstanding tenet of anthropology that sensitive and valid analysis cannot be achieved without careful and thorough examination of social context. Invoking *logics* is a way of moving beyond a tendency to exoticize or assign arbitrary value to diverse ways of eating that I encounter in my ethnographic work; akin to cultural relativism, but seeking to minimize a dependence on "culture." Participating in a global industrial food system requires navigating multiple social value systems around food and eating that do not always share consensus. For example, food scholars have pointed to dissonance between multiple ways of "eating well" (Serra-Mallol et al. 2021; Gracia-Arnaiz 2021; 2010). People who moved to Europe from a distinct foodscape in Latin America know an additional set of place-based eating logics from their birth place. In sum, I strive through my dissertation to make the argument that every person's way of eating makes complete sense when understood in the full context of their lived experience.

What influences "logics of eating" in Alicante, Spain?

Alicante is a quickly-growing coastal province that sits between the city of Valencia and southern Spain. Located at the nexus of local Mediterranean foodways, the Eurozone's global industrial system, and rising international migration, the Alicante region of Spain affords an ideal location from which to examine entangled changes to society, foodways, and health. Alicante and Spain, generally, have a large immigrant population, ostensibly good social support systems, and robust local food systems. Yet, rising popularity of Americanized fast-foods and experiences (eating on-the-go) suggest diets are changing in Spain in response to changing social norms (Méndez 2015; Gracia-Arnaiz 2022). Similar dietary transitions occurring around the globe point to the project's broad potential impact (Hawkes et al. 2012; Tovar et al. 2013).

Understanding Spain's historical and political context is crucial to interpreting dynamics in local food environments today (Leatherman and Goodman 2011). Three major events in Spain that are crucial for understanding contemporary social contexts in Alicante are a consolidated population shift in the 1990s from international emigration to immigration that doubled the country's population within a decade (Vega-Durán 2016; Hierro 2016); the economic crisis of 2008-2014; and the coronavirus pandemic crisis in 2020-2021. Unlike the rest of Western Europe, Spain's processes of globalization were heavily consolidated in the second half of the 20th century, which corresponded with the end of the Franco regime and transition to a decentralized democratic system (Hedgecoe 2015). This political shift facilitated a striking demographic shift, as, for the first time, thousands of people immigrated to Spain from countries in Latin America, Northern Africa, and Eastern Europe. Their arrival coincided with a high demand for unskilled labor during a "boom" period in the construction, services, and domestic help sectors (Gotsens et al. 2015). Concomitantly, international trade took off; the economic

sector surged with a high tide in consumerism; and Spain went through a period of cultural metamorphosis (Nichols and Song 2013).

On the heels of a boom period, the 2008 economic crisis hit Spain hard, and legacies of that hardship continue to influence policies as well as social and economic conditions for residents to this day (Hooper 2019). Within six months of the 2008 collapse, more than 1.2 million jobs had disappeared. The unemployment rate climbed from 8.3 percent in 2007 to 26 percent in 2013, preceding a corresponding hike in the number of Spaniards at risk of poverty and/or social exclusion ("EU Unemployment" 2018). The severity of the crisis on residents' livelihood and health is best-exemplified by the government's response to austerity measures imposed by the European Union. These involved a steep tax hike and cuts to wages, pensions, and benefits, including temporarily removing access to Spain's universal health care for undocumented persons living in the country (Ortiz-Miranda, Pérez, and Alegre 2016)

Finally, the Covid-19 pandemic was an unprecedented global crisis that exacerbated existing precarities and reshaped social organization. Spain had one of the most sudden and deadly Covid-19 outbreaks, peaking in April 2020 and leaving a devastating legacy of 13.7 million recorded cases (nearly 30% of the country's total population) and 119,479 deaths (Almukhtar et al. 2023). Population statistics revealed that people in Spain who had migrated from Asian, Latin American, and African countries were significantly more likely to contract Covid-19 (Guijarro et al. 2020; Aldea 2022) due to their high representation in frontline jobs, restricted access to healthcare and social support programs, and loss of income due to unemployment ("Latest Report: Registered Unemployment" 2020; "Unequal Impact of Covid-19: Spotlight on Frontline Workers, Migrants and Racial/Ethnic Minorities" 2022.; Corrado and Palumbo 2022). Emerging data find that non-European migrants are having greater difficulty

recovering from the Covid-19 crisis, and underscore steepened disparities in post-pandemic income, employment, and health measures (Aldea 2022; “Unequal Impact of Covid-19: Spotlight on Frontline Workers, Migrants and Racial/Ethnic Minorities” 2022) .

The preceding paragraphs highlight three pronounced societal changes for publics in Spain. While the latter two point to acute crisis and growing precarity (Gracia-Arnaiz 2022), Spain’s rapidity incorporating international peoples, markets, and influences makes the country a remarkable place from which to study effects of globalization on local food environments (Moreno, Sarría, and Popkin 2002). Reflexively, a critical study of food environments in Spain today can point to underlying processes that promote or constrain food access around the globe (Díez et al. 2016). Understanding why people eat what they eat is additionally important for engaging with Spanish public health research that highlights growing disparities in population health (Coveney et al. 2016; Pedrós Barnils, Eurenius, and Gustafsson 2020; “Spain Country Health Profile 2021” 2021). Recent epidemiological work in Spain notes with concern that young immigrants are the highest-risk category for obesity, hypertension, and cardiovascular disease (Antelo, Magdalena, and Reboredo 2017; Cardona 2017; Guallar-Castillón et al. 2012). Efforts to reduce these rates have pushed Spanish health research to focus on immigrants’ health-related behaviors (Marín-Guerrero et al. 2015), including eating patterns. Although this body of work aims to address and reduce health disparities, it can also have the unintended effect of increasing surveillance over immigrants’ eating habits, and suggest to pathologizing them (Briones et al. 2012; Llull et al. 2015). Through my work, I hope to offer a counter-narrative that emphasizes the social logics and innovations through which eating habits change.

In addition to historical and demographic context, it is important to review the place-based significance of examining food and eating in Alicante, a Mediterranean coastal area with

longstanding and globally-lauded culinary traditions. Studies conducted in Spain and around the world consistently link a "Mediterranean diet" and cardiovascular health (Schröder et al. 2004; León-Muñoz et al. 2012; Abellán Alemán et al. 2016). Research on this topic conducted in Spain (and other countries along the Mediterranean Sea) additionally emphasizes the local significance and tradition of this type of diet (Sofi et al. 2010; Willett et al. 1995). However, empirical studies vary in how they define and test a Mediterranean diet, as well as a participant group's adherence to it. For example, Sánchez-Villegas and colleagues' (Sánchez-Villegas et al. 2003) cross-sectional study deployed factor analysis to derive dietary patterns from food-frequency questionnaire data. This technique yielded two main patterns; the first (which emphasized fast-food) was labelled as a "Western" dietary pattern, whereas the second (which emphasized fruits and vegetables) was labelled a "Spanish-Mediterranean" dietary pattern. Deploying the same study design on a different (though comparable) population, Aranceta et al. (2003) found that factor analysis revealed five diet patterns, instead of two. Abellán Alemán et al. (2016) took a different approach entirely, opting to define the Mediterranean diet according to the national government's food pyramid, and evaluating participants' adherence to that model.

The range of possibilities for what a "Mediterranean diet" can be in Spain adds a level of difficulty when reviewing nutrition research about variation and change in Spain's food environments (I. Benazizi et al. 2019). It also poses a methodological conundrum because the benefits attributed to a Mediterranean Diet are usually positioned opposite one of two threats: that of a nutritional transition accompanying migration to Spain, or that of the "Western" diet. As I continued to see studies set up to address one of these two relationships (e.g. (Guallar-Castillón et al. 2012; León-Muñoz et al. 2012; Schröder et al. 2004), it occurred to me that they were united by their effort to detect and describe social change.

I have spent 10 years engaging with dialogues about the Mediterranean ways of eating in Spain and in the US; in papers, and in conversations over lunch. For me, pulling at the thread of what people mean when they invoke a Mediterranean diet is ceaselessly generative for evaluating the many ideologies, contradictions, and biosocial significance of food. Ortiz-Miranda and colleagues wrote in a 2016 review that, "in Spain, when it comes to the Mediterranean diet, the accent is not put on the geographical origin of products, but on what [they] are and how they combine to shape up this healthy diet." I follow-up from their point in my dissertation to ask: what are the logics of eating in Alicante?

This brings me to a theoretical distinction I make in the ensuing chapters: I approach eating in a Spanish Mediterranean province to mean eating a Mediterranean diet. My position on this is not meant to be absolute, but seeks to acknowledge the multiplicity, contradictions, and possibilities for change in what a Mediterranean diet can mean. Local foodways throughout the Mediterranean region have collectively and distinctly recalibrated throughout millennia of trade and regime change, and they continue to this day respond to changing economic systems and social attitudes (Díaz-Méndez 2014; Bilal et al. 2018). By opting for a place-based approach to Mediterranean ways of eating, I follow-up from decades of anthropological work emphasizing relativism and diversity of human dietary patterns. My approach is also pragmatic, as it avoids conflation between ways of eating in Alicante and the dietary ideals that accompany global imaginings of a "Mediterranean Diet."

DISSERTATION PROJECT OUTLINE

My research program centers food and eating in order to illuminate the social, historical, and political forces that perpetuate health inequity in high-resource settings. These forces are

norms and they can be so pervasive or implicit in our lived experiences that it is difficult to delineate and evaluate their effects. But in periods of formidable change, things like the international migration and the coronavirus pandemic, social forces are rendered more visible, and, therefore, easier to measure. In my dissertation, I incorporate culturally-validated surveys, qualitative interviews, ethnographic fieldwork, and dried blood-spot sampling to understand how migration stress influences eating practice, diet change, and metabolic health in two generations of Latinos who resettled in the Alicante region of Spain.

The project builds upon the strong partnership and research base I developed over 6 years with Dr. Elena Ronda Pérez at the University of Alicante. I started working with Dr. Ronda in 2017 on the Platform for Longitudinal Studies of Immigrant Families, or PELFI *(Plataforma de Estudios Longitudinales de Familias Inmigrantes).* Dr. Ronda co-directed PELFI, which was run through the Immigrant and Health program of Spain's Consortium for Epidemiology and Public Health Research in Spain (CIBERESP). I spent summers 2017 and 2018 conducting preliminary fieldwork on PELFI at the study's sites in Alicante and Barcelona., through which I produced an analysis of PELFI data on adolescent resilience and adult dietary change (E. Koselka et al. 2019; E. Koselka, 2019), co-wrote a review of literature linking nutrition and immigrant health in Spain (I. Benazizi et al. 2019), and interviewed university students and transnational residents about their eating habits (E. Koselka, 2018).

Questions I bring together in this project reflect my long-standing engagement with Spain, catalyzed in 2012 when I spent a year teaching middle-school youth in Madrid as a US Fulbright Scholar. My familiarity with Spanish cultural dynamics, especially my first-hand insight into peer-influences that teenagers negotiate in school, conferred rich ethnographic basis for the proposed analysis. Other prior fieldwork experiences include a mixed-methods needs

assessment of children's food security in Chicago suburbs, survey development and adaptation to explore experiences of food insecurity among university students in DeKalb, IL, and qualitative research on the bureaucratic burden of participating in federally-subsidized meal programs like SNAP and WIC. These experiences conferred nuanced understanding of the processes and challenges associated with survey development and field research techniques.

Although my original data collection plan involved 3 phases of in-person fieldwork in Alicante beginning in March 2020, the Covid-19 crisis significantly constrained what I was able to do, and irrevocably altered daily life and health for everyone involved in the study. Prior to the pandemic, I had planned my dissertation to follow-up with participants in the PELFI study, but displacements forced by the Covid-19 pandemic rendered that infeasible. With support from Dr. Ronda and the rest of my dissertation committee, I designed an established a new multi-generational cohort study with Latin American adults living in and around the city of Alicante: The Migration, Food, Stress and Health Study, or *Estudio de la Migración, la Comida, el Estrés y la Salud* (*Estudio MCES)*. *Estudio MCES* reflects over a year of study (re)design and adaptation in a step-by-step consultation with Dr. Ronda and a locally-based research assistant we hired through University of Alicante.

The majority of *Estudio MCES* used remote data collection methods (online surveys, phone and Zoom interviews, and direct mailings for self-administered dried blood-spot assays), which were necessary responses to the Covid-19 pandemic. Rather than allowing these to inhibit community-engaged work, I leveraged the public's new comfort with virtual modes of connection and in-home testing (i.e., for Covid-19) to build accessible user interfaces for participants and collaborators. I built a research website (www.estudiomces.com) for potential participants to learn about the study, review forms and materials, and meet/contact study team

members. Upon enrollment in the project, participants could opt in to receive email updates about forthcoming results and publications, and they are invited to give feedback. These efforts aim to demystify the research process and emphasize my responsibility to the people who participate.

Data collection began in May of 2021 with teleconference interviews with key informants: health researchers and community health workers in Spain and/or who specialize in immigrant health. My aim in these early interviews was to understand how the pandemic has affected immigrant communities in Spain, and I used that information to guide survey and interview questions. Over the next year and with support from Dr. Ronda and my advisor Dr. William Leonard, I onboarded a highly-skilled research assistant, concretized study protocols, validated and pre-tested all materials, and secured approval from the Northwestern University IRB (STU00214325) and the University of Alicante ethics review committee. In summer 2022, I was able to travel to Alicante for a month of in-person fieldwork ahead of launching the online questionnaire in August 2022 with a 20-member pilot group.

Recruitment for *Estudio MCES* occurred using non-probabilistic techniques (mainly convenience and snowball sampling), and reflected collaborative work between study team members and local community resource organizations for immigrant communities in Alicante. Our principal recruitment strategy was to enroll in pairs consisting of one parent and one adult child (18+ years), to enable intergenerational comparisons in addition to a full sample evaluation. Though parents and their adult children were recruited together, their enrollment and participation throughout the study was entirely individualized.

MCES used three principal strategies to collect data: an online questionnaire, self-administered dried blood spot (DBS) assays, and semi-structured interviews with a subset of 32

participants (16 parent-child pairs). Enrollment into the study occurred after potential participants completed an online screening questionnaire in Qualtrics secure survey platform ("Online Survey Software" n.d.). If they met the criteria listed above, a participant could proceed through online informed consent forms and complete the baseline survey at their desired pace. By enrolling in *Estudio MCES,* a participant consented to completing and online survey and self-administering a dried-blood spot assay. Our research assistant organized interviews with a 32-member sub-sample who had indicated at the end of the survey that they were interested in being interviewed. Remuneration occurred after each phase of completed participation with a digital gift card in the amount of 16 Euros for a completed survey; 12 Euros upon receipt of a DBS sample; and 20 Euros after completion of a 60-minute interview.

Remote methodologies we developed for *Estudio MCES* were not part of standard health research for study team members or participants prior to the coronavirus pandemic. They were selected because they minimize contact between researchers and participants in accordance with health and safety protocols following the Covid-19 pandemic, and, even so, could generate detailed data about social context, health, and idiosyncratic information about eating habits--for instance, a person's favorite foods and, "how do you describe what you eat?" As much as *Estudio MCES* is a project about biosocial connections between eating, stress, migration, and health, it is also about testing new methods for assessing those variables. The project is still open and will continue to collect data through 2024. Results presented in this dissertation focus on descriptive and formative insights that guide a forthcoming series of qualitative, narrower-scope, and mixed-methods analyses.

AIMS AND OUTLINE OF DISSERTATION CHAPTERS

The overarching aim of my dissertation is to examine the social dynamics that drive change in eating habits and migration-related stress for 2 generations of people who moved to Alicante from Latin America. Figure 1.3 depicts the model of the "logics of eating" outlining the proposed relationships among social dynamics, stress, diet, and health. The specific aims and hypotheses that I will address through subsequent dissertation chapters are listed below. They are also illustrated in Figure 1.3, the conceptual framework guiding my dissertation, which can be used as a visual reference throughout. All aims and analysis covered in this dissertation use baseline survey data from 85 MCES participants, collected between August 2022 and February 2023.

AIM 1: Conduct a thorough examination of demographic, household, financial, and occupational conditions for a multi-generational cohort of Latin American adults in order to assess post-pandemic socio-economic context for this sample.

> ***H1:*** *In the wake of the Covid-19 crisis, participants experience resource precarity, specifically evidenced by housing insecurity, financial difficulty, and job insecurity.*

AIM 2: Examine impacts of social conditions on participants' eating habits, migration-related stress exposure, and health status.

> ***H2a:*** *Fewer material assets negatively influence eating, stress, and health across multiple measures*
>
> ***H2b:*** *Conversely, more resources and social supports correlate have better health and health-related measures, i.e., less change in eating habits, better diet quality, less migration-related stress.*

AIM 3: Determine relationships between eating habits, migration-related stress, and health.

H3a*: Participants reporting less migration stress have less change in eating habits, better diet quality, and better health status.*

H3b: *Migration-related stress exposure interacts with participants' change in eating habits and/or diet quality to influence health status.*

AIM 4: Test intergenerational trends in eating habits, stress, and health using a subsample of matched parent-child pairs

H4: *Childrens' eating, migration-related stress, and health measures will differ from those of their parents, reflecting a generational shift.*

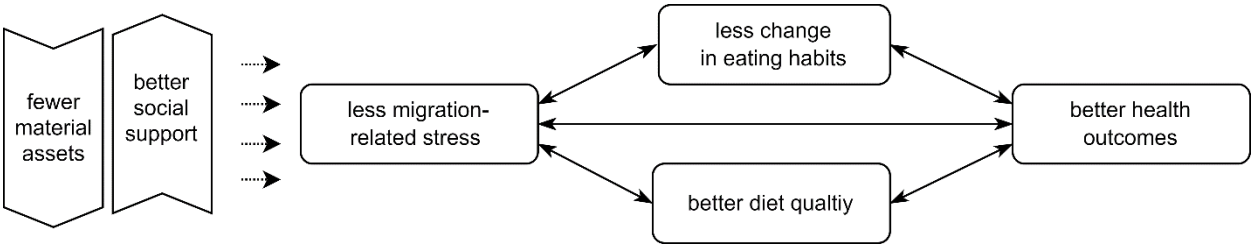


Figure 1.3. "Logics of eating" dissertation conceptual model and project hypotheses. This model predicts that fewer material assets will be associated with greater stress, and poorer dietary and health outcomes, while greater social support will be associated with less strass and better dietary and health measures. Further, the model proposes that lower stress levels will correspond with better eating habits and health, and that dietary change and/or quality intercede in the relationship between stress and health.

Over the next four chapters, I present the first series of results from *Estudio MCES* using baseline survey data. These papers introduce the study I designed and ran for my dissertation, and lay a base frame for forthcoming analyses that integrate interview, ethnographic, and bioassay data sources. Chapters 2-4 directly address each of the dissertation aims I put forward above in order, and they present detailed and context-driven results that invite future inquiry.

In Chapter 2, I describe study design, recruiting participants, and I share socio-demographic information about the survey sample. Since *Estudio MCES* was build out of prior multi-site survey research study (PELFI), I organized Chapter 2 to resemble publications by PELFI researchers that introduced the cohort project and provided sample statistics (Cayuela et al. 2017; Hernando Rovirola et al. 2017).

In Chapter 3, I describe variables used to assess eating, stress, and health among MCES participants, and I test associations between the socio-economic conditions described in Chapter 2 on these variables of interest. Referring back to my dissertation's conceptual framework, Chapter 3 focuses on the left-hand side of Figure 1.3, aiming to understand the range of material assets and social supports for this sample. Through Chapter 3, I make the case that social conditions in Alicante are uneven for MCES participants, and have differential influences on stress, eating, and health.

Chapter 4 moves to test associations between eating, stress, and health measures. These are depicted towards the center-right in my conceptual model. I interrogate the relationships between three measures of eating (dietary change, food insecurity, and diet quality), asking: what does accumulated change in eating habits mean for the other two? And, how do each of these facets of eating relate to health? I also test whether migration-related stress exposure intercedes in the relationship between eating and health, and test for intergenerational trends using a sub-sample of matched parent-child pairs. Finally, in Chapter 5, I conclude with a summary of key findings, forthcoming analyses, and directions for future work.

Chapter 2

Design and Sample Characteristics for the Migration, Food, Stress and Health Study: A Multi-generational Cohort Study in Alicante, Spain

INTRODUCTION

Each migration story is unique and hinges on one's particular assemblage of circumstances, resources, starting point, and destination (Gielis 2009; Schiller, Basch, and Blanc 1995; Wise and Velayutham 2009). Even so, a common theme threaded through migration studies is that resettlement in the global North can prove challenging (Fassin 2011; Nollenberger 2014). When people move to Europe or to the United States, they arrive to a new social system and physical environment (Hierro 2016) in nation-states that are built upon centuries of settler colonialism and violent imperialism (S. J. García 2017). Immigrants can often face discrimination and structural violence upon resettlement in these places (A. Agudelo-Suárez et al. 2009; Benson 2008; M'charek 2013).

Population disparities between health outcomes in immigrant versus non-immigrant communities reflect consequences of these sustained challenges (Sargent and Larchanché 2011). Although immigrants often experience health improvements during the first few years of settling in the United States and Europe, their health often deteriorates over time (Acevedo-Garcia et al. 2012). As such, immigrants are among the groups at highest-risk for chronic diseases like heart disease, obesity, and diabetes (Esteban-Gonzalo et al. 2015; Gualdi-Russo et al. 2014; D. A. Himmelgreen et al. 2014; Malmusi, Borrell, and Benach 2010).

Identifying leverage points to improve social and structural conditions that negatively affect these populations is a challenge for research aiming to improve livelihood and health for

immigrants and other marginalized groups. The significance of such conditions was thrown into sharp focus most recently by the coronavirus crisis. Covid-19 disproportionately affected marginalized groups (Dorn, Cooney, and Sabin 2020; Yancy 2020), and exacerbated long-existing precarities for people who had previously immigrated to Europe and the US (Alsedo 2020; Gozzer 2020; Martín 2020). Covid-19 also halted, then accelerated international migration, due in large part to the collapse and restructuring of national and international economies.

In the case of Spain, 3.8 million residents were unemployed by May 2020 ("Latest Report: Registered Unemployment" 2020), and young people and immigrants were the two most-likely groups to be dismissed from work during Covid-19 shutdowns, which continued through 2021 (Vega 2020; Gómez 2020; Rolfe and Morris 2020). Spain had one of the most sudden and deadly Covid-19 outbreaks, peaking in April 2020 and leaving a devastating legacy of 13.7 million recorded cases (nearly 30% of the country's total population) and 119,479 deaths (Almukhtar et al. 2023). Population statistics revealed that people in Spain who had migrated from Asian, Latin American, and African countries were significantly more likely to contract Covid-19 (Guijarro et al. 2020; Aldea 2022). This vulnerability was attributed to their high representation in lower-wage jobs that cannot be performed remotely ("The Unequal Impact of COVID-19: A Spotlight on Frontline Workers, Migrants and Racial/Ethnic Minorities - OECD" 2022). Frontline, lower-wage work is associated with restricted access to healthcare and social support programs in Spain, as with Europe and the US (Corrado and Palumbo 2022; Loustaunau 2021).

In short, many people who had arrived to the country for work could not find any, and they lived in more precarious conditions with higher illness risk and less healthcare. Furthermore, with loss of income came increased food insecurity (Rubio and Castilleja 2020;

Martín 2020; Velasco 2020; Congostrina 2020; Smith and Wesselbaum 2020). Emerging data find that non-European migrants are having greater difficulty recovering from the Covid-19 crisis, and underscore steepened disparities in post-pandemic income, employment, and health measures (Aldea 2022; "The Unequal Impact of COVID-19: A Spotlight on Frontline Workers, Migrants and Racial/Ethnic Minorities" n.d.) . It is perhaps unsurprising, then, that in 2023 migration to Spain flattened relative to 2020 ("INEbase / Demografía y población /Fenómenos demográficos /Estadística de migraciones / Últimos datos" n.d.). However, the international population for one Spanish province on the Mediterranean coast has never been stronger. In the wake of the pandemic, Alicante is now home to Spain's third-largest and fastest-growing international community (Diaz 2022; Pascual 2023).

Alicante, Spain: an ideal site for examining migration, food, and health

The Spanish province of Alicante is located on the Mediterranean coastline between Valencia and southern Spain. Alicante is an ideal site to explore relationships between society, food, and health because of its location at the nexus of strong industry and food production sectors, Mediterranean culinary traditions, swift economic change, and growing international attention. Although Alicante continues to have robust local food systems and a reputation as the dietary gold standard (Willett et al. 1995), nutrition studies note with concern that the number of Spanish residents maintaining a heart-healthy Mediterranean diet (Schröder et al. 2004) has dwindled (León-Muñoz et al. 2012). Recent work highlights the rising popularity of Americanized foods and eating experiences like fast-casual dining and eating "on-the-go" ("Informe del Consumo Alimentario en Espana 2018" 2019), especially among youth and immigrants (Méndez 2015; Arechavala et al. 2016). This suggests that diet changes in Spain respond to changing social norms and a broad orientation toward Americanized food systems

(Rodríguez-Mireles et al. 2018). This phenomenon reflects similar dietary transitions occurring globally (Hawkes et al. 2012; Tovar et al. 2013), which points to the potential for research this site to advance understanding of key topics in biological anthropology: experiences of migration, nutrition transitions, and human variation.

Rising rates of obesity and heart disease throughout Spain indicate negative health consequences of these diet changes. Indeed, recent epidemiological studies in Spain find that immigrants are the highest-risk category for obesity, hypertension, and cardiovascular disease (Antelo, Magdalena, and Reboredo 2017; Cardona 2017; Guallar-Castillón et al. 2012). Efforts to reduce these trends have pushed Spanish health research to focus on immigrants' health-related behaviors (Marín-Guerrero et al. 2015). An understudied consequence of this public health concern is that it has intensified the social stakes of eating in Mediterranean regions (Gracia-Arnaiz 2013; 2017). In other words, global discourse extolling the healthful properties of a Mediterranean diet heightened the significance of local food ideologies (Martínez-González et al. 2000). Proponents, ranging from the American Heart Association and the European Association for the Study of Diabetes, to *Harper's Bazaar* emphasize how the diversity of food sources and low-food-processing support optimal brain and body function, and they also locate the health significance the diet within a broader idealized Mediterranean lifestyle (Peppin 2022; Williamson 2023; *Diabetes* 2019). The Mediterranean Diet, "has become the bedrock of virtuous eating," around the world, and in Spain (Blum 2023). Messages like these are inescapable when living in Mediterranean food environment, and they can have an outsized impact on people already experiencing pressure to fit into Spanish society (Briones et al. 2012; Llull et al. 2015).

The Migration, Food, Stress & Health Study

This chapter describes the study design and sample characteristics for the Migration, Food, Stress & Health Study or *Estudio de la Migración, el Estrés, la Comida y la Salud* (MCES), which originated in 2021 and has data analysis waves continuing annually through 2024. *Estudio MCES* was established in response to significant changes that the coronavirus pandemic forced to both daily life and research protocols in Spain. These included the discontinuation of a prior longitudinal research infrastructure that had evaluated social, occupational, and structural determinants of health in 250 immigrant families from 2015-2017. (Cayuela et al. 2017; Hernando Rovirola et al. 2017). The Platform for Longitudinal Studies of Immigrant Families, or PELFI (*Plataforma de Estudios Longitudinales de Familias Inmigrantes*) examined social, structural, and environmental determinants of health, with specific emphases on work conditions, mental health, eating and nutrition.

Estudio MCES was designed as a follow-up to PELFI that endeavors to understand the social logics that influence foodways and health for people living in Alicante through the perspectives of those who immigrated there and have international comparatives. In the study's design, everyday eating habits are examined for changes required by relocating to this new context. Eating is positioned as responsive and dialogic with stress, health, and living situation. The specific objectives of *Estudio MCES* were to (1) understand social factors that exacerbate or alleviate stress exposure for immigrants in Alicante; (2) Similarly, evaluate the social logics behind why people eat what they eat; (3) Incorporate survey, interview, ethnographic, and biomarker data to examine relationships between health, eating, and stress measures among people who had immigrated to Alicante; (4) Assess impacts of the Covid-19 crisis socio-economic conditions, migration-related stress exposure, eating habits, and health.

METHODS

Recruitment, engagement, and enrollment

Recruitment for *Estudio MCES* occurred using remote techniques, and in collaboration with local organizations/stakeholders with good rapport with immigrant communities in Alicante. A local field researcher was hired through the University of Alicante to lead on-the-ground recruitment using non-probabilistic techniques, primarily convenience and snowball sampling. Our principal recruitment strategy was to enroll in pairs consisting of one parent and one adult child (18+ years), to enable intergenerational comparisons in addition to a full sample evaluation. Though parents and their adult children were recruited together, their enrollment and participation throughout the study was entirely individualized. Prior to enrollment, every potential participant completed a screening questionnaire to verify they were eighteen years or older, currently living in Spain, and born in a country in Latin America, or, for adult children, Spain. To clarify, adult children in this study may have immigrated to Spain like their parent, or they may be the first-generation born in Spain. It did not matter if parent and child shared a household, and people were included regardless of their legal status, employment, and the time of residence in Spain. The study did not include pregnant women or individuals who could not consent, since some analyses focused on metabolic indices.

Recruitment flyers and additional study information for potential participants can be accessed here: www.estudiomces.com. Drawing from this accessible information platform that was designed for potential participants, study team members used a combination of convenience and snowball sampling through four strategies. First, we collaborated with community resource groups, including by visiting these local partners and providing information to potential participants on-site. Second, participants were recruited and enrolled in parent-child pairs. The

screening question began by asking a respondent to indicate if they identify as a parent who moved to Alicante from a country in Latin America or if they identify as the child of someone who did (and may well have migrated, too). Potential participants shared contact information for their respective parent or child, who was then sent an email that invited them to participate and explained that their parent/child had completed the screening questionnaire. Third, the screening questionnaire and flyer was emailed to students enrolled at the University of Alicante. Fourth, study team members circulated the questionnaire and flyer to professional and collegial networks.

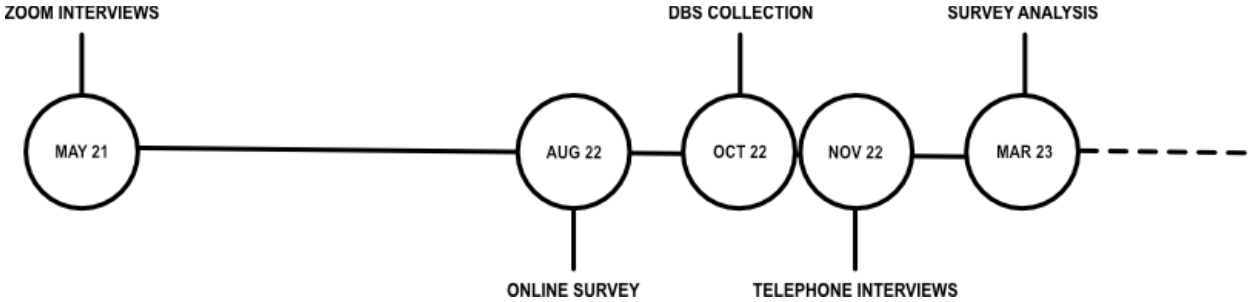


Figure 2.1. Estudio MCES began in May 2021 with interviews with 6 health researchers/workers. The online survey was deployed in August 2022, and all survey participants (n=85) were mailed dried-blood spot collection kit to compete at home in October 2022 (n=35). Interviews with 32 survey participants were conducted in November 2022.

Study design and timeline

Figure 2.1 shows the timeline for the implementation of this research. Data collection began in May of 2021 with interviews with key informants, health researchers and community health workers in Spain and/or who specialize in immigrant health, to discuss how the pandemic has affected immigrant communities in Spain. These interviews informed survey and interview questions, which were deployed beginning in August of 2022. MCES collected data using three principal strategies: a culturally-validated online questionnaire, self-administered dried blood spot assays, and semi-structured interviews with a subset of 32 participants (16 parent-child

pairs), thereby exceeding the number of interviews needed to achieve code and meaning saturation during qualitative analysis (Hennink, Kaiser, and Marconi 2017). Enrollment into the study occurred after potential participants completed an online screening questionnaire in Qualtrics secure survey platform ("Online Survey Software" n.d.). If they met the criteria listed above, a participant could proceed through online informed consent forms and complete the baseline survey at their desired pace.

As soon as a participant completed the survey, they were emailed a digital gift card to Europe's largest department store El Corte Inglés in the amount of 16 Euros. We also mailed all survey participants a dried-blood spot (DBS) collection kit to self-administer an assay at home and return it to the research team at University of Alicante. Upon receiving a completed DBS sample, we emailed the participant a second digital gift card of 12 Euros to the same department store toward any online or in-person purchase. Interview participants were selected from the survey cohort using text and email correspondence with the research assistant, and each interview participant received an additional department store digital gift card for 20 Euros. These protocols were established to recognize participant time and investment in the project and to minimize contact between researchers and participants in accordance with health and safety protocols following the Covid-19 pandemic. Throughout the rest of this chapter, all analyses and protocols will focus on participation in the online survey.

Culturally validated online survey

The baseline survey for *Estudio MCES* was administered using the Qualtrics Survey Platform, and participants could access it directly after consenting online. The survey marshaled questions from three Spain-based population health studies to collect information on migration history, financial security, current residence and household dynamics, occupation, education,

social support, and health status. Specific sources were the 2017 Spanish National Health Survey individual adult questionnaire (Cardona 2017; "ENSE Cuestionario Adulto" 2017), the Spanish Sociology Research Center's 2021 Mental Health Survey of Spaniards during the Covid-19 Pandemic (Centro de Investigaciones Sociológicas (CIS) 2021), and the baseline adult survey from the Platform for Longitudinal Studies with Immigrant Families ("Plataforma de Estudios Longitudinales de Familias Inmigrantes (PELFI) Cuestionario Adulto Principal: Basal" 2015), which was run in Alicante by MCES study team members from 2015-2017. Scale measures that had been previously validated for use with immigrant populations in Spain additionally collected data on exposure to migration-related stressors (Tomás-Sábado et al. 2007), eating habits, and nutrition (Segal-Isaacson, Wylie-Rosett, and Gans 2004), and anxiety and depression symptomologies (Rodríguez-Muñoz et al. 2020). Interviews with key informants and Alicante-based health workers were crucial during survey validation, which continued over a period of eight months of pre-testing survey measures and adapting items as needed so that they were clear and valid for our study population.

Ethics statement and data protections

Estudio MCES was approved by the Northwestern IRB (STU00214325) and the University of the Alicante Ethics Review Committee before the study launch. Although data collection procedures were remote, the study participants were living in Spain and our study therefore observed the General Data Protection Regulations (GDPR). Each participant received a subject ID number upon enrollment, which linked data sources after all identifying information was removed: survey responses, protein saver cards used for dried blood spot collection, and interview transcripts.

Statistical analysis:

Variables were characterized using descriptive statistics and examined for outliers using Stata 15 software (StataCorp 2017). Two participants' responses were removed in this process due to unreliable data. Bivariate analyses were then used to test for any differences in demographic, social-economic, and occupational variables between the two generations represented in the cohort (parents and their adult children). For categorical variables, I used the chi squared statistic, whereas I used paired student's t-test to assess generational differences in continuous variables. Next, all demographic, social-economic, and occupational variables were correlated in a matrix that used pairwise deletion, in order to assess relationships between them.

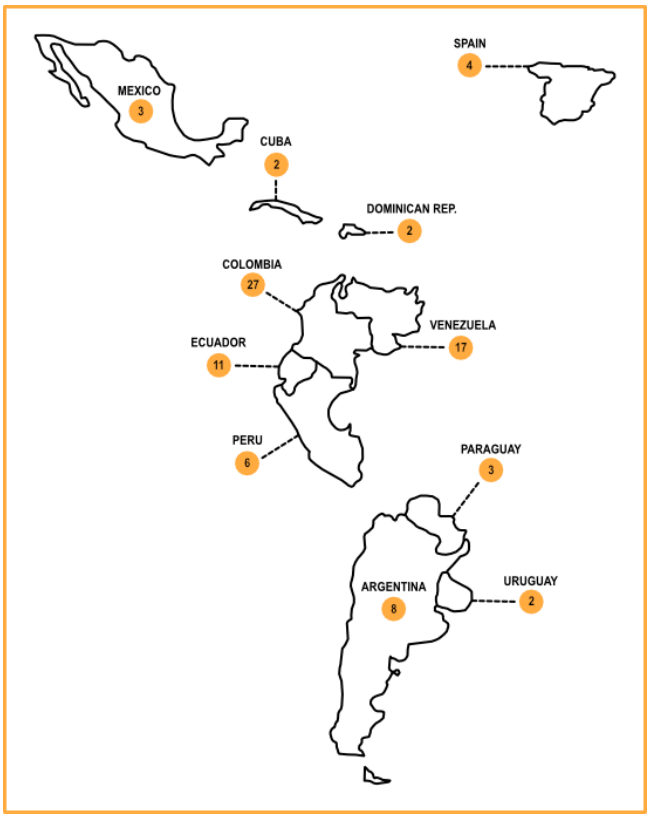


Figure 2.2. Map showing birthplace of MCES participants. Sample size for each country indicated by the corresponding number.

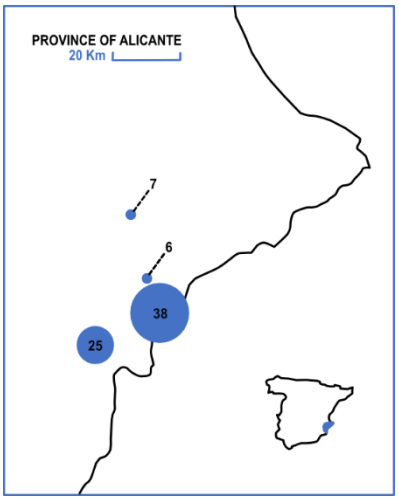


Figure 2.3. Map showing MCES participants' current residence in the Alicante province of Spain.

RESULTS

Recruitment and Retention

Two-hundred and sixteen people responded to the recruitment materials by beginning the screening questionnaire, 137 of whom completed it (63%). Twelve people were deemed ineligible for participation based on their screening responses. Detailed information about the study protocol was immediately provided to 125 people, together with online consent forms, and they were invited to enroll. One-hundred and three (82%) of those eligible enrolled in the study, and 87 of those people completed the entire survey (85%).

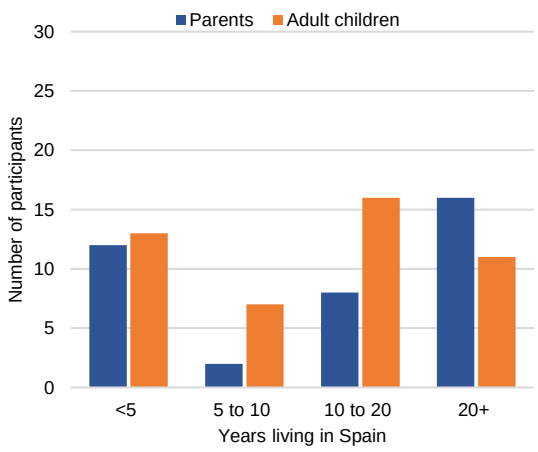


Figure 2.4. Duration (years) of residence in Spain among parents and adult children in the MCES Study.

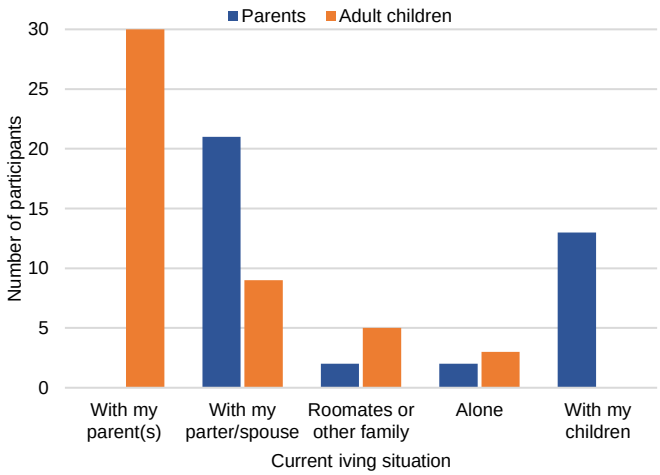


Figure 2.5. Current living situation of parents and adult children of the MCES study

Sample characteristics

In total, the MCES cohort has 85 members, 64 of whom were enrolled with their corresponding parent or child (32 matched pairs). Participation throughout all phases of the project was individualized, so although we had invited the parent or child of each participant to

enroll, there were 21 individuals whose corresponding family member did not. Thirty-seven participants identified themselves as a parent, who had moved to Alicante from a country in Latin America. Forty-eight participants identified themselves as the child of someone who migrated to Alicante, although it is worth noting that most members of the child sub-cohort were also born in Latin American countries (n=43). Figure 2.2 shows there 11 countries in this sample that are a participant's birthplace, and the most common were Colombia (n=27), Venezuela (n=17, and Ecuador (n=11). Figure 2.3 shows most participants currently live in the capital city of the Alicante province, Alicante (n=35), followed by the similarly sized neighboring city Elche (n=28), and smaller towns surrounding these two (San Vicente del Raspeig, n=6, Ibi, n=7). We observe 2 trends in this sample of length of residence in Spain, namely, under 5 years and over 10 years (see Figure 2.4).

Demographic information about participants is presented in Table 2.1. The mean age for the sample is 38.5 years. Among members of the parent sub-cohort, mean age is 52.5 years [35.1, 41.8], and among for adult children, mean age is 27.4 years [24.9, 30.00]. Seventy-six percent of participants in our sample self-identified female (65), while 20 identified male, and this is consistent between parent and child sub-cohorts. Mean household size was roughly 3 across the total sample, although the composition relationships in a household predictably differed by whether the participant identified as the parent or the child in the study (Figure 2.5). Duration of current living situation varied among participants from less than one year to five or more years. Finally, 20% of participants indicated that over the past year, they had difficulty staying in their home (n=17).

Table 2.1. Demographic information

	Total (n=85)	Parents (n=38)	Children (n=47)
Age (n=84)	38.49 [35.13, 41.80]	52.49 [49.39, 55.58]*	27.43 [24.85, 30.00]*
Gender			
Female	65	30	35
Male	20	12	8
Duration of current living situation			
<1 year	15	6	9
1 - 3 years	23	7	16
3 - 5 years	15	8	7
5+ years	32	17	15
Household size	3.27 [2.99, 3.54]	3.32 [2.88, 3.76]	3.23 [2.88, 3.56]
Housing insecurity	17	6	11

Table 2.2. Economic information

	Total	Parents	Children
Indiv monthly income (Euros) (n=64)			
<452	11	3	8
452 – 751	18	8	10
752 - 1503	33	18	15
1504+	2	1	1
Indiv annual post-tax income (n=18)	14,800 [11,258, 18,343]	13,755 [9,835, 17,676]	16,443 [8,074, 24,812]
Difficulty with Monthly expenses	50	24	26
Benefits, subsidies, or aid in past 12 months			
Unemployment,	13	3	10
Unemployment, retirement, or survivor benefits	17	7	10
School financial aid or scholarship	19	6	13
Family or medical leave	3	2	1
Government social support	5	2	3
Other	21	11	10

Table 2.4. Work conditions

	Total (n=85)	Parents (n=38)	Children (n=47)
Current occupation (n=68)[1]			
Child or family care, domestic work	8	7*	1*
Full-time employment	26	17*	9*
Part-time employment	20	6	13
Not employed	12	7	5
Written contract for employees (n=45)	35	15	20
Lost job in pandemic	17	7	10
Duration of current occupation			
<1 year	24	7*	17*
1 - 2 y	8	2*	6*
2 - 5 y	22	6*	16*
5 - 10 y	7	3	4
10+ y	17	16*	1*
Paid work hours	22.36 [18.1, 26.6]	25.70 [19.2, 32.2]	19.67 [13.9, 25.4]
Unpaid work hours	15.19 [10.9, 19.5]	18.00 [10.3, 25.7]	13.04 [8.04,18.04]
Primary occupation activity			
Seated	28	7	21
Standing	22	16	6
Strenuous	29	12	17

Table 2.3. Education

	Total (n=85)	Parents (n=38)	Children (n=47)
Completed education			
Primary studies	6	6	0
Diploma or GED	44	16	28
Professional degree	15	6	9
Bachelor's degree	15	8	7
Advanced degree	5	2	3
Additional education	58	25	33
Professional certificate	18	10	8
Language study	20	1	19*
Unemployment courses	18	11	7
Other	16	9	7
Current study			
GED course	3	1*	2*
Professional study	3	0	3*
University study	26	0	26*

* Indicates p<.05 between parent and child sub-cohorts
[1] Occupation as a current student is shown in Table 2.3 (n=32)

Table 2.2 summarizes information about participants' income and expenses. Only 64 participants provided any information about their individual monthly income, and only 18 shared their annual pre- and post-tax income. Almost all MCES participants report having a modest individual income of less than 1503 Euro per month (about $1580), with 11 reporting a very-low income of less than 452 Euros (about $475) per month. Fifty-nine percent (n=50) of the sample indicated that their household had difficulty covering expenses each month, and 58 have received

financial benefits, subsidies, or aid within the past 12 months, most commonly unemployment benefits (n=13) or school financial aid / scholarship (n=19).

Table 2.3 focuses on completed, additional, and continuing education among participants. The majority in this sample reported completing secondary school and receiving a subsidies, diploma, or GED equivalent (n=44), and 68% (n=58) reported completing additional courses, such as professional certifications (n=18), language programs (n=20; n=19 for child sub-cohort), or employee assistance programs during unemployment (n=18). There are significantly more members of the child sub-cohort who are currently enrolled students (37% of total sample), most of whom are completing university study (n=25).

Current work conditions are shown in Table 2.4. We see variability in what participants reported as their primary occupation, as well as significant differences in work type between sub-cohorts. Twenty-six work full-time, 20 work part-time, 11 are not currently employed, and 8 are engaged in child/family care or household work. Among those who were currently employed, 37 (80%) responded that they have a formal written contract, which is required to access Spain's public health and social security systems, and can reflect administrative status. Twelve of the people who are currently employed are also enrolled students. Notably, 20% of participants reported that they lost their job during the coronavirus pandemic. It is also significantly more common for participants in the parent cohort to have long-term employment than younger adults in the child cohort.

Table 2.5. Zero-order correlations (R) between demographic, economic, education, and work characteristics

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 Age																
2 Gender	.048															
3 Spain residence duration	.096	.082														
4 HH adults	-.148	-.092	-.067													
5 Living situation duration	.184	-.026	**.410***	-.045												
6 Housing insecurity	**-.215**	.139	**-.232**	-.158	-.125											
7 Individual monthly income	.142	-.077	.101	.071	**.342***	-.000										
8 HH financial difficulty	.030	.049	-.158	**.279***	-.004	**.353***	.014									
9 Benefits & aid	.014	.098	.038	-.130	-.164	-.164	-.094	.037								
10 Completed education	.012	-.115	.011	-.125	-.028	-.108	-.039	**-.345***	.077							
11 Additional study	.079	-.021	-.082	-.130	-.071	.152	.044	.016	.023	**.247**						
12 Current student	.032	-.026	.208	.231	**-.379**	**-.357**	-.136	.108	**.459***	.274	-.237					
13 Employed	.012	-.118	.135	.031	**.219**	-.024	**.546***	-.166	**-.219**	.118	-.033	-.079				
14 Written contract	**-.326**	-.111	-.015	.10	-.114	-.041	**.332**	-.248	**-.089**	.166	-.021	.311	**.746***			
15 Child, family or HH work	**.259**	.179	-.022	.162	-.002	-.161	-.113	.122	.047	-.081	.047	--	**-.326***	-.284		
16 Occupation duration	**.350***	.126	**.314***	.031	.119	**-.269**	.065	-.049	.109	.052	-.067	.242	.137	.250	**.414***	
17 Occupation activity	.097	-.097	.063	.110	-.021	-.101	**.263**	-.004	.043	.016	-.175	-.012	**.306***	**.322**	-.013	.204

Pairwise correlation coefficients in **bold** are statistically significant at p<0.5, ***** indicates p<.01.

Zero-order correlations between demographic, economic, education, and work variables are shown in Table 2.5. Age has a moderate and statistically significant negative association with housing insecurity, and correlates strongly with work conditions. Age has a strong inverse relationship with having a written work contract (r=-.326), and strong positive associations with engagement in household work or care of a child/family member (r=0.259), and duration of current occupational situation (r=0.350). These findings reflect previously observed statistical differences between the parent and child sub-cohorts for latter two variables (Table 2.4). We

observe no gender-based differences in demographic, financial, education, or occupational situation for the sample.

Duration of residence in Spain was strongly positively associated with two other time-based variables, duration of current occupation, and duration of current living situation; that is, more years living in Spain correlates with more time at current occupation (r=.314) and in current living situation (r=.410). Meanwhile, a negative association with housing insecurity was observed (r=-.232), suggesting that fewer years living in Spain correlated to higher likelihood of having difficulty staying in one's home. Housing insecurity was also correlated with less time at current occupation (r=-.269).

Individual monthly income, which had the highest missingness of any variable in the sample (n=18), nonetheless strongly correlated with duration in current living situation (r=.342). Three strong correlates were observed for household financial difficulty, rendered in these models as an ordinal variable about ease or difficulty covering all monthly expenses. Greater household financial difficulty was associated with more adults in the household (r=.279), and with experiencing housing insecurity in the past 12 months r=.353). Conversely, HH difficulty had an inverse relationship with completed level of education (r=-.345). Higher completed level of education was also directly associated with completing additional studies (r=.247), and current enrollment as a student was strongly associated with receiving financial aid, (r=459), as was previously described in Table 2.1. Student enrollment was an ordinal variable from GED programs to advanced degree, which helps to interpret two subsequent inverse relationships with housing: while being a student had a strong negative association with time at current living situation, it also reduced likelihood of experiencing housing insecurity.

Regarding work conditions: participants who were currently employed reported on average a higher individual monthly income, receiving benefits or subsidies (such as unemployment) in the past 12 months, having a written work contract, and performing greater physical activity levels at their job. Being employed also had a moderate association with longer time in current living situation (r=.219), and not engaging in care of child/family care or household work (r=-.326). Meanwhile, people who reported that their primary occupation was care of a child/family member or household work had, on average, worked in that capacity for a longer time than those with other primary occupations.

DISCUSSION

By recruiting participants in parent-child pairs, *Estudio MCES* assembled a project that can make intergenerational comparisons and begin to explore processes and changes over time. Assembling a multi-generational cohort through primarily digital recruitment strategies was a formidable challenge, but descriptive results presented here suggest its importance for understanding the social realities of people who moved to Spain, and building a case for stronger support. Attrition during the screening and consent process was a primary challenge our study experienced with participant recruitment. Communications that study team members had with people who did not complete the screening questionnaire revealed concerns about payment and data protections that we did not expect. Namely, the officialness of our university affiliation and our emphasis on transparency, including detailed and repeated explanations of how data are protected in the study, appears to have put people off participating. Financial remuneration, in the form of a digital gift card, in thanks for participants' time, was also met with skepticism. That said, participants who completed the study protocols expressed satisfaction with the ease of

online consent, survey questions, and digital payment receipt in follow-up communications with study team members. Importantly, when asked in the baseline survey if they would like to receive future communications about study findings and/or offer feedback on forthcoming publications, including this one, 73 people (86% of the sample) said yes. Holding space for continued participant engagement in MCES is a crucial step toward building strong coalitions that can mobilize support for immigrant communities in Alicante. Moreover, sharing findings with the people whom the work is about and asking what they think is a critical way to improve project results (B. O. Reyes 2023). Investments such as these strive to demystify the research process and emphasize our responsibility to the people who participate (B. Reyes 2021; Reardon and TallBear 2012).

Building from Braveman and colleagues' argument for a comprehensive, transparent description of socio-economic status that considers plausible explanatory pathways (Braveman et al. 2005), I focused this chapter on multiple domains around living situation, monies, work, and education. Vallejo et al. took a similar approach evaluating perceived stress and SES in a national sample of Spanish adults, and found differential relationships between PSS-4 and sex, age, nationality, education, parental status (Vallejo et al. 2018). Socio-economic status is a necessarily multi-faceted concept, and results presented here contribute evidence that one SES measure does not adequately represent the full story, and ignores interesting relationships between domains. This point was made by Galobardes and colleagues in their 2001 study testing independent and additive effects of education versus occupation on diet (Galobardes, Morabia, and Bernstein 2001)

An in-depth approach to SES affords greater insight about local contexts that my subsequent work will draw from, particularly for interpreting health and health-related processes.

The four domains presented in Tables 2.1-2.4 were selected based on prior work assessing social and structural determinants of health (E. Goodman 1999; Marmot et al. 2008; Pérez et al. 2012; Adler, Glymour, and Fielding 2016). Results showed strong associations between demographic, economic variables, and work-related variables, and less-consistent correlations between those three and education.

Participants were least likely to provide information on their income, which is consistent with prior findings that missingness in income data categories is notable and growing. Some plausible reasons for this are: participants are reluctant to share income information because people consider it especially important for interpreting social class and standing—people with lower incomes may not want to share information that reflects badly on them, or may wish to avoid feelings of shame that reporting brings up (Barcelo 2008). It is also possible that participants do not know precise income information. This information is not often known even among members who share a household, and it is possible that participants may not be ready or able to access their annual income amount (Davern et al. 2005) As income is underreported by MCES participants, the missing data and smaller samples may help to explain why income was not as strong a correlate in the matrix as experienced financial difficulty each month.

The observation that higher level of education is associated with less financial difficulty in the household is consistent with population research on socio-economic status (Operario, Adler, and Williams 2004; Winkleby et al. 1992). However, findings presented here suggest that completed level of education should not be used as a proxy for SES in the MCES sample, and underscore the need for a multi-variate approach to assess socio-economic context in any sample group. Education had no association with work conditions, for example, whereas demographic, household, and financial conditions did. Researchers have previously demonstrated non-

recognition of education credentials earned by people who immigrated to live in the Global North, including in Spain. A qualitative project with Latin American women in Spain noted that, although women's educational levels were either medium or high, their labor opportunities were limited because they faced barriers in validating foreign degrees or broadening educational credentials in Spain. Given some of the demographic similarities between that study and this one, it is plausible that completed level of education for this sample may be underreported. Another consideration is that education may not correlate with job and economic opportunity because distinct bureaucratic and administrative/legal barriers prevent those opportunities for people migrating to the Global North.

What is striking about the correlation analysis in Table 2.5 are the multiple pathways it displays that support or erode security for MCES cohort members. In other words, the matrix is large out of necessity. It seeks to display multiple concurrent relationships between a suite of social conditions that shape lived experiences. For the MCES cohort, no single financial or work-based factor emerged as having a stronger relationship to other social conditions. Nonetheless, Table 2.2 shows a few formative trends that assist in identifying the root causes for socio-economic disparities in Alicante. As one example, all duration-based variables show strong correlation with one another: these are duration of residence in Spain, duration of current living situation, and duration of current employment. This cluster demonstrates the security afforded by continued residence and integration in Spain, and thus also reflects that that securing a stable livelihood in Alicante takes years. Table 2.2 also shows that financial and work-based conditions variables tend to correlate. From observing these multiple correlations, the table parses out how employment significantly improves access to crucial economic and social supports. Being employed is strongly associated with a longer time in one's current living situation (echoing the

point above), and predicts more than half of the variation in income (r=.546, p=.00). Employment also significantly increases receipt of benefits, subsidies, or financial aid, and in this sample, most of the participants who were employed had a written work contract, which affords access to Spain's public health and social security systems. In Spain, only documented legal residents can obtain a formal written work contract in Spain. Having one thus proxies a major stabilizing force for people who migrated to Alicante: not only is there no threat of the rupture of deportation, there is also access to crucial government systems for social and health care. Finally, of all the variables considered here, housing insecurity had the most far-reaching reverberations across all four demographic, economic, education, and work-related domains. People who had difficulty staying in their home were more likely to be younger, students, experienced month-to-month financial difficulty, and been in their current occupation for less time.

CONCLUSION

Estudio MCES was established with the overarching goal of improving visibility to support the diverse experiences Latinos have in the Alicante region, especially around stress, eating, and health. This chapter introduced the MCES study design and sample characteristics, and described trends across and between two generations of adults: older adults who identified themselves as a parent who had moved to Alicante from a country in Central or South America, and younger adults identifying as their children, most of whom had immigrated as well. Baseline results from survey data presented here set a strong foundation for continued and mixed-methods analysis that seeks to elucidate biosocial pathways to health equity in the global North.

Chapter 3

How do social conditions in Alicante, Spain affect stress, health, and eating habits for Latin Americans living there?

INTRODUCTION

Biological anthropologists have long been interested in how diet shapes physiological variation. Moving from a core focus on the evolutionary significance of human dietary diversity (Hrdy 2007; Leonard and Robertson 1994), more recent biocultural work grappled with health consequences of the "nutrition transition," in which highly-processed, nutrient-poor foods originating in American fast food culture supplant local food systems around the globe (A. H. Goodman and Leatherman 1998; Popkin, Adair, and Ng 2012). Subsequent studies trace parallels between increased social inequality and widening disparities in nutrition quality and health outcomes. Indeed, the syndemic relationship between Americanized food systems, social marginalization, and poor nutrition is considered a driving force behind rising rates of obesity and other chronic conditions around the globe (Brooks, Simpson, and Raubenheimer 2010; Wells 2012; Simpson and Raubenheimer 2012; Alcock, Franklin, and Kuzawa 2012).

In high-resource countries like Europe, marginalized groups including People of Color (POC) and immigrants are most likely to have to adapt to poor diets for two reasons: inaccessibility and marketing (Alvidrez et al. 2019). Healthy foods usually cost more, so many people from historically marginalized groups do not have the money for a healthy diet (Rao et al. 2013). This inequity builds from longstanding structural racism that perpetuates a pay gap for POC and immigrants(Odoms-Young 2018). In addition, highly-processed, nutrient-poor foods are often strategically marketed to low-income communities (Luan, Minaker, and Law 2016). As

a result, marginalized groups are most likely to experience the negative associated health outcomes, such as diabetes, obesity, heart disease and similar conditions (Bailey et al. 2017).

The Alicante province on Spain's Mediterranean coastline affords an ideal location from which to examine the impact of social conditions on foodways and health inequality. Home to the country's third-largest and fastest-growing international community (Diaz 2022; Pascual 2023), this is a densely-populated region with ostensibly good social support systems, and robust local food and health systems (Schröder et al. 2004; Díaz-Méndez 2014; Rinken 2023).

However, prior work in Spain and throughout the Global North has emphasized the deepening inequity in population health outcomes due to entrenched sexism, classism, and racism in our societies (Avanzas, Pascual, and Moris 2017; Bartoll et al. 2014; Malmusi, Borrell, and Benach 2010). Health research studies, including some conducted in Alicante, attribute observed poor health and health disparities to social barriers like discrimination, low wages, and workplace hazards that migrated and marginalized people disproportionately experience (Agudelo-Suárez et al. 2010; 2011; Pérez et al. 2012). For people from countries in Central and South America, moving to Spain has distinct bureaucratic and discriminatory challenges underwritten by five centuries of settler-colonial and imperial policies (García 2017; Agudelo-Suárez et al. 2009) . Recognizing the significance of these legacies, a thorough examination of social conditions in Alicante is vital to understanding the health of the people who migrated to live there today.

The Migration, Food, Stress, and Health Study (*Estudio de la Migración, la Comida, el Estrés y la Salud,* or MCES) is a multi-phase observational study with 2 generations of people who moved from countries in Central and South America to live in the Alicante province of Sapin. *Estudio MCES* seeks to understand experiences of stress that accompany migration to

Alicante, with the specific aim to identify place-based social conditions that alleviate or exacerbate those stressors. By working with a multi-generational cohort of Latin Americans who live in Alicante, *Estudio MCES* can examine foodways in Alicante from their comparative perspective, and it can also assess eating and stress reactivity that occurs after the major change of migrating to Spain. This Chapter uses baseline survey data aim to examine impacts of social conditions on participants' eating habits, migration-related stress exposure, and health status. Recognizing the heterogenous conditions among MCES participants that I described in Chapter 2, here I seek to evaluate which conditions most prominently influence their health. Overall, I expect that fewer material assets will show negative consequences across multiple health and health-related measures, whereas more resources and social supports will correlate with less change in eating habits, better diet quality, less migration-related stress.

METHODS

This chapter characterizes the social and economic context for interpreting eating variables, and measures of stress and health for participating adults in the Migration, Food, Stress & Health Study, or *Estudio MCES: la Migración, la Comida, el Estrés y la Salud*. *Estudio MCES* is a prospective cohort study that began in 2021 with two generations of adults who moved from countries in Latin America and resettled in the Alicante province of Spain. Baseline survey data used in my analysis was collected over a six-month period from September 2022 through February 2023. The full study design and sample characteristics are detailed in Chapter 2. In brief, adults who had immigrated to Spain from a country in Latin America were invited to participate in a mixed-methods study about their experiences and specifically those around food, stress, and health. Participating adults (18+ years) were recruited as parent-child pairs beginning

in July 2022 in order to make inter-generational comparisons. Nonetheless, participation in the study was individualized and consisted of an online survey and a self-administered dried-blood spot assay kit mailed directly to/from participants to complete at home and return. The resulting sample has 85 adults, 37 of whom identified as a parent who immigrated to Spain from a country in Central or South America, and 48 who identified as the child of someone who had immigrated, although 92% of the child sub-cohort had also immigrated. Sixty-five participants (76%) self-identified their gender female, and this was consistent between generational sub-cohorts.

To evaluate social and economic intermediaries of health for the MCES cohort, I selected four sets of variables that assess (1) the living situation in Alicante, (2) finances, (3) education, and (4) work conditions. Living situation is evaluated using 3 measures: duration of residence in Spain, duration of current household living situation, and difficulty staying in their home over the past 12 months (housing insecurity). Finances are assessed using individual monthly income, month-to-month financial difficulty for the household, and receipt of benefits, subsidies, or aid in the past 12 months. Three dimensions of education were selected: highest completed degree, completion of additional study, and current student enrollment. Work conditions considered were employment, being engaged in child/family care or household work, duration of current occupation, and occupational physical activity. Those who had responded on the survey that they were employed were subsequently asked if they had a formal written contract, which reflects administrative status and proxies access to Spain's public health and social security systems since only documented legal residents can obtain a formal written work contract.

Eating, stress, and health variables of interest

Change in eating habits: Five survey questions asked participants about changes in what they eat now compared to (1) their childhood, (2) their parent's diet, (3) their birth country (or

their parent's, as applicable), (4) what they ate before the pandemic, and (5) what they ate during the pandemic. While items 1, 4, and 5 were dichotomous (yes or no), asking participants to describe what they eat now is different from those reference points, item 2 asked participants to rate how different their diet is from that of their parents from 0 (no difference) to 4 (totally different). Item 3 asked participants how often each week they eat a meal typical of their birthplace (or that of their parents, when applicable), and responses ranged from all the time, once a day, every other day, once a week, or never (scored 0-4). Responses from these 5 questions were summed to produce a diet change score, reflecting a magnitude of change or instability in eating habits through time and place. Internal reliability for this measure, measured using Cronbach's alpha, was found to be acceptable at 0.61.

Food insecurity data was collected as part of assessing participants' current diet quality, and measured using the Food Insecurity Experiences Scale (FIES) for individuals. The FIES is an 8-item tool that focuses on self-reported food-related behaviors and experiences associated with increasing difficulties in accessing food (FIES | WHO 2013). Using data analysis protocols from the UN Food and Agriculture Organization, I found the Rasch reliability coefficient for the FIES in the MCES cohort was .75, exceeding acceptable fit thresholds for scale use and comparative analyses ("Analyse the Data | Voices of the Hungry | Food and Agriculture Organization of the United Nations" n.d.).

Diet quality was assessed by summing responses to the first 13 questions of the Rapid Eating Assessment for Participants (REAP-s) short-form questionnaire, completed for the previous 2 weeks' intake (Johnston et al. 2018). Questions began, "in your daily life, over the course of a week, how often do you…" and continued by asking about skipping breakfast, eating less than 2 servings of fruit or vegetables, and eating carryout or at restaurants 4 or more times.

Likert-type scale responses were ‘Usually/Often’ (1 point), ‘Sometimes’ (2 points), and ‘Rarely/Never’ (3 points) (Segal-Isaacson, Wylie-Rosett, and Gans 2004), and possible scores ranged from 13 to 39 with a higher score indicating a higher diet quality.

Migration-related stress was measured using the Barcelona Immigration Stress Scale (BISS) (Tomás-Sábado et al. 2007), a 42-item instrument developed specifically for use with Latinos in Spain’s northern Mediterranean region, focusing on themes of perceived discrimination, intercultural contact stress, and general psychosocial stress (Qureshi et al. 2008). Participants respond to BISS items on a Likert-like scale from 1 (strongly disagree) to 5 (strongly agree): higher scores indicate greater migration-related stress (Revollo et al. 2011). After consulting with BISS scale authors, *Estudio MCES* study offered the additional option for participants to respond “Don’t know / Not applicable” to each scale question, which was scored 0. The internal consistency in our sample was measured using Cronbach’s alpha and was shown to be very good ($\alpha = 0.93$), consistent with prior work, e.g.,.(Borho et al. 2021).

Social support was measured using a ten-item inventory from the 2017 Spanish National Health Survey that asks participants 5-point Likert-scale questions such as, “I have people who care about what happens to me,” and “I receive useful advice when an important event occurs in my life.” These items focus on perceptions of interpersonal, emotional support received from people and communities, and higher scores correspond to greater social support. (“ENSE Cuestionario Adulto” 2017).

Mental health was assessed using the short-form version of the Patient Health Questionnaire, a 4-item scale that is widely used and well-validated for evaluating mental health, including in previous studies in Spain with adult populations (Muñoz-Navarro et al. 2017; Rodríguez-Muñoz et al. 2020). The PHQ-4 is an ultra-brief composite measure that takes the first

two questions from the PHQ-8 and the first two questions from the General Anxiety Disorder-7 inventory to efficiently measure depression and anxiety, respectively. Total score is determined by adding together the scores of each of the 4 items. Scores range from 0 to 12 and are categorized as follows: normal (0-2), mild (3-5), moderate (6-8), and severe (9-12). Additionally, a total score of 3 or greater on the first 2 questions on the PHQ-4 suggests anxiety and a total score ≥3 for last 2 questions suggests depression (Kroenke et al. 2009).

Physical health was assessed using a question from the Spanish National Health Survey about perceived general health status over the past month ("ENSE Cuestionario Adulto" 2017; Malmusi, Borrell, and Benach 2010). Participants also reported measures of current height and weight, which I used to calculate body mass index (BMI; kg/m^2).

Finally, five measures of health-related behavior were included to contextualize associations between the variables listed above: average sleep hours each night, alcohol consumption, smoking frequency, and physical activity at primary occupation (Cardona 2017; "Plataforma de Estudios Longitudinales de Familias Inmigrantes (PELFI) Cuestionario Adulto Principal: Basal" 2015).

Statistical analysis

Using Stata 15 software (StataCorp 2017), variables were characterized using descriptive statistics and examined for outliers, through which 2 observations were dropped. Descriptive statistics for FIES questions were performed using online app-based software provided through the United Nations platform Voices of the Hungry ("Analyse the Data | Voices of the Hungry | Food and Agriculture Organization of the United Nations" n.d.). Bivariate analyses were then used to identify correlations between socio-economic variables (e.g., work conditions, social support), all study variables of interest, and health-related behaviors (e.g., sleep hours,

smoking). Regression models were then run for three main outcomes of interest: migration-related stress exposure, change in eating habits, and self-reported health.

Table 3.1. Descriptive statistics for dietary and health variables for men and women of the *MCES* study

	Frequency or Mean (sd)			Range
	Total sample	Females	Males	
Change in eating habits	6.33 (3.01)	6.42 (2.99)	6.05 (3.12)	0 - 14
From childhood	53	39	14	0, 2
From parent	1.71 (1.2)	1.62 (1.14)	2 (1.35)	0 - 4
From birth country	2.94 (1.0)	3 (.98)	2.75 (1.07)	0 - 4
From pre-pandemic	14	13	1	0, 2
From pandemic	27	21	6	0, 2
Food insecurity score	1.86 (2.11)	1.99 (2.08)	1.45 (2.19)	0 – 8
Mod-severe food insecurity	15	11	4	
Diet quality	27.26 (4.01)	27.11 (4.20)	27.75 (3.35)	13 - 39
Migration-related stress	66.72 (19.31)	67.77 (19.56)	63.3 (18.51)	0 – 118
Social & emotional support	27.23 (8.0)	28.22 (7.85)	26.15 (8.47)	0 – 40
BMI kg/m²	26.13 (4.44)	25.88 (4.38)	26.90 (4.67)	17.92 - 37.18
Weight (kg) n=84	68.84 (13.07)	66.06 (12.07)*	77.73 (12.41)*	46 - 104
Height (m) n=84	1.62 (.08)	1.6 (.06)*	1.7 (.08)*	1.38 - 1.82
Self-report health	3.71 (.82)	3.55 (.75)*	4.25 (.79)*	0 – 5
Bad	4	4*	0*	
Regular	28	24*	4*	
Good	39	32*	7*	
Very good	13	4*	9*	
Mental health (PHQ-4)	3.39 (3.08)	3.68 (3.04)	2.45 (3.09)	0 – 12
Anxiety	20	17	3	
Depression	16	13	3	
Sleep hours	7.11 (1.1)	7.11 (1.1)	7.1 (1.39)	5 - 10.5
Smoking (n=84)				
Lifelong non-smoker	67	52	15	
Prior smoker	12	9	3	
Current smoker	4	2	2	
Alcohol frequency (n=84)				
<1 drink per month	29	24	5	
1-3 drinks per month	30	22	8	
1-2 drinks per week	16	12	4	
3+ drinks per week	9	6	3	
Physical activity (n=79)				
Low	28	22	6	
Medium	22	18	4	
High	29	20	9	
Desire to eat more healthfully	66	54*	12*	

For continuous variables, participant means are listed, with standard deviations in parentheses. Frequencies are reported for categorical variables. * indicates differences are significant at p<.05, tested using chi square statistic or paired t-test.

RESULTS

Full descriptive statistics about socio-economic factors in the MCES cohort are detailed in Chapter 2. Here, Table 3.1 shows participant frequencies and means for the study's main

variables of interest: migration-related stress, eating practice, and health. These descriptive statistics are separated by self-identified gender (all participants responded male or female) and health-related behaviors are also shown at the bottom of Table 3.1 for additional context about the sample. MCES participants had a magnitude of dietary change from 0-14 in the sample averaged 6.33 (3.01). For items within the summary index score, 53 participants (62%) reported eating differently from how they ate growing up. Asked how different their diet was from that of their parent(s), participants' responses averaged 1.71 out of 4 (sd=1.2). Most participants (n=45) reported eating a meal typical in their birthplace 1-3 times each week, and 23 reported that none of their meals were ones typical in their birthplace. Whereas only 14 participants recalled that what they eat now is different from what they were eating before the Covid-19 pandemic, 27 noticed that their eating habits now are different than they were during the pandemic. Fifty-five participants (65%) had experienced food insecurity in the past 12 months, and of that number, 15 reported experiences of moderate-to-severe food insecurity, meaning a FIES score of at least 4. The MCES had a mean diet quality score on the REAPs of 27.26 (4.01) on a scale between 13-39. This score is about five points lower than the base comparison established by Johnston et al. in a 2018 validation study with US adults (Johnston et al. 2018).

Participants' self-reported weight and height had means of 68.84 kg (sd = 13.07 kg) and 1.62m (sd = .08m), respectively, and BMIs calculated from their self-report values averaged 26.13 kg/m^2 (sd = 4.44 kg/m^2). There were significant differences by gender for height and weight, but not BMI. Sixty-one percent of participants (n=52) reported that their health was good or very good, and responses to this question differed significantly by gender ($p<.01$), such that males, on average, reported better health than females. The mean score on the PHQ-4 was 3.39 (sd=3.08) out of 12, categorized as mild anxiety and depression symptomologies. When

evaluated categorically, responses on the PHQ-4 indicate 37% of the participants (n=31) experience mild (score of 3-5) anxiety and depression symptoms, and 19% of participants (n=16) experience moderate-to-severe symptoms (score ≥4). Scores on the first two scale items suggest that 20 MCES participants have anxiety approaching a clinical threshold and 16 members of the cohort experience depression. Although on average, male participants reported a lower PHQ-4 score of 2.45 (sd=3.09) compared to female participants (mean=3.68, sd=3.04), no statistical differences were observed for PHQ-4 scores between genders, or for those reporting clinical thresholds for anxiety or depression.

Regarding health-related behaviors, participants reported an average of 7.1 hours of sleep each night. Only 16 participants (19%) reported that they had ever smoked, and frequency of alcohol consumption was similarly low: 69% of participants (n=59) reported having only 3 drinks or fewer over the past month. Physical activity was assessed using a question about primary physical position and activity in one's occupation. Twenty-eight participants reported low levels of physical activity (primarily seated), 22 reported medium physical activity (standing or walking), and 29 reported high physical activity level from hauling or carrying. No gender-based differences were observed for any of the above health-related behaviors. However, a significantly higher proportion of participants who identify as female attested that they are invested in making changes to eat more healthfully (n=54), compared to males (n=12). In total, 78% of the MCES cohort (n=66) expressed their investment to eat more healthfully.

Table 3.2 Comparison between REAP-s scores for Estudio MCES with other study sample groups

	Location	Sample Population	Sample size	Mean ± sd	Validation
Segal-Isaacson et al. 2004	US	Medical students	110	*not reported*	Block 1998 FFQ
Johnston et al. 2018	US	Healthy US adults with plant-based or omnivorous diet	81	33.6±3.1	HEI-2010
Johnston et al. 2018[1]	*US*	*Healthy US adults with* ***omnivorous diet***	*27*	*31.8±3.1*	*HEI-2010*
Mayra et al. 2019	US	University campus population with plant-based or omnivorous diet	33	37.75±1.75	
Devereaux et al. 2021	US	Health services graduate students	77	29.45±3.67	
Lam et al. 2021	US	New York Firefighters in the World Trade Center Health Program	4,015	29.46±4.22	
Gardea Resendez et al. 2022	US, Chile, Mexico	Adults with Bipolar Disorder	734	27.6±4.9	
Estudio MCES	Spain	Latin America adults	85	27.26±4.01	

*Johnston et al. 2018 included participants with omnivorous, vegetarian, and vegan diets, and reported a total sample mean of 33.6±3.1. After discussing notable differences in REAP-s score between the 3 groups, authors concluded that the REAP-s score for the omnivorous diet pattern group, 31.8±3.1, could be used as reference score for comparison in future studies.

Table 3.2 compares REAP-s scores for MCES participants with those of other sample populations based mainly in the US. Diet quality in the MCES cohort was scored at 27.26 ±4.01 using the REAP-s questionnaire, which is 5 points lower than the reference score of 32 established by (Johnston et al. 2018). Findings from specific items on the questionnaire are helpful for interpreting what a cumulative score on REAP-s represents: 42% of MCES participants (n=36) said that they typically eat less than 2 portions of fruit per day; 45% (n=38) report that they usually eat less than 2 portions of vegetables per day; 58% of respondents (n=50) report eating more than one serving of white or red meat per day; and 71% (n=61) report rarely drinking artificially-sweetened drinks.

Estudio MCES is the first study to my knowledge to use the REAPS questionnaire with a population in Spain. Results of prior validation studies found similar diet quality scores to those of our sample, and reflect growing popularity of the REAP-s questionnaire, which is a short and user-friendly dietary assessment developed to assist clinicians in assessing patients nutrition

(Gans et al. 2003). In a recent multi-site study with 734 adults in the US, Chile, and Mexico, mean REAP-s score was 27.6±4.9 (Gardea-Resendez et al. 2022). Devereaux et al. (2021) found a sample mean of 29.45±3.67 in a US sample of graduate students, and Johnston et al. (Johnston et al. 2018) found a mean score of 33.6 ± 3.1 among a healthy cohort of adults with either a vegetarian, vegan, or omnivorous diet. Johnston and colleagues additionally found that the REAP-s correlates strongly with the Healthy Eating Index (HEI) 2010 scores and four other diet-quality measures. The HEI are well-established as a valid and reliable diet-quality indicator that uses a dietary recall survey (as opposed to a food-frequency questionnaire like REAP-s) to assess adherence to the Dietary Guidelines of America. Through their validation with the HEI-2010, Johnston et al. concluded that the REAP-s score for the omnivores in their study, 31.8±3.1, could be used as a reference population in future work.

Table 3.3. Zero-order correlations (r) between socio-economic and health measures

	Dietary change	FIES	REAPs	BISS	Social support	BMI	Gen health	PHQ-4	Sleep hours	Smoking	Alcohol	Physical activity	Desire to improve eating
Age	-.073	-.150	.077	-.022	-.069	.194	-.081	**-.289***	-.045	-.033	.001	.097	-.203
Gender	.053	.108	-.068	.099	.110	-.098	**-.370***	.170	.004	.093	-.109	-.097	**-.255**
Dur residence in Spain	.014	-.097	-.175	**-.260**	.120	-.036	-.081	-.162	.143	.106	-.180	.063	-.078
HH adults	**-.223**	.010	.063	.070	-.138	.144	-.118	**.219**	-.112	-.046	-.007	.110	-.054
Dur current living situation	-.010	**-.216**	**-.251**	**-.311***	.153	.106	-.022	-.181	.097	.012	.034	-.021	.030
Housing insecurity	.176	**.413***	-.069	**.251**	-.194	.115	**-.241**	**.254**	-.089	-.034	-.000	-.102	-.131
Indiv monthly income	-.074	-.089	-.155	-.055	-.005	.198	.012	.100	-.204	.186	.169	**.263**	-.110
Financial difficulty	.059	**.506***	-.119	**.361***	**-.282***	**.366***	**-.321***	**.466***	-.132	.037	.125	-.004	-.185
Benefits & aid	-.015	-.058	**.235**	-.023	-.046	-.049	.009	-.125	-.014	.045	-.117	.043	.091
Completed education	-.002	-.089	.168	-.211	.092	-.141	.048	-.092	-.112	.079	-.025	.016	.003
Additional study	.004	-.010	.032	.089	-.087	.108	-.045	.087	.183	.021	.068	-.175	-.124
Current student	-.030	-.049	-.030	.150	-.006	-.050	-.100	.039	-.069	.040	.249	-.012	.012
Employed	.075	-.044	-.088	.044	-.147	.043	-.088	-.102	-.152	.138	.036	**.306***	-.004
Written contract	.026	.167	.094	.062	.010	.052	-.136	.249	-.157	.131	-.106	**.322**	.130
Child, family, or HH work	.026	.022	.171	.032	-.025	**.217**	.014	-.159	-.106	.082	.022	-.013	-.075
Dur current occupation	-.061	-.005	.139	-.010	-.051	.149	-.095	-.171	-.083	.169	**-.219**	.204	.021

Pairwise correlation coefficients in **bold** are statistically significant at p<0.5, * indicates p<.01.

Pairwise correlations between socio-economic variables (at left) and health measures (columns) are shown in Table 3.3, with statistically significant relationships (p<.05) noted in bold. The strongest socio-economic influences for eating, stress, and health outcomes were month-to-month household financial difficulty housing insecurity in the past 12 months. Whereas number of adults in the household had a moderate negative correlation to change or inconsistency in eating habits (r=-.223), food insecurity scores were more strongly associated with two measures of financial security: experiencing housing insecurity (r=.413) and difficulty covering all expenses each month (r=.506).

These same associations are rendered in the coefficient plots shown in Figures 3.1 and 3.2, which display bivariate regressions of socio-economic factors on eating change and food insecurity, respectively. OLS regression tests found that number of household adults predicted 5% of the variation in dietary change scores (b=-.64±.31, p=.04). Regression tests also clarified that experiencing housing insecurity over the past 12 months predicted higher food insecurity scores (2.16±.52, p=.00). There was strong association between greater financial difficulty and greater food insecurity (.86x±.16, p=.00). More time in one's current living situation was moderately correlated with both greater food insecurity experience (r=-.216) and lower diet quality (r=0.251). Diet quality scores were also positively associated with receiving benefits, subsidies, or financial aid in the past year (r=.235).

Table 3.3 and Figure 3.3 show that migration-related stress exposure is highly-sensitive to living and financial contexts, with statistically significant associations to the duration of participant's residence in Spain (r=-.26, b=-3.93±1.6), duration of their current living situation in Alicante (r=-.311, b=-4.38±1.47), housing insecurity over the past year (r=.251, b=12.04±5.1), and financial difficulty making ends meet each month (r=,361, b=6.62±1.59).

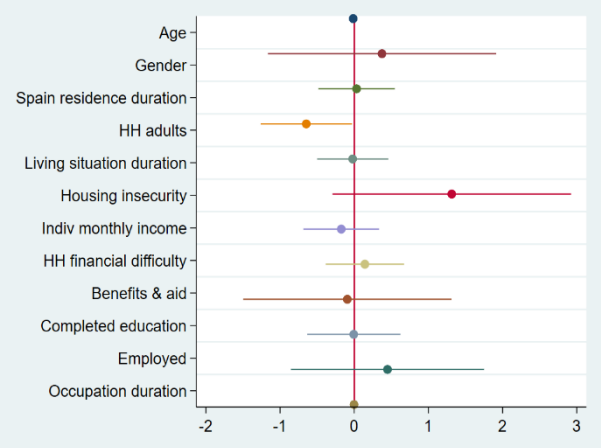


Figure 3.1. Regression coefficients and confidence intervals for socio-economic variables (left) regressed on dietary change

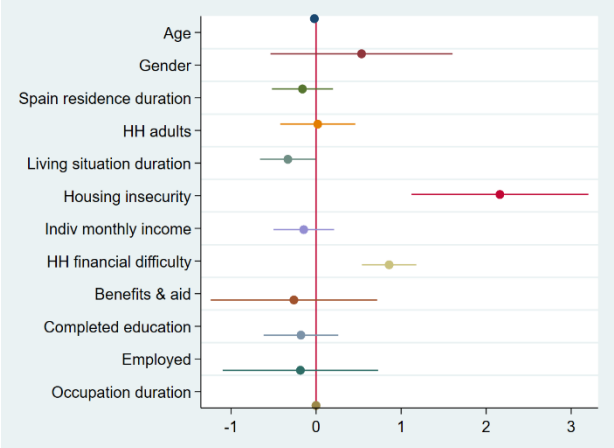


Figure 3.2. Regression coefficients and confidence intervals for socio-economic variables (left) regressed on food insecurity sum score.

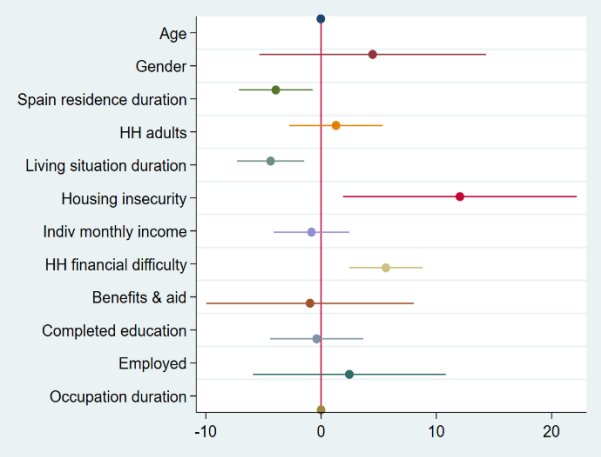


Figure 3.3. Regression coefficients and confidence intervals for socio-economic variables (left) regressed on migration-stress exposure (sum BISS score).

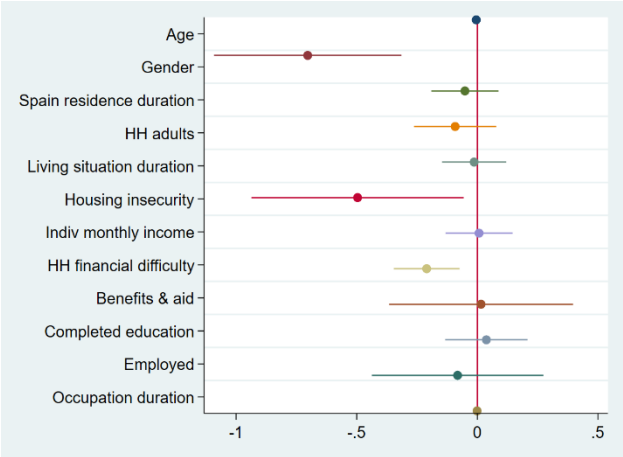


Figure 3.4. Regression coefficients and confidence intervals for socio-economic variables (left) regressed on general health.

All three survey health measures had strong correlations to household financial difficulty. Greater difficulty meeting all monthly household expenses was strongly associated with higher BMI (r=.366), poorer general health (r=-.321), and higher anxiety & depression symptomologies (r=.466). Greater social-emotional support, meanwhile, was associated with attenuated household financial difficulty (r=-.282). Another strong health correlate was housing insecurity, which had associations with poorer general health and PHQ-4 scores. In addition to Table 3.3, Figure 3.4 renders bivariate regressions of socio-economic factors on general health, which is considered the primary health outcome for this study. Experiencing housing insecurity predicted 5.7% of the variation in health (b=-.49±.22, p<.03), and household financial difficulty predicted 10% of health variation (b=-.21±.07, p<.01).

Meanwhile, few correlations were observed between health-related behaviors and socio-economic conditions. Physical activity has the strongest correlation with individual monthly income (r=.263) and employment (r=.306). Less time in current occupation had a moderate association with greater alcohol consumption (r=-.209), and female participants expressed significantly less willing to make changes to eat more healthfully (r=-.255): 40% of male

participants responded that they are willing to make those changes (n=8), compared to 17% of female respondents (n=11).

DISCUSSION

Results of the MCES study illustrate multiple relationships connecting social conditions with eating and health measures. Consistent with prior work (Li 2015; De Irala-Estévez et al. 2000; Aggarwal et al. 2011), we find that household and financial conditions significantly predict eating practices for the MCES cohort. Of the three measures of eating, food insecurity was the most sensitive to socio-economic context. Increased severity of food insecurity experiences correlated with more difficult household financial conditions, including staying housed. One potential explanation for this strong association is that food security is entwined with economic security in its most commonly-used definition, that "all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" ("Food Security Policy Brief" 2006). From this view, food insecurity occurs when any of the above conditions are not met, and therefore constitutes a resource deficit.

Results of this study make an early contribution to growing evidence on the prevalence of food insecurity in Spain, specifically by measuring FIES with Latin Americans who moved to live there. While important studies have previously described food insecurity among a site-specific population and/or qualitatively (e.g. Egbe 2015), there is currently dearth of studies that assess the degree of food deprivation among people in Spain (Shankar-Krishnan, Fornieles Deu, and Sánchez-Carracedo 2021). This is largely because the government does not acknowledge that food insecurity exists as a permanent phenomenon and, consequently, it is not understood as

a political issue (Gracia-Arnaiz 2022). Rather, the concept of food security that Spanish authorities have principally used focuses on issues of safety throughout the food chain, and protection from physical or biological hazards (Ortiz-Miranda, Pérez, and Alegre 2016). The Covid-19 pandemic accelerated change in how authorities and the public discussed food security, as news 2020 headlines reported widespread and increased use of emergency food services by people who had lost jobs and income during economic shutdowns (Martín 2020; Velasco 2020; Congostrina 2020). Results were published in 2022 for the first national survey of food insecurity in Spain, which used the FIES (Moragues-Faus and Rocío Magaña-González 2022). Data from a nationally-representative sample of households in Spain were collected before (2019) and during the pandemic (2020-2021), and indicate that 13.3% of Spanish households are food insecure. Comparisons between MCES participants and the nationally-representative sample are striking: 65% of adults in the MCES study reported at least one experience of being food insecure over the past 12 months. Two important differences exist between the national study and *Estudio MCES*. Namely, our study used the individual FIES questionnaire, and collected data post-pandemic in 2022. Nonetheless, this comparative finding underscores far greater resource precarity for Latin Americans in Alicante, compared to the general population, and makes an important contribution to emerging work in Spain that seeks to improve visibility and mobilize resources to support people that cannot get the food they need.

My dissertation's emphasis on diet change follows up from decades of anthropological work establishing the negative effects of a population-level transition to Americanized eating patterns, but with a twist. Alicante is an ideal field site for a study on food and health because it has robust local food systems and a heavily industrialized global food complex. As a result, residents have many food choices, and making those food choice requires negotiating competing

value systems about food and eating. In Alicante, a coastal Spanish region on the Mediterranean Sea, residents are quick to describe the high health value of local Mediterranean ways of eating—customs, meal times, ingredients, and so on (Koselka et al. 2023; Sofi et al. 2010). Studies conducted in Spain and around the world consistently link a "Mediterranean diet" and cardiovascular health (Schröder et al. 2004; León-Muñoz et al. 2012; Abellán Alemán et al. 2016). In addition to emphasizing that the diversity of food sources and low-food-processing support optimal brain and body function, proponents also describe the health significance of the diet as part of a broader idealized Mediterranean lifestyle (Peppin 2022; Williamson 2023; *Diabetes* 2019). As global discourse extolling the healthful properties of a Mediterranean diet thus reverberates back to Alicante, it lends additional significance to local food ideologies (Martínez-González et al. 2000). People who have moved to the region from Central and South America thus negotiate not only a new material food system but also strong messages about the healthful properties of new local ways of eating.

Instead of focusing cross-cultural differences, or a direction of diet change (e.g., dietary acculturation), I ask through *Estudio MCES* if it may be that instability itself in eating practices merits greater attention. Therefore, the composite measure I developed to assess dietary change proxied as an exposure indicator that does not necessarily hinge on resource availability in the same way as the FIES. Conceptually, change in eating habits may reflect an attitudinal openness to new options, and/or it may reflect required modifications to eating because the food system changed. This latter facet of dietary change is a major consideration when working with the MCES sample—the required changes of living in a new food system, such as needing to use new kinds of groceries. Through deploying this provisional measure, and my ensuing analysis, my

dissertation tests a methodology for assessing the smaller and ongoing nutrition transitions that occur within populations.

Chapter 3 focused on cumulative instability in eating habits (i.e., a participant's summary diet change score) relate to their social-economic conditions and to their other measures of eating (food insecurity and diet quality). For MCES participants, the only notable relationship observed is that more adults in a household appears to minimize change in eating habits. Diet change does not correlate with financial conditions, whereas food insecurity does. This finding is key supports the position that, in the high-resource setting of Alicante, Spain, cumulative instability in eating habits can be measured and considered separately from economic security/deprivation. In other words, diet change does not reflect resource precarity in the same way that food insecurity does. Being able to parse out those three sets of conditions is crucial for interpreting their relative contributions to health and health inequity. Furthermore, greater attention to why and how people's diets change has the potential to enrich how understand experiences with food insecurity in this highly-resourced setting. For example, did a participant's diet change significantly upon arrival to Spain because they could not access the foods they were accustomed to? Indigenous ontologies and food activism has mobilized a broadening of how we should understand food security, specifically by attending to how appropriate, recognizable, and useful the available foods are. In other words, "food can only be said to be secure if it is both accessible and culturally relevant" (Xavier 2017:4). This point is key to understanding how recent food insecurity over the past 12 months might overlap or diverge from cumulative diet change over one's life course. And, it especially important to consider when working with people who moved from the Global South to live in Spain.

Diet quality, using the REAP-s questionnaire, is lower for the MCES sample than for prior study samples who used the same questionnaire, and significantly lower that the US-based reference population established by Johnston et al. (2018). Participants' REAP-s scores in this study is similar to a multi-national sample of adults in the US, Mexico and Chile (Gardea-Resendez et al. 2022). Although comparisons between mainly US-based samples and *Estudio MCES* have limitations, they nonetheless point to an overall lower diet quality among Latin Americans living in Spain, who on average only met about half of the recommendations for optimal eating. Benazizi and colleagues noted similar challenges in comparing across Spanish studies that assessed immigrants' diet quality in their 2019 systematic review. Authors found heterogenous results, reflecting a diversity in participant groups, countries represented, and measures used (I. Benazizi et al. 2019). Nonetheless, a general thread through the reviewed work was that people who had migrated to Spain did not have optimum dietary quality. More recently, a 2022 study using data from the PELFI project, from which this study followed-up, found that adherence to the dietary recommendations for a Mediterranean Diet was low a multinational sample of immigrant adults, and comparatively lower than Spanish adults (Ikram Benazizi et al. 2022).

Taken together, data available suggest that the MCES cohort has lower diet quality, compared to reference populations based in the US, using a well-validated short-form FFQ. This challenges ideas, including some surrounding the premise of my dissertation, that living in a high-resource setting with relatively easy access to fresh produce would promote high-quality diets. A 2019 study comparing two neighborhoods that were considered socio-economically "average" in Baltimore, US and Madrid, Spain found that "residents in Madrid had a denser and more homogeneously distributed local food environment, with greater pedestrian access to

healthy foods and to a larger variety of food stores types." (Díez et al. 2016: 241). Qualitative and spatial evidence suggests a booming food environment in Spain, with high density and consistency in food store options; however, authors noted that gentrification and increasing neighborhood socio-economic inequality has acted to stratify neighborhood food purchase options (Bilal et al. 2018; Díaz-Méndez 2014). Given the positive findings about Spanish foodways, it stands to reason that research conducted at that site can theoretically examine ways of eating in a setting that is less-constrained by resource deprivation. Yet these results show evidence of pervasive food deprivation in a historically-marginalized sample in Alicante. Latin Americans participating in this study had food insecurity scores that are more than 5 times the national average, and reported lower-quality diets compared to reference and general populations.

Interestingly, diet quality is not associated with monthly income or with month-to-month financial difficulty (or lack thereof). Having higher diet quality does however correlate with receipt of subsidies, benefits, or financial aid in the past year. Due to the broad possibilities of what programs are included under this variable (most participants cited unemployment benefits, school financial aid, or "other program" in the survey follow-up question), there are multiple ways to interpret this relationship. What is clear is that financial support or relief boosts diet quality for MCES participants. This finding is more meaningful given this sample group's diet quality and low monthly income. Almost all participants have modest income of less than $1580 per month, and one third report earning less than $790 per month (n=29, see Table 2.1). Results here suggest that a boost to the latter can significantly improve the former.

Other key findings from this analysis include that the BISS measure worked well with this sample. It has good internal reliability, and shows sensitivity to social context, specifically

household dynamics and financial conditions. The severity of migration-related stress exposure for MCES participants was consistent with prior work conducted with Latin American sample populations in Spain (Tomás-Sábado et al. 2007; Evangelidou 2019). The strongest correlates of BISS in this sample indexed key facets of social stability or precaritization. Participants who had lived in Spain longer or who had spent more time in their current living situation experienced fewer stressors associated with migration. Participants who were housing- and financially-secure also experienced less stress. These results provide a first glimpse of some of the major social conditions that mitigate stresses associated with migration. Understandings of less-pronounced or contributory factors to this positive association will benefit from qualitative and mixed-methods analyses. Finally, MCES cohort members also reported relatively high levels of social support, which was linked with less financial difficulty for the household. Future analyses will evaluate whether strong social support may positively influence health measures, or intervene in the relationship between social marginalization and migration-related stress.

Limitations

Results presented here are limited by a small sample size, n=85, and it is possible that some of the analyses did not have adequate statistical power (which I had set to >0.8) to detect a relationship. In sample size calculations run ahead of the data collection in 2020, I had used PS 3.1.2 Power/Sample Size Calculation software to determine the sample sizes necessary to address my hypotheses with sufficient statistical power (Dupont & Plummer, 1998). Using published coefficients that link migration-related stress with blood biomarkers of metabolic health (ß=0.08, sd = 1.23, (Fang et al. 2014), power analyses revealed that a sample size of 139 participants is sufficient to identify significant associations (a = 0.05, power = 0.8). While there was no precedent for assessing impact of acculturative stress on diet pattern, numerous studies

have identified significant associations between stress and diet in sample sizes around 100. These include samples of 101 university students (Cheon and Hong 2017), and 53 international university students (Guendelman, Cheryan, and Monin 2011). In Chapter 2, I described recruitment strategies for *Estudio MCES* and challenges thereof.

All analyses presented here are cross-sectional, collected from the MCES baseline survey, which limits what questions can be asked of the data. Nonetheless, detailed findings about the socio-economic correlates for MCES participants' health set a strong foundation for follow-up surveys and studies with this cohort. Future work will additionally compare responses between matched parent-child pairs in order to make inter-generational comparisons.

Well-reasoned and strong critiques exist about acculturation and acculturative stress research (Viruell-Fuentes 2007). Not only do inquiries about acculturation build from racist stereotypes about non-white and non-European people, but studies that seek to assess the impacts of acculturative stress on mental health are often confounded by the fact that the two measures assess the same symptoms (Rudmin 2009). Critics of acculturative stress advocate for measuring learning processes and discrimination for diasporic populations. *Estudio MCES* supports this view. In the MCES study, a site-specific scale of migration-related stress was used to establish a baseline measure through which I can assess the impacts of social conditions. I strive to hold the latter to greater account and re-focus future analyses away from individualized recalled survey measures of stress, which psychology studies have found to be limited by participants' desire to respond favorably (Brenner and DeLamater 2016), perhaps as a protective process of desire/self-deception (Wheeler, Gregg, and Singh 2019).

CONCLUSION

This Chapter characterized survey health measures among the MCES cohort, specifically assessing relationships between socio-economic context factors and eating, stress, and health variables. Through a detailed evaluation of how demographic, financial, education, and work-placed conditions related to study variables of interest, I identified that household and financial conditions had the most prominent influence, compared to occupation and education. While participants reported moderate migration-related stress exposure and good-to-moderate overall health, the high prevalence of food insecurity in this sample (nearly two thirds, five times Spain's national average) and comparatively low diet quality show evidence of navigating difficult social conditions. In my continued work on the project, I strive to center social conditions as the object of inquiry and correspondingly mobilize strong resources and solidarity for people who immigrate to Spain.

Chapter 4

How is health related to eating and/or migration-related stress in the MCES cohort?

INTRODUCTION

Considerable research has shown that stress and nutrition pathways are both highly-responsive to local cues, and alter biological processing via inflammation and metabolism (Kim et al. 2020; Kiecolt-Glaser 2010). In studies of migration to the Global North, both pathways feature prominently for describing immigrant health and interpreting population health disparities. However, although elevated stress and dietary change have each been associated with metabolic health decline for resettled populations in the Global North, considerably less attention has been paid to the links between these two biosocial pathways. Addressing these linkages may improve our understanding of health and population health disparities in the context of increasing global migration.

Evaluating stresses associated with migration to Spain

Migration-related stress refers specifically to stress prompted by conflict in the process of integrating into a new society, such as incongruent cultural values and practices, language difficulties, and discrimination (Gil and Vega 1996). Stress of this kind is common for people who migrated as adults or as children. It also persists in later generations, as youth can feel "caught in the middle" between longstanding family dynamics and new social expectations (Mena, Padilla, and Maldonado 1987; Crockett et al. 2007) Migration-related stress has been linked to increased severity of depression and anxiety (Katsiaficas et al. 2013; Bhowmik,

Cheung, and Hue 2018) and also predicts elevated metabolic risk, measured using blood chemistry analyses (Tull et al. 2003) and C-reactive protein concentrations (Fang et al. 2014).

The cross-cutting theme in research on migration-related stress is that experiences of migration increase the frequency of stressful events, which leads to a suite of coping strategies. As part of coping, immigrants may change how they eat, move, talk, or go about their day. Implicit in this area of inquiry is an acknowledgement that stress exposure and everyday habits are linked. However, more research is needed to elucidate specific biological pathways that connect stress exposure for immigrants, everyday habits, and health outcomes (Allen et al. 2014; Viruell-Fuentes 2007). This type of work is crucial not only for enriching biosocial anthropology, but also for counteracting irresponsible research about immigrant populations living in the global North that implies cultural inferiority and/or biological difference to interpret population health disparities (Martínez 2013; Teruya and Bazargan-Hejazi 2013).

Everyday eating is highly-sensitive stress and to social and material conditions

Everyday eating habits represent a highly-modifiable exposure with direct connections to social context, stress, and health. Within anthropological scholarship, biocultural analyses of eating have grappled with the health consequences of neoliberal policies and globalization, and they produce important context-driven work. Among them are Leatherman and Goodman's 2005 paper, which paired qualitative insights from living with Mayan communities in the Yucatan alongside historic food purchasing data and micronutrient profiles to show how the arrival and dispersal of Coca Cola to these villages predicted worse eating and health patterns. Patil and colleagues integrated pollical-economic, epidemiological, and critical biocultural perspectives to build a more holistic conceptual model for understanding pathways that exacerbate or attenuate dietary acculturation among refugees in the US (Patil, Hadley, and Nahayo 2009). Included in

their findings on food insecurity (or security) and malnutrition (or nutrition), authors found a recurring theme through their interviews with participants of stress associated with high living and utility costs in Midwest United States.

Additional evidence on the biopsychosocial significance of eating comes from experimental studies in psychology, which found that the acute experience of being socially devalued predicted a higher preference for and consumption of sugary, salty, or fatty foods (Cheon and Hong 2017; Cardel et al. 2016). One such study specifically tested effects of discrimination and identity-threats on immigrants' food choices, finding that when a sample of Asian Americans in the US were asked if they could speak English, they were significantly more likely to describe their diet as a prototypically Americanized one (Guendelman, Cheryan, and Monin 2011). In the same study, the participants subsequently ate foods during the lab experiment that were significantly higher in calories and fat, compared to control groups of white Americans and Asian Americans who were not identity-threatened. These findings provide acute evidence that social pressure, and particularly experiences of discrimination or migration-related stress, influence how people eat during their resettlement. In this Chapter, I take up a similar question as the experimental study above, but focus on a broader and retrospective lens, asking: How is health related to eating and/or migration-related stress in a multi-generational sample of adults who migrated to Spain?

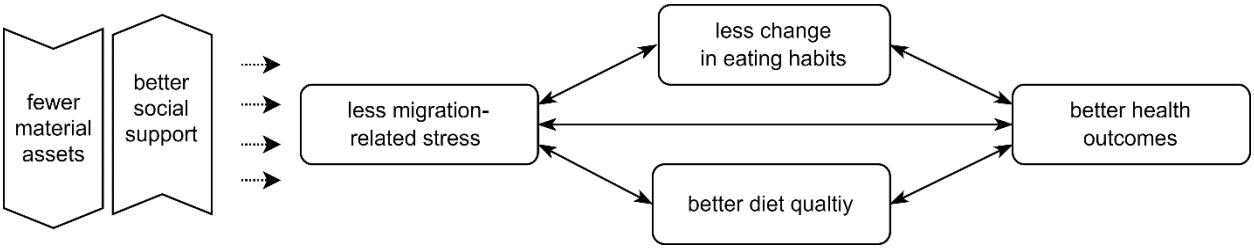


Figure 4.1. "Logics of eating" conceptual model guiding my dissertation project, introduced in Chapter 1, and re-printed here for reference.

Although elevated migration-related stress and dietary change are each associated with metabolic health decline for immigrant populations in the global North (González et al. 2012; Leonard, 2014; Montero et al. 2017), considerably less attention has been paid to the links between these two biosocial pathways. Addressing these linkages may elucidate interrelated diet and stress mechanisms that affect population health disparities over time. My dissertation project aimed to address the social conditions that shape eating, stress, and health outcomes. Figure 4.1 shows my project's conceptual framework, which strives to understand and situate interconnected relationships between social conditions, eating practice, stress, and health. In prior Chapters, I evaluated material assets and social support, and tested their relationships to the latter three variables of interest (stress, eating and health). Here, I test relationships between these three biosocial processes.

Using survey responses from the "Migration, Stress, Food and Health Study" (*Estudio MCES: la Migración, el Estrés, la Comida y la Salud)*, I describe in this chapter associations between migration-related stress exposure and diet change(s) among two generations of adults who emigrated from Latin America and resettled in Alicante, Spain. Subsequently, I compare

their respective influences in participants' health using multiple linear regression. Interpreting these ongoing processes in relation to one another can improve our understanding of health and wellbeing in the context of increasing global migration.

METHODS

Data come from *Estudio MCES,* a prospective cohort study in Alicante, Spain with two generations of adults who had immigrated there from countries in Central and South America. MCES participants were adults recruited in parent-child pairs, and each individual completed a regionally-specific and validated migration stress exposure scale, food frequency questionnaire, and a five-question series on diet changes since childhood. Since all participation was individualized, not every participant's corresponding parent or child ended up completing the survey. The survey cohort has 85 members, 38 who identified themselves as a parent who had moved from Latin America, 47 who identified as being the child of someone who did. 43 members of the younger generation had also migrated to Spain. Using baseline survey responses collected between September 2022 through February 2023, I analyzed associations between measures of eating, stress, and health, and I tested for intergenerational trends or differences. Multiple linear regression was subsequently used to clarify the influence of eating and/or stress exposure on health. Last, I used OLS regression models to determine whether a parent's measure of eating, stress, or health predicted that of their child in a restricted sample of 32 matched parent-child pairs (n=64). Stata 15 software was used for all statistical description and testing (StataCorp 2017).

Table 4.1. Sample characteristics for the total MCES cohort, and for the parent and child sub-cohorts

	Frequency or Mean (sd) Parent (n=38)	Child (n=47)	Range
Change in eating habits	6.32 (2.88)	6.35 (3.14)	0 -14
From childhood	17	15	0, 2
From parent	1.90 (1.19)	1.57 (1.20)	0 - 4
From birth country	2.76 (1.07)	3.09 (.93)	0 - 4
From pre-pandemic	5	9	0, 2
From pandemic	11	16	0, 2
Food insecurity score	1.76 (1.94)	1.94 (2.25)	0 - 8
Mod-severe food insecurity	6	9	
Diet quality	27.71 (3.67)	26.89 (4.27)	13 - 39
Migration-related stress	66.87 (17.61)	66.60 (20.76)	0 - 168
Social & emotional support	26.34 (8.81)	28.85 (7.17)	0 - 40
BMI (kg/m^2)	27.12 (4.61)	25.30 (4.17)	17.92 - 37.18
Weight (kg, n=84)	69.97 (13.97)	67.90 (12.36)	46 - 104
Height (m, n=84)	1.60 (.07)	1.64 (.08)	1.38 - 1.82
Self-report health	3.63 (.68)	3.78 (.92)	0 - 5
Bad	1	3	
Regular	15	13	
Good	19	20	
Very good	3	10	
Anxiety & Depression (PHQ-4)	2.58 (2.14) *	4.04 (3.56)*	0 - 12
Anxiety	5*	15*	
Depression	3*	13*	
Sleep hours	7.05 (1.03)	7.15 (1.17)	5 - 10.5
Smoking (n=84)			
Lifelong non-smoker	31	36	
Prior smoker	5	7	
Current smoker	2	2	
Alcohol frequency (n=84)			
<1 drink per month	15	14	
1-3 drinks per month	16	14	
1-2 drinks per week	5	11	
3+ drinks per week	2	7	
Physical activity (n=79)			
Low	7*	21*	
Medium	16*	6*	
High	12	17	
Desire to eat more healthfully	1.55 (.80)	1.85 (1.04)	1 - 5

For continuous variables, participant means are listed, with standard deviations in parentheses. Frequencies are reported for categorical variables. * indicates differences are significant at p<.05, tested using chi square statistic or paired t-test.

RESULTS

Summary statistics are shown for each measure of eating, stress, and health in Table 4.1. Results show that participants who identified as parents do not have significantly different health characteristics from those who identified themselves a member of the child cohort. Responses to five questions about changes to eating habits compared to five reference points yielded a modest mean composite score for the MCES sample: 6.34 (sd = 3.01) on a scale of 0-14. Although 18%

of respondents (n=15) have had at least one experience of food insecurity over the past 12 months, food-frequency data suggest this sample has reasonably high-quality diets: 27.26 (sd=4.01) out of 39. More good news: migration-related stress exposure is relatively low in the MCES cohort (66.72 out of 168, sd=19.31), and social support is high (27.23 out of 40, sd=8.0). Younger adults in the child cohort reported slightly greater social support, and they also had slightly lower BMIs on average, but neither approached statistical significance.

There was no difference between the two generations in self-reported health, as had been observed between genders in Chapter 3. Most MCES participants described their health as "Good" (n=39), and 28 described it as "Regular," resulting in a sample mean of 3.71 (sd=.82) out of 5. However, members of the child cohort reported significantly greater anxiety and depression symptomologies on the PHQ-4. The total sample mean was 3.39 out of 12 (sd=3.03), which corresponds to mild symptomology, but participants in the parent cohort had a lower mean of 2.58 (sd=2.14) compared to higher anxiety and depression scores in the younger generation, averaging 4.04 (sd=3.56). Additionally, 18% of the child sub-cohort (n=15) had scores that suggest anxiety, and 15% (n=13) of the younger generation had scores suggesting depression. By comparison, only 5 parents' scores suggested anxiety, and only 3 suggested depression.

Another area where the two generations differed was physical activity level, one of five health-related behaviors included to contextualize health outcomes in this sample population. Members of the parent cohort reported, on average, greater levels of physical activity, compared to the younger generation, with 76% of the sub-cohort (n=29) reporting medium or high physical activity levels, such as being on-foot, walking, or performing strenuous physical labor like lifting or hauling. By comparison, nearly half of younger adults in the child cohort reported low physical activity levels, i.e., being primarily seated throughout the day (n=21).

Table 4.2. Zero-order correlations between eating, stress, and health measures

	1	2	3	4	5	6	7	8	9	10	11	12
1 Change in eating habits												
2 Food insecurity	**.326***											
3 Diet quality	**-.279**	-.148										
4 Migration-related stress	.211	**.333***	.089									
5 Social support	**-.291**	**-.363***	.123	**-.441***								
6 BMI	.076	.224	-.202	.009	-.142							
7 Self-report health	-.182	**-.340***	.067	**-.351***	.193	-.127						
8 Anxiety & depressive symptomologies	**.306**	**.394***	-.136	**.454***	**-.314***	.069	**-.431***					
9 Sleep hours	**-.238**	**-.365***	-.039	**-.320***	**.297***	.022	**.282***	**-.296***				
10 Smoking frequency	-.015	.071	.085	-.038	-.031	.010	.062	-.138	-.065			
11 Alcohol frequency	-.026	.057	-.195	.195	-.113	.031	-.019	.197	-.186	**-.304***		
12 Physical activity	.121	-.005	.057	.172	-.186	.136	.137	.091	**-.288***	.021	.004	
13 Desire to eat more healthfully	-.171	-.217	.076	**-.277**	.100	-.166	.178	**-.256**	.115	.059	-.021	-.101

Correlation coefficients shown in **bold** are statistically significant at p<.05, *indicates p<.01 and **indicates p<.001

Pairwise correlations between eating, stress, and health variables are shown for the whole sample in Table 4.2. Among the three measures used to assess eating, change in eating habits was shown to be a strong correlate for both food insecurity and diet quality. Meanwhile, experiencing food insecurity did not significantly correspond to a lower diet quality in this sample (r=-.148). Food insecurity did have the strongest correlations with stress and health measures out the three variables that addressed eating practices. Greater food insecurity was associated with more migration-related stress (r=.333), reduced social support (r=-.363), worse self-reported health (r=-.340), more anxiety & depression symptoms (r=.306), and less sleep each night (r=-.365). Change in eating habits also correlated strongly to most of these same variables. Greater dietary change was associated with reduced social support (r=-.291), greater severity in anxiety and depression (r=.306), and less sleep per night (r=-.238). Notably diet

quality did not correlate with any health or health-related variables. Discrepancies between how these variables related to stress and health reflect how they capture different and important data on everyday eating. Specifically, the strength of the association between self-reported health and food insecurity, but not dietary change or diet quality, echo the strong influence of socio-economic factors on the former two variables, and not the latter two. Chapter 3 illustrated links between financial security, food security, and good health. Here, it is important to re-state the socio-economic deprivation that shapes food insecurity, which is a gross and extreme form of resource precarity (Kamdar et al. 2022; Dickinson 2019). Changes to eating habits are not necessarily connected to resource deprivation in the same way as food insecurity, although greater change can suggest greater instability in meeting all nutritional needs (Piperata et al. 2011).

Migration-related stress was highly sensitive to health, sleep, social support, and food insecurity. Results suggest that stronger experiences of migration-related stress have a significant negative influence on health (r=-.351) and correlate with significantly heightened anxiety and depression symptomologies (r=.454). Meanwhile, social support appears to significantly attenuate migration-related stress severity (r=-.441) as well as symptom severity for anxiety and depression (r=-.314). No associations were observed with BMI in this sample, but self-reported health had strong correlations across eating, stress, social support, and other health measures. For this reason, self-reported health is considered the primary health outcome in subsequent regression models. Considerable prior research supports the validity of self-report health measures (Waller 2015; Bombak 2013), highlighting that a participant's process of evaluating their own health consistently predicts diagnostic measures (Bellón et al. 2000).

Among health-related behaviors, the average number of sleep hours per night shows the strongest positive influence across eating, stress, and health. Getting more sleep per night correlates with less change in eating habits (r=-.238), less food insecurity (r=-.365), less migration-related stress (r=-.320) and less-severe anxiety and depression (r=-.296), as well as better social support (r=.297) and better self-reported health (r=.282). The only other health-related behavior with moderate associations to health outcomes was participants' self-rated interest in making changes to eat more healthfully. Participants who reported stronger desire to change their eating to be healthier reported less-severe migration-related stress (r=-.277), and symptomologies of anxiety and depression (r=-.256).

Table 4.3. Multiple linear regression models of cumulative and composite change in eating variables predicting health status

	Model 1	Model 2	Model 3
Gender	-.69 ± .19**	-.69 ± .20**	-.65 ± .19**
Change in eating habits	-.04 ± .03		-.02 ± .03
Change from childhood		-.11 ± .10	
Change from parent		-.06 ± .08	
Change from birth country		.18 ± .09*	
Change from pre-pandemic		-.18 ± .12	
Change from pandemic		-.07 ± .10	
Food insecurity			-.12 ± .04**
Diet Quality			-.00 ± .02
Intercept	4.52 ± .24***	4.01 ± .31***	4.59 ± .67***
Model Adjusted R^2	.14	0.17	.20

*indicates p<.05, **p<.01, ***p<.001

Results from Table 4.3 demonstrate that change in eating habits is not associated with migration-related stress exposure for the MCES cohort. These null results are further considered in a series of multiple regression models I present in Table 4.4. Model 1 tested whether the composite change variable predicts health when gender is held constant. Participants who

identified female rated their health significantly lower than did males, whereas change in eating habits showed no health association. Model 2 evaluated the validity of the composite measure of dietary change by testing the predictive strength of each of the five reference categories, again holding gender constant. Results illustrate very little association between any of the five items, although one small positive association between health and change from typical meals in one's birth country is notable because of its divergence. That is, while four out of the five items showed no to very slight negative relationships to health, change from birth country predicts slightly better health status, and this discrepancy is lost in the composite measure. Model 3 introduces food insecurity and diet quality, which improves the overall fit from .17 to .20. Higher food insecurity scores on the FIES significantly predicted poorer health status, consistent with Table 4.2 and prior literature (Gundersen and Ziliak 2015). As with bivariate tests, neither diet quality nor changes in eating habits had any association to health in multiple regression models.

Here, it is important to restate findings from Chapter 3 that financial difficulty, including difficulty staying housed, had strongly predicted food insecurity in the MCES sample, but had not predicted change in eating habits, nor diet quality. This finding is consistent with prior studies demonstrating links between economic access and food security (Jones et al. 2013). The financial difficulty implied in FIES scores may help explain why this one measure of eating behavior significantly predicts health, while the other two do not.

Table 4.4. Multiple linear regression models predicting effects of migration-related stress and change in eating habits on health status

	Model 1	Model 2	Model 3	Model 4
Gender	-.64 ± .19 **	-.64 ± .19**	-.61 ± .19**	-.63 ± .18**
Migration-related stress	-.01 ± .00**	-.01 ± .00**	-.01 ± .00*	-.01 ± .01*
Change in eating habits		-.03 ± .04	-.01 ± .03	-.03 ± .03
Diet Quality			.01 ± .02	.00 ± .02
Food insecurity			-.08 ± .04	
Financial difficulty				-.14 ± .07*
Intercept	5.09 ± .31***	5.20 ± .32***	4.89 ± .66***	5.46 ± .71***
Model Adjusted R^2	.22	.22	.23	.24

*indicates p<.05, **p<.01, ***p<.001

A central aim of this chapter is to discern the relative influence of dietary change and/or migration-related stress on participants' health. To do so, I constructed in Table 4.4, a series of multiple regression models to assess whether dietary change had any influence on the relationship between migration-related stress exposure and health. As with Table 4.3, gender was held constant in all models. Model 1 found that, when controlling for gender, health status was significantly lower among participants who reported more experiences of migration-related stress (b=-.64). Introducing change to eating habits in Model 2 had no effect on this relationship. Model 3 additionally controlled for diet quality and food insecurity, which slightly reduced the strength of association between migration-related stress and health, but it was still statistically significant. Drawing from the established association between food insecurity and financial difficulty, I operationalized food insecurity in both Table 4.3 and Table 4.4 to be a measure of economic precarity, as well as one of eating behavior. Model 4 replaces food insecurity with financial difficulty to prevent multicollinearity and test directly the influence of economic factors. Doing so slightly strengthened the relationship between migration-related stress and health and improved model fit (Adj R^2 = .24).

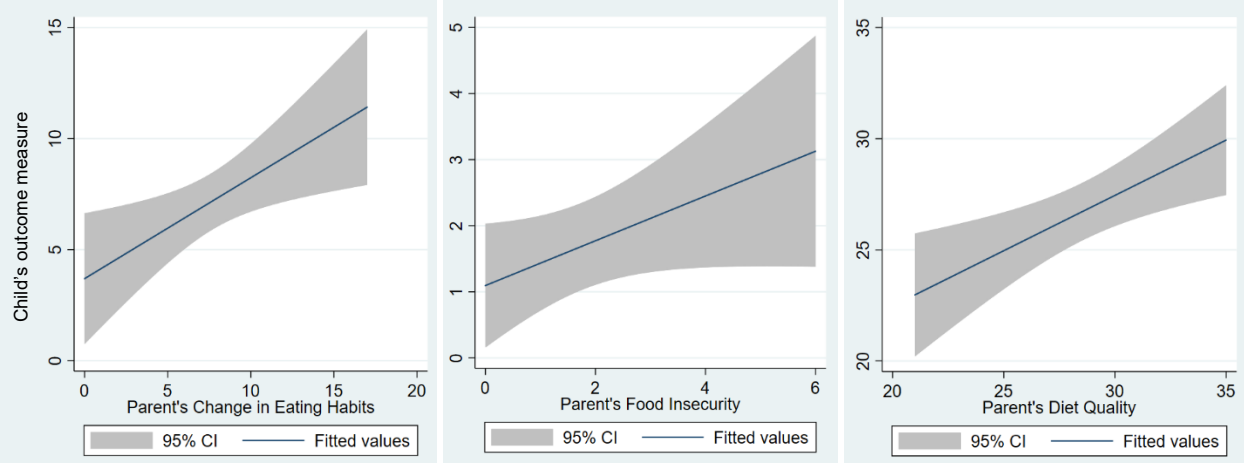


Figure 4.2 a-c. Confidence interval (CI) plots for change in eating habits (a), food insecurity (b), and diet quality (c). For each figure, child's score (y) is regressed on their parent's score (x).

The last set of analyses seeks to understand if a parent's outcome predicts that of their child. For these, only the 64 participants who were matched as parent-child pairs were included. Intergenerational comparisons the three measures of eating are displayed in Figure 4.2 a-c. Each confidence interval (CI) plot visualizes parents' outcome on the x-axis and their child's outcome as the dependent variable, with OLS regression outputs listed at the top of each figure. The three plots in Figure 4.2 visualize a clear correspondence between parents' eating measures and those of their children in the patterning of each figure for diet change, food insecurity, and diet quality. Parents' change in eating significantly predicts how much their child's eating has changed ($b=.45 \pm .17$, $p<.05$), and parent's reported diet quality has an even stronger predictive influence on their child's diet quality ($b=.50 \pm .16$, $p<.01$). The relationship between a parent's food insecurity score and that of their child follows the same trend as the other two measures of eating, but does not approach statistical significance, at ($b=34 \pm .19$, $p=.08$).

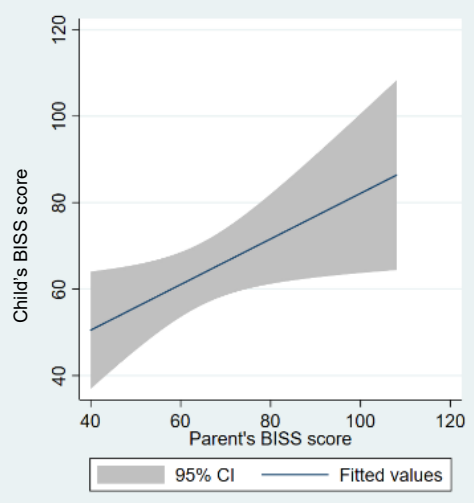


Figure 4.3. CI plot of parent's migration-related stress exposures score (x) by that of their child (y).

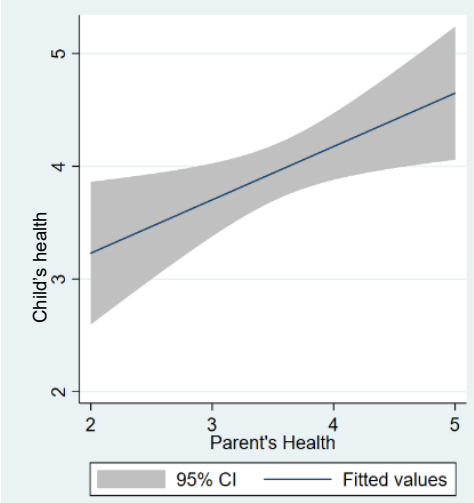


Figure 4.4. CI plot of parent's health (x) by their child's health (y)

I also constructed CI plots to visualize intergenerational stress and health patterns in the MCES sample. Figure 4.3 shows that parents' experiences with migration-related stress significantly predicted their child's experience (b=.53±.23, p=.03), and Figure 4.4 shows a strong intergenerational health trend (b=.47±.18, p<.02).

DISCUSSION

These results provide a detailed evaluation of two biosocial processes, eating and stress, in a multi-generational cohort of immigrant adults in Alicante, Spain. By working with a population who moved to Alicante from Latin America, the study can focus on biosocial responses to a new place, and to a new set of food, health, and social systems that come with it. Three survey measures were used to evaluate eating habits in this sample, dietary change, food insecurity, and diet quality. Relationships among these three were intriguing. I found that change in eating habits strongly correlated with both food insecurity and diet quality, whereas the latter two had no association. This finding suggests that dietary change may represent a plausible

intermediary between food insecurity and diet quality for this sample. Inconsistent eating patterns and/or nutrition are central in food insecurity experiences. Items on the FIES specifically ask if a participant had skipped meals, could not eat healthy foods, or ran out of food over the past 12 months ("FIES | WHO" 2013). Although the composite measure of dietary change similarly assessed instability in how participants' have been eating, it did so over a longer period since childhood. Additionally, questions that asked participants about changes in their eating did not imply deprivation or directionality, as the FIES questionnaire does. Dietary change questions therefore captured distinct data on disruptions or inconsistencies in eating over the life course that did show a moderate negative effect on current diet quality.

Participants in the MCES study had moderate diet quality scores of 27.26±4.01 within a range of 13-39, which corresponds to meeting about 50% of the contributors to an optimum diet quality. As I had previously showed in Chapter 3 (see Table 3.2), these results are consistent compared with other studies that used the REAP-s (Gardea-Resendez et al. 2022; Devereaux et al. 2021), but significantly lower (by 5 points) than a reference population of adults in the US adults (Johnston et al. 2018). What is striking in this analysis is that diet quality is significantly higher among people who reported less change in eating habits. This result suggests that accumulated inconsistency in how someone eats can influence the healthfulness of their diet, which aligns with nutritional anthropology work emphasizing negative impacts of acute and population-level dietary disruptions (Baker et al. 2016; Phillips 2006).

My dissertation project sought to contribute to human biology research on global foodways by deploying a provisional metric that could assess smaller and ongoing nutrition transitions that occur within populations. Although prior evidence around the globe supports that a greater or a fast-paced dietary transition can lead to malnutrition and negative metabolic effects

(Riosmena et al. 2012), living in Alicante promises an idealized foodscape, albeit one firmly entrenched in the global industrial food complex (Gracia-Arnaiz 2021). A myriad of possible ways of eating co-exist in the study location, and this same cacophony of possibility occurs in any major city in the world (Gracia Arnaiz 2001). People who moved to Alicante from a distinct foodscape in Latin America know an additional myriad of possible ways to eat. What does it mean, then, when their eating changes? Rather than categorizing diet patterns, or assigning value to one over another, my dissertation asks if instability itself in eating habits may merit greater attention. Results showing a link between higher dietary change and lower diet quality suggest that this composite measure captures something distinct and valuable for understanding global foodways.

Finally, results invite the question: what does it mean that recent food insecurity had no association to diet quality, while longer-term instability in eating did? More research is needed to fully address this question, but a few possible explanations are offered here. One may be that experiencing food insecurity over the past twelve months, which included the Covid-19 pandemic, did not correlate with current diet quality over the past two weeks. The Covid-19 pandemic caused cute and severe disruptions to work, financial, and food security in Spain—principally through unemployment forced during economic shutdowns (Velasco 2020; Rubio and Castilleja 2020). It is possible that over the past year since pandemic restrictions and health concerns abated, people were able to secure better resource, although growing evidence in Spain and coming out of the pandemic highlights protracted and disproportionate negative consequences for people who moved there from the Global South (Aldea 2022; “The Unequal Impact of COVID-19: A Spotlight on Frontline Workers, Migrants and Racial/Ethnic Minorities - OECD” 2022). In addition, nutrition and health researchers have chronicled the shortcomings

of food-frequency questionnaires for assessing dietary quality (Kowalkowska et al. 2013). Although the pros of a user-friendly, less-time-intensive, survey module to assess diet often win-out during study design, cons are substantial, and included reduced data reliability and validity (Schatzkin et al. 2003). Related work has also documented the strong social-approval bias at work when participants report their diet (Miller et al. 2008)—that is, participants may recall an optimized version of their diet, either in order to reject/diffuse reporting poor eating habits, or as a means of self-deception. The REAP-s was selected because it is an efficient questionnaire that asks approachable and slightly less recognizable or value-driven questions like, "How often do you eat a portion of meat (any meat) per day?" Still, it is a short-form FFQ and as such has known limitations.

Migration-related stress predicts health, unlike change in eating or diet quality

Bivariate and multiple regression analyses showed that health is influenced by migration-related stress exposure and food insecurity for the MCES cohort, but not dietary change or dietary quality. This finding suggests that biopsychosocial stress exposure and resource deprivation are the primary pathways affecting the health of this sample. By contrast, diet quality and diet change did predict self-reported health status in separate bivariate tests, nor when added to the multivariate model with BISS scores. Results presented in Table 4.4 thereby offer a counter perspective to nutrition and health work that prioritizes dietary interventions and nutrition education in order to improve population health. No doubt these projects can do important work, but my results suggest that diet and eating are not the driving force of health inequality in Alicante. Instead, severity of exposure to stressors around migration—for instance, discrimination, homesickness, or failed expectations upon moving to start a new life there—predict 22% of the variation in participants' health when gender is held constant (Table 4.4

Model 1). Including eating habits and financial difficulty only slightly improved model fit to explain 24% of health variation (Table 4.4 Model 4). In Chapter 3, I had previously demonstrated in Table 3.3 and Figure 3.3 that more severe financial difficulty predicted more-severe migration-related stress exposure. Bringing these observations together clarifies how migration-related stress works as a biopsychosocial pathway. It additionally helps to clarify health significance of having or not having economic security.

Higher migration-related stress severity was associated with more-sever anxiety and depression symptomologies ($r=.464$, $p<.01$), which is unsurprising, given that the two scales shared in common a measure of psychosocial distress symptoms (Rudmin 2009). These two distress measures also strongly correlated with food insecurity, which reflects extensive literature establishing a connection between food insecurity and mental health outcomes (Jones 2017; Hadley and Crooks 2012). For example, in a national survey with 100,401 Canadian adults, Martin et al. (2016) found that people who reported experiencing food insecurity had increased risk of mental illness, and their increased risk is further exacerbated in high-stress and socially isolated environments. This finding is particularly relevant for working with a sample of international migrants in Spain, who report experiencing migration-related stresses, including discrimination and social isolation. Maharaj et al. (2017) surveyed food insecurity and mental health in a cohort of refugees in South Africa and found that insufficient food predicted significantly higher anxiety and depression symptomologies. Finally, Boateng and colleagues concluded that food insecurity interacted with another form of resource scarcity, water insecurity, as well as illness (HIV) to increase depressive symptomatology among Kenyan women (Boateng et al. 2022). Food insecurity measures necessarily imply resource scarcity as they ask about experiences of not having enough of the food one needs for a healthy, active life

("FIES | WHO" 2013), and financial difficulty is a consistently strong correlate of food insecurity, and FIES scores specifically (D. Himmelgreen et al. 2022; Boero 2021). In the MCES sample, greater financial difficulty, experiencing housing insecurity, and less time in current living situation were all linked to greater food insecurity (see Table 3.3 and Figure 3.2b). These empirical links suggest it is plausible to interpret food insecurity as a metric of socio-economic deprivation for the MCES cohort. This approach reinforces the conclusions from Chapter 3 that stress, social support, health, and health behavior are all heavily influenced by financial security. In synthesizing results from Chapter 2 with those presented here, I submit that it is social and material resource deprivation, including via food insecurity, that wield the strongest negative influence on health outcomes downstream. While more visibility and attention to the difficulties MCES participants' face is crucial, my discussion and dissertation strives to mobilize support for Latin Americans in Spain, and this finding highlights a promising space for intervention.

Understanding differences between and trends across two generations

Table 4.1 displayed health and health-related measures between older adults participating in the study as parents, and younger adults who identified as being the child of someone who moved there from Latin America. It is important to re-state here that almost all of those who identified with the younger cohort had also gone through the experience of migrating to Spain (see Figure 2.2). From Table 4.1, we see very few differences between members of the older (parent) and younger (child) generations in the sample. In fact, the only health measure with significant discord is scores on the Patient Health Questionnaire, used to assess severity of anxiety and depressive symptomology. Parents had significantly better mental health compared to children. This finding maps onto a trend across prior intergenerational cohorts of people who migrate to the Global North, including a US-based study with 3 generations of Hispanic

adolescents that found that while similar levels of discrimination were reported by all three generations, there was clear variation in the number and type of stressor experienced, depending on generation. Authors stressed in their results that studies tracking a "Hispanic paradox" are oversimplified and prioritized parsing apart the differences in stress appraisal and experience between generations. The "Hispanic paradox" refers to an observed trend that people who migrate from Latin American countries to the US (and elsewhere in the Global North) often have comparably better health than people in their home country, and that these positive health attributes fade with each subsequent generation living in the US/Global North. Alegría and colleagues similarly advocate prioritizing discussion of various biosocial pathways that shape health post-migration in their review of epidemiological work with immigrant populations. Authors conclude that, "While epidemiological studies have established a general pattern of lower risk for mental health disorders among first-generation (foreign-born) immigrants in the USA, recent studies highlight how this pattern varies substantially by the intersection of race, ethnicity, national origin, gender, and socioeconomic status." (Alegría, Álvarez, and DiMarzio 2017: 145).

Intergenerational trends in eating, stress, and health are notable in the MCES study because they demonstrate the imprint of one's household and/or family context on health and health-related behaviors. These results offer a counter-perspective to prior observations that children of people who immigrate to the US and Europe have distinct health trajectories from their parents (Wilson and Renzaho 2015; Cervantes et al. 2013). In the MCES sample generally, and in the restricted sample of matched pairs, parents and children reported stress, eating, and health experiences that are remarkably similar. Especially in tests with matched parent-child pairs, these similarities may reflect the fact that most shared migration histories and even

households. Sample characteristics detailed in Chapter 2 showed nearly everyone in this sample is living with their family, and went through the experience of immigrating to Spain. Chapter 2 additionally found no difference in economic security between parent and child sub-cohorts, which Chapter 3 demonstrated to be the strongest predictor of eating, stress, and health. What is striking about the intergenerational analyses is that they suggest a profound durability, which may help to explain trenchant and widening population health disparities in Alicante, and around the world.

A Vignette Connecting Migration, Food, Stress, and Health

I close this chapter with a vignette from one study participant, who recounted *in vivo* the connections between migration, stress, eating, and health that my dissertation set out to address. Marcela (pseudonym), had completed the survey and agreed to a phone-interview, where I asked about her experience migrating to Alicante, and how she feels about her eating and her health today. Some identifying information is removed or edited to preserve Marcela's confidentiality.

Marcela decided she had to move and find work in Spain because she was not able to afford a home or a living in Ecuador. Seeing that no good opportunities existed in her home country, she followed a friend's advice and moved to Alicante. After describing how heartbreaking it was to leave her baby with family in Ecuador, Marcela talked about the disappointing and difficult work conditions she endured in Alicante. She needed work and income quickly, but she did not have a work visa, so she had to take a low-paying job in a restaurant. With long work hours and little relief, she notes:

> *"Then of course the flu came, and fever. I became ill a lot, but my goal was to work, to earn some money. They paid me very little in a month, something like €700, it was too little to keep a house and take care of myself. So, I decided, 'ok, I'll use this to pay for a room.' Luckily, I could eat the place where I worked, but I ate poorly because I'd have a coffee with milk and then I didn't eat until work time was over at 4:00 p.m. Then we ate whatever was left."*

> *"That's when my change in eating began. I mean, today I had lentils and fish! But it [eating changes] didn't happen completely or right away. I'd just eat whatever was left one day, then the next, and so on."*

Marcela went on recount finding a better-paying job at a busy restaurant that had long hours, so she was often working through the night. Although she sometimes had to miss meals to serve customers, the pay was better, and she was able to stabilize and earn/save enough money.

> *"Well, that's what takes. And that's how you lose them, the habits you had, your customs and the schedules you're used to. You have a new rhythm of life, and you have to accept it. It's to work, work, work! But hey, that was better for me. A week there was €300. Within a week, I had enough to send back to family and then the next week I could cover my expenses here. That's how I saved until I could bring my daughter."*

Marcela and her husband were able to bring their daughter to live with them in Spain six years later, through the Family Reunification Program. Her story brings together the tremendous work and sacrifice that Latin Americans put in to make a life in Alicante. The also clearly demonstrate inhospitable and difficult socio-economic conditions—low-wage intensive labor, most prominently—that immigrants often must endure in Spain because these are the only income options.

Through this short account, Marcela cogently demonstrates the health impacts of social inequity and global, racial capitalism (Phelan, Link, and Tehranifar 2010; Robinson 1983; Laster Pirtle 2020). Power and economic inequities that frame how we understand and distinguish between the Global South and the Global North forced Marcela to determine that the only way she could make a living was to move to seek work in Spain. Thereupon, her experience makes it clear that it was only through steep costs to her wellbeing that she was able to earn enough money to afford for her family to make a life in Alicante. Socio-economic deprivation is clearly connected to health, food insecurity, dietary change, and diet quality in the selections above. In fact, Marcela's story makes these connections so explicitly that I was able to list them in order of

their appearance in the vignette above. Marcela's powerful remarks reflect points raised and themes shared throughout the 32 interviews we conducted for *Estudio MCES.* Interviewees were striking in their matter-of-factness—whatever the situation or challenge, the only option was to work through it, and so they did.

Limitations

Scholars and activists alike have described the harm that dietary surveillance can cause, and documented histories of xenophobia, racism, and fatphobia in how "good" and "bad" eating are described (Gay 2017; Strings 2019). Diet quality results in *Estudio MCES* may be limited by social-desirability bias, which prior studies showed to alter reported intakes of fruit and vegetables (Miller et al. 2008; Wheeler, Gregg, and Singh 2019). These and other studies demonstrating the strong social value of eating healthy support the position that MCES survey respondents are aware of heightened attention to what they eat, and they may have completed dietary surveys to show desired diet quality.

CONCLUSION

In this chapter, I evaluated associations between change in eating habits, migration-related stress exposure, and self-reported health. Whereas the prior chapter had demonstrated the strong influence of social conditions, particularly financial security, on these three outcomes of interest, analyses, here I tested whether eating and/or stress predict health for the MCES sample. I found that participants' health was associated with migration-related stress exposure, but not change in eating habits. Food insecurity also significantly predicted health, which echoes the findings from Chapter 3 on the negative health impact of resource precarity. Subsequently, I tested whether a parent's outcome predicted that of their child in a sub-sample of 32 matched

pairs, and found significant intergenerational trends for health, migration-related stress, dietary change, and diet quality.

Chapter 5

Dissertation Conclusion and Next Steps for the MCES Study

SUMMARY OF RESULTS

Through ten years of professional and academic work, the overarching goal of my career has been to understand biosocial pathways to health equity and support marginalized groups in redressing food injustice. My dissertation focused that broader aim to explore how living in Alicante, Spain impacts the eating, stress, and health of people who moved there from Central and South America. Working with Latin Americans allowed me to examine foodways in Alicante from their comparative perspective, and assess eating and stress reactivity that occurs after the major change of migrating to Spain. For my dissertation project, I established with Dr. Ronda Pérez a new prospective cohort study that uses culturally-validated surveys, dried blood-spot sampling (C-reactive protein, glycated hemoglobin), qualitative interviews, and ethnographic fieldwork to understand how migration-related stress influences eating practice, diet change, and metabolic health in 2 generations of adults. (n=85). The results contribute to anthropological understanding of social and dietary change in the context of increasing global migration and inequality. They also reflect the utility of a biosocial approach for understanding two embodied processes that shape how health is expressed: eating and stress.

Through the results I presented in my dissertation, I make the case for a multi-faceted and thorough examination of socio-economic context to understand population health trends and disparities. I describe the study design and protocols of *Estudio MCES,* which represent innovations to health research that prioritize both remote methodologies and participant engagement. Responding to safety protocols that were enacted during the Covid-19 crisis, I

reorganized a dissertation project that sought to understand local context and idiosyncratic ways of eating so that it would minimize potential illness exposure for researchers and participants, who have heightened social and health vulnerabilities (Aldea 2022; Gracia-Arnaiz 2022; Nollenberger 2014). None of these methods were part of standard health research practice for study team members or participants and required extensive deliberation and validation before use with the sample group. The central tension during project planning was how to efficiently collect detailed information about social and living conditions, eating and migration histories, experiences of stress, and health/wellbeing in a way that was intuitive for participants to complete on their own, and did not cause an undue burden on participants' time or energies. These three objectives often proved difficult to align, and gathering them together took careful consideration and additional pre-testing. As one example, we set a standard during survey development that the online consent process and 10-module questionnaire would take an average of 35 minutes for the participant to complete. Questions ranged from well-established Likert-scale formats to a few open-ended ones I wrote specifically for this project, based on prior work in Spain and the US (Koselka and Leonard 2022; Koselka 2019; 2018): "How was your work affected by the Covid-19 pandemic?"; "How do you describe what you eat?"; and "Tell us about two of your favorite foods in the space below."

Results presented in Chapters 2-4 address 4 aims set forth in my introduction, which together take an emphasis on formative and descriptive analysis. To understand social conditions for Latin Americans in Alicante (Aim 1), I focused Chapter 2 on *Estudio MCES* design and protocols, and I introduced characteristics. After evaluating multiple domains around participants' living situation, monies, work, and education, I concluded contributors to socio-economic status varied in the sample. I found that demographic, economic, and work-related

variables correlated more strongly than education. Based on this evidence and prior work, I concluded that understandings of SES in this sampled needed to include multiple variable domains (Braveman et al. 2005; Vallejo et al. 2018; Galobardes, Morabia, and Bernstein 2001).

The in-depth approach I took to measuring SES in Chapter 2 afforded insight about health impacts of social conditions, which I explored in Chapter 3. Ch 3 endeavored to examine impacts of social conditions on participants' eating habits, migration-related stress exposure, and health status (Aim 2). I used the same slate of demographic, economic, education, and occupational variables as Chapter 2 and evaluated their associations to health, eating habits, and migration-related stress. I found that, as we would intuitively expect, fewer material assets negatively influenced eating, stress, and health across multiple measures. The strongest negative influence was observed for experiencing month-to-month difficulty covering all expenses, and experiencing housing insecurity over the past year. Conversely, more resources and social support correlated with better health and health-related measures, i.e., less change in eating habits, better diet quality, less migration-related stress.

Chapter 4 moved to determine the relationship between the latter three variables of interest (Aim 3). I found that participants reporting less migration stress had less change in eating habits, better diet quality, and better health status. Whereas migration-related stress clearly influenced eating and health, there was very little relationship observed between the latter two domains. In other words, participants' self-reported health status was strongly associated with their socio-economic conditions and their migration-related stress exposure, but not with diet change or diet quality, as I had hypothesized. Experiencing food insecurity did show a strong negative influence on health in a pairwise correlation matrix, but in a multivariate model, this relationship was less-robust than migration-related stress score or experiencing financial

difficulty, suggesting that socio-economic deprivation and discrimination have the strongest impact on health status. I also tested in Chapter 4 whether eating, stress, and health measures differed between the two generations in the MCES sample (parents who had moved to Alicante from a country in Central or South America, and their children) using a subset of matched parent-child pairs (n=64). Contrary to my hypothesis, results showed that a parent's outcome predicted their child's across multiple measures of eating, migration-related stress exposure score, and self-reported health score.

A main argument I hope to make through Chapter 4 and through this dissertation is that a focus on diet habits and quality cannot adequately explain health inequity. My results suggest instead that the strongest leverage points for improving participants' health and advancing health equity in Alicante are to improve social and economic support for Latin Americans living there. I focus on the social embeddedness of eating in order to emphasize other embodied processes that co-occur as food is consumed. I also make an explicit connection to migration-related stress as one starting point for modelling the entanglements between stress physiology, nutrition, inflammation, and metabolism that define human biological variation. Findings I discussed in this dissertation represent a need by extension for stronger emphasis on innovative and ethnographically-robust methodologies that evaluate why people eat what they eat.

FORTHCOMING WORK AND NEXT STEPS

Baseline data collection for *Estudio MCES* produced two additional data sources beyond the survey data I presented in this dissertation: 32 interview audio recordings and written transcripts, and 35 dried blood-spot (DBS) samples from a sub-set of study participants. Interviews conducted in fall 2022 are currently being transcribed for content thematic analysis

which I will undertake in fall 2023. The aim of these open-ended interviews was to understand social dynamics that affect participants' stress and eating day-to-day. Interviews began with an open-ended prompt, "Tell me about some of your favorite things to eat," and worked backward to explore key relationships, places, or considerations that influence why interviewees prefer these foods. In my preliminary analysis of the audio recordings, clear themes of joy, time, belonging, and/or availability came up in the ensuing conversations, each of which indexed a broader condition that contours their day-to-day experience. Interviewees were also asked to reflect on specific situations that induce migration-related stress for them, and on situations that mitigate their stress. This set of questions moved to evaluate shared social conditions that flare/dampen the migration stress interviewees experience.

Early findings from interview transcripts point to documentation status as a pivotal threshold for alleviating/contributing to the difficulties of living in Alicante. Securing legal documentation took years, which deeply limited work possibilities and income. As one interviewee put it, "without a contract, no papers; and without papers, no contract" *("sin contrato, no papeles, y sin papeles no contrato"*). Interviews also make it clear that the reasons and conditions for migrancy vary greatly among participants, who include, for example refugees fleeing from Venezuela. In addition to enriching survey data with greater nuance and detail, qualitative interview data will also be used to assemble a set of key social conditions that influence participants' stress and health. Coding and thematic analysis to generate these key conditions will focus on features that interviewees name as the source of migration stress (e.g., access, ideas around appropriateness), and features that relieve migration stress for interviewees, such as community or stability (Viruell-Fuentes 2007; Oncini 2019). Identifying these features will clarify associations observed in the survey database, and may point to further examinations

of survey variables that I have not yet explored yet in detail. By shifting the analytic focus away from an individual's perception or recollection, and centering it instead on shared social features or dynamics, I prepare for my future work on the project to take a more-participatory and activist approach.

Dried blood-spot samples were also collected and await analysis, which can provide clarity about participants' inflammation and metabolic health. *Estudio MCES* originally modelled for health to be assessed using a slate of metabolic and inflammatory indices that could be tested with DBS: principally glycated hemoglobin (HbA1c) and C-reactive protein (CRP). Glycated hemoglobin (HbA1c) is a form of hemoglobin that is chemically linked to a sugar. Consequently, HbA1c values are a diagnostic criterion for diabetes and cardiovascular disease, and are considered reliable indicators of metabolic health (Park et al. 2012). Moreover, HbA1c values analyzed from dried bloodspots (DBS) have excellent correlation and agreement with values from venous blood draws, meaning that HbA1c analysis from DBS will produce accurate, robust findings (Maleska et al. 2017; Affan et al. 2014). C-reactive protein (CRP) is an acute phase protein produced by the liver in response to inflammation anywhere in the body. Growing evidence from several well-controlled prospective studies shows a strong link between CRP and metabolic risk in clinical and healthy populations (Williams and McDade 2009), such that higher CRP concentrations predict higher metabolic risk later in life (Dressler et al. 2016; Arellano-Ruiz et al. 2017). In this study, I expect that lower economic status (and specifically more month-to-month financial difficulty), as well as higher severity of migration-related stress exposure will predict greater inflammatory profiles, i.e., higher HbA1C and higher CRP. Similarly, I expect that more-severe experiences with food insecurity, more diet change, and poorer diet quality will predict elevated HbA1C and CRP.

By analyzing DBS and assessing these values, I can determine how social conditions and stresses associated with migration get "under the skin" to impact participants' biology. I used in *Estudio MCES* the field-friendly dried-blood spot (DBS) collection techniques developed by Thom McDade and colleagues (2014), which McDade modified for remote research during the Covid-19 pandemic (McDade et al. 2020). Although the health research teams with whom I collaborate had not previously used DBS, they have been used elsewhere and produced strong results(Lopez-Campos et al. 2021). In order to collect biospecimens safely and remotely, participants received a collection kit in the mail for self-sampling of capillary blood. The kit contained an alcohol prep, sterile gauze, sterile single-use lancet, Whatman #903 Protein Saver Cards, and band aid. The kit also contains written instructions on how to collect a DBS sample that our study team adapted from prior studies in the US (Appendix 1). I transported these kits to Spain in summer 2022 at the start of one-month of fieldwork ahead of our study pilot in August. Once a participant self-administered a DBS sample, they put the completed sample card into a small plastic bag with desiccant and then mailed it in a postage-paid return envelope to the University of Alicante's Health Sciences building. I will return to Spain in September 2023 and can retrieved them for analysis at the Lab for Human Biology Research (LHBR) in Northwestern University's Department of Anthropology.

In addition to these forthcoming analyses, I am using the findings presented in this dissertation to publish a series of articles in peer-review journals in fall 2023 and winter 2024. Each article builds from the formative and descriptive work here, but narrows the topical scope to produce a refined research contribution. Forthcoming publications include: a mixed-methods assessment of "logics of eating" in Alicante that incorporates dietary change and quality variables with open-ended responses about participants' favorite foods and self-described diet;

prevalence and contributors of food insecurity among a sample of Latin American adults in Spain; a factor analysis of the Barcelona Immigration Stress Scale with this sample group and in the wake of the coronavirus pandemic; and a validation of a Spanish version of the Rapid Eating Assessment for Participants shortform questionnaire (REAP-s);

As I look ahead to my career post-PhD, I am eager to build on results presented in this dissertation through a US Fulbright Postdoctoral Fellowship that I was awarded for 2022-23 to continue *Estudio MCES.* I will join the University of Alicante's Department of Community Nursing, Preventative Medicine & Public Health, and History of Sciences with Dr. Elena Ronda as my advisor. During my Fulbright year, I will focus on enriching ethnographic insights to complement data assembled to date, and I will conduct in follow-up interviews and surveys. I look forward to the opportunity to continue to examine existing data, including those presented in this dissertation, with the additional context and perspective that will come with living in Alicante. This mixed-methods approach sets a strong base framework, and affords that continued work on *Estudio MCES* can move away from individual survey-recall, focusing instead on more participatory and activist modes of engagement. Finally, MCES's existing research infrastructure affords convenient annual follow-ups with participants, which can set a foundation for assessing health trajectories over time.

CONTRIBUTIONS AND SIGNIFICANCE

The overarching goal of my research is to advance health justice by contributing relativist, antiracist work on eating and stress that highlights the social, historical, and political forces underpinning health inequities. Integrating anthropological, epidemiological, and biological sciences, my dissertation explores how social dislocation impacts human stress

physiology and eating practices to shape health inequities in Spain. I established with Dr. Ronda a new international field site in Alicante, Spain and used mixed-methods and a fully-remote design involving culturally-validated surveys, dried blood-spot sampling, qualitative interviews, and ethnographic fieldwork to understand how migration-related stress influences eating practice, diet change, and metabolic health in 2 generations of adults who immigrated from Latin America and resettled in Alicante, Spain. The study reflects 6 years of close collaboration with Dr. Elena Ronda Pérez at the University of Alicante and associated strong relationships with health researchers in Spain. Establishing a new international field site, and running the MCES project are among the strongest contributions my dissertation makes to anthropological inquiry and practice. Below, I discuss five areas to which I hope my current and future work can contribute.

Improve understanding of diet change processes

Although numerous studies have documented population-level effects of adopting an industrially-processed "Americanized" diet, considerably less attention has been paid to finer-grained diet transitions that occur within populations or over generations (D. A. Himmelgreen et al. 2014). My dissertation was designed to assess determinants and patterns of diet change upon resettlement in Spain from one generation to the next. Results I present can enrich our understanding of eating habits and changes among diasporas around the world, which sets a foundation for future work assessing their health trajectories over time. Moreover, my conceptual framework pushes to consider social conditions that contour diet change patterns for people who migrate to the Global North. In doing so, we move toward a more holistic and relativist approach for understanding why people eat what they eat; that is, their logics of eating.

Examine diet- and stress-based mechanisms that shape immigrant health

My conceptual framework models both direct and indirect effects of migration stress on immigrants' metabolic health. To my knowledge, this study will be the first to test whether migration stress drives diet change to negatively impact young immigrants' metabolic health. This approach responds to promising work testing stress-based mechanisms of health disparities, particularly among minority youth, in order to elucidate biosocial mechanisms that influence young people's metabolic trajectories (Sweet 2010; Bryan et al. 2016).

Identify biosocial pathways that reinforce health disparities

Over the past decade, chronic disease rates have continued to increase around the globe, even with stronger preventative strategies and despite the fact that the general public has a better understanding of healthy lifestyle recommendations (Marmot 2015; Gracia-Arnaiz 2017). Anthropological studies are crucial for interpreting this apparent contradiction (e.g. Greenhalgh 2019); especially as they investigate imprints of social inequality on human biological variation (Hoke and McDade 2014; Kuzawa and Gravlee 2016). My dissertation project continues this tradition. By leveraging longitudinal data on participants' migration histories, and using mixed methods to assess stress, diet, health, and social pressure, this project can measure imprints of social experience on young immigrants' stress and diet pathways. Pairing these analyses with a health assessment can further clarify how social pressures get "under the skin" to stratify health outcomes over the life course.

Improve public health and health justice for marginalized groups

Aims of this project reflect my three years at the Northern Illinois Food Bank, where I worked to improve community food security and children's nutrition in 500 out-of-school programs. During that time, I was repeatedly caught off guard by how little food people had in a

region known for its agricultural yield. My dissertation research, together with each of my professional appointments, demonstrate a commitment to take on projects grounded in the service of real-world communities. Indeed, my drive to understand why health inequalities persist serves my broader goal to collaborate on projects that improve public health and health justice for marginalized groups (Carney and Krause 2020; Hinchliffe et al. 2018).

Support immigrant communities in Spain

This project seeks to identify social dynamics that elicit migration stress in order to improve visibility for immigrants in Spain, and mobilize resources for better support. To begin working toward these interventions, I will leverage strong relationships I cultivated with health researchers and local community resource groups to organize events and advocacy campaigns with direct benefits for migrant communities in Alicante.

REFERENCES

Acevedo-Garcia, Dolores, Emma V. Sanchez-Vaznaugh, Edna A. Viruell-Fuentes, and Joanna Almeida. 2012. "Integrating Social Epidemiology into Immigrant Health Research: A Cross-National Framework." *Social Science & Medicine*, Part Special Issue: Place, migration & health, 75 (12): 2060–68. https://doi.org/10.1016/j.socscimed.2012.04.040.

Adler, Nancy E., M. Maria Glymour, and Jonathan Fielding. 2016. "Addressing Social Determinants of Health and Health Inequalities." *JAMA* 316 (16): 1641–42. https://doi.org/10.1001/jama.2016.14058.

Affan, Eshan T., Devarsetty Praveen, Clara K. Chow, and Bruce C. Neal. 2014. "Comparability of HbA1c and Lipids Measured with Dried Blood Spot versus Venous Samples: A Systematic Review and Meta-Analysis." *BMC Clinical Pathology* 14 (1): 21. https://doi.org/10.1186/1472-6890-14-21.

Aggarwal, Anju, Pablo Monsivais, Andrea J Cook, and Adam Drewnowski. 2011. "Does Diet Cost Mediate the Relation between Socioeconomic Position and Diet Quality?" *European Journal of Clinical Nutrition* 65 (9): 1059–66. https://doi.org/10.1038/ejcn.2011.72.

Agudelo-Suárez, Andrés A., Fernando G. Benavides, Emily Felt, Elena Ronda-Pérez, Carmen Vives-Cases, and Ana M. García. 2010. "Sickness Presenteeism in Spanish-Born and Immigrant Workers in Spain." *BMC Public Health* 10 (1): 791. https://doi.org/10.1186/1471-2458-10-791.

Agudelo-Suárez, Andrés A., Elena Ronda-Pérez, Diana Gil-González, Carmen Vives-Cases, Ana M. García, Carlos Ruiz-Frutos, Emily Felt, and Fernando G. Benavides. 2011. "The Effect of Perceived Discrimination on the Health of Immigrant Workers in Spain." *BMC Public Health* 11 (1): 652. https://doi.org/10.1186/1471-2458-11-652.

Agudelo-Suárez, Andrés, Diana Gil-González, Elena Ronda-Pérez, Victoria Porthé, Gema Paramio-Pérez, Ana M. García, and Aitana Garí. 2009. "Discrimination, Work and Health in Immigrant Populations in Spain." *Social Science & Medicine* 68 (10): 1866–74. https://doi.org/10.1016/j.socscimed.2009.02.046.

Ahmed, Sara. 1999. "Home and Away : Narratives of Migration and Estrangement." *International Journal of Cultural Studies* 2 (3): 329–47. https://doi.org/10.1177/136787799900200303.

Aiello, Leslie C., and Peter Wheeler. 1995. "The Expensive-Tissue Hypothesis: The Brain and the Digestive System in Human and Primate Evolution." *Current Anthropology* 36 (2): 199–221. http://www.jstor.org/stable/2744104.

Alcock, Joe, Melissa L. Franklin, and Christopher W. Kuzawa. 2012. "Nutrient Signaling: Evolutionary Origins of the Immune-Modulating Effects of Dietary Fat." *The Quarterly Review of Biology* 87 (3): 187–223.

Aldea, Néstor. 2022. "Mortality Impact of the Covid-19 Epidemic on Immigrant Populations in Spain." *SSM - Population Health* 20 (November): 101291. https://doi.org/10.1016/j.ssmph.2022.101291.

Alegría, Margarita, Kiara Álvarez, and Karissa DiMarzio. 2017. "Immigration and Mental Health." *Current Epidemiology Reports* 4 (2): 145–55. https://doi.org/10.1007/s40471-017-0111-2.

Allen, Jennifer Dacey, Caitlin Caspi, May Yang, Bryan Leyva, Anne M. Stoddard, Sara Tamers, Reginald D. Tucker-Seeley, and Glorian C. Sorensen. 2014. “Pathways between Acculturation and Health Behaviors among Residents of Low-Income Housing: The Mediating Role of Social and Contextual Factors.” *Social Science & Medicine* 123 (December): 26–36. https://doi.org/10.1016/j.socscimed.2014.10.034.

Almukhtar, Sarah, Aliza Aufrichtig, Matthew Bloch, and Julia Calderone. 2023. “Spain Coronavirus Map and Case Count.” *The New York Times*, March 10, 2023, sec. World. https://www.nytimes.com/interactive/2020/world/europe/spain-coronavirus-cases.html.

Alsedo, Quico. 2020. “El Covid de los inmigrantes: ‘Mi padre cotizó 30 años recogiendo espárragos y la sanidad pública nos falló.’” *El Mundo*, May 11, 2020, sec. Coronavirus. https://www.elmundo.es/papel/historias/2020/05/12/5eb2ac3821efa0107b8b45bd.html.

Alvidrez, Jennifer, Dorothy Castille, Maryline Laude-Sharp, Adelaida Rosario, and Derrick Tabor. 2019. “The National Institute on Minority Health and Health Disparities Research Framework.” *American Journal of Public Health* 109 (Suppl 1): S16–20. https://doi.org/10.2105/AJPH.2018.304883.

“Analyse the Data | Voices of the Hungry | Food and Agriculture Organization of the United Nations.” n.d. Accessed May 30, 2023. https://www.fao.org/in-action/voices-of-the-hungry/analyse-data/en/.

Anderson, Lara. 2010. “Commercial Success or Culinary Legacy: Turn-of-the-Century Spanish Culinary Nationalization.” *Revista Canadiense de Estudios Hispánicos* 34 (2): 341–58. http://www.jstor.org/stable/20779181.

Antelo, Manel, Pilar Magdalena, and Juan C. Reboredo. 2017. “Obesity: A Major Problem for Spanish Minors.” *Economics & Human Biology* 24 (February): 61–73. https://doi.org/10.1016/j.ehb.2016.11.002.

Arechavala, Teresa, Xavier Continente, Anna Pérez-Giménez, Xavier Bartoll, Francesca Sànchez-Martínez, and María José López. 2016. “Food Consumption Frequency and Excess Body Weight in Adolescents in the Context of Financial Crisis in Barcelona (Spain).” *Gaceta Sanitaria* 30 (6): 457–63. https://doi.org/10.1016/j.gaceta.2016.03.013.

Arellano-Ruiz, Paola, Antonio García-Hermoso, Vicente Martínez-Vizcaíno, Fernando Salcedo-Aguilar, Miriam Garrido-Miguel, and Montserrat Solera-Martinez. 2017. “Trends in Cardiometabolic Parameters among Spanish Children from 2006 to 2010: The Cuenca Study.” *American Journal of Human Biology* 29 (4): e22970. https://doi.org/10.1002/ajhb.22970.

Avanzas, Pablo, Isaac Pascual, and César Moris. 2017. “The Great Challenge of the Public Health System in Spain.” *Journal of Thoracic Disease* 9 (Suppl 6): S430–33. https://doi.org/10.21037/jtd.2017.04.59.

Bailey, Zinzi D., Justin M. Feldman, and Mary T. Bassett. 2021. “How Structural Racism Works — Racist Policies as a Root Cause of U.S. Racial Health Inequities.” *New England Journal of Medicine* 384 (8): 768–73. https://doi.org/10.1056/NEJMms2025396.

Bailey, Zinzi D., Nancy Krieger, Madina Agénor, Jasmine Graves, Natalia Linos, and Mary T. Bassett. 2017. “Structural Racism and Health Inequities in the USA: Evidence and Interventions.” *The Lancet* 389 (10077): 1453–63. https://doi.org/10.1016/S0140-6736(17)30569-X.

Baker, Phillip, Sharon Friel, Ashley Schram, and Ron Labonte. 2016. “Trade and Investment Liberalization, Food Systems Change and Highly Processed Food Consumption: A

Natural Experiment Contrasting the Soft-Drink Markets of Peru and Bolivia." *Globalization and Health* 12 (1): 24. https://doi.org/10.1186/s12992-016-0161-0.

Barcelo, Cristina. 2008. "The Impact of Alternative Imputation Methods on the Measurement of Income and Wealth: Evidence from the Spanish Survey of Household Finances." SSRN Scholarly Paper. Rochester, NY. https://doi.org/10.2139/ssrn.1321827.

Bartoll, Xavier, Laia Palència, Davide Malmusi, Marc Suhrcke, and Carme Borrell. 2014. "The Evolution of Mental Health in Spain during the Economic Crisis." *European Journal of Public Health* 24 (3): 415–18. https://doi.org/10.1093/eurpub/ckt208.

Bellón, J. A., P. Lardelli, J. D. Luna, and A. Delgado. 2000. "Validity of Self Reported Utilisation of Primary Health Care Services in an Urban Population in Spain." *Journal of Epidemiology and Community Health* 54 (7): 544–51. https://doi.org/10.1136/jech.54.7.544.

Benazizi, I., M. Blasco-Blasco, J. Sanz-Valero, E. Koselka, J. M. Martínez-Martínez, and E. Ronda Pérez. 2019. "¿Cómo es la alimentación de la población inmigrante residente en España? Resultados a partir de una revisión sistemática." *Anales del Sistema Sanitario de Navarra* 42 (1): 55–68. https://doi.org/10.23938/ASSN.0389.

Benazizi, Ikram, José Miguel Martínez-Martínez, Rocío Ortiz-Moncada, Laia Ferrer-Serret, Allan Krasnik, and Elena Ronda-Pérez. 2022. "Compliance with Dietary Recommendations and Sociodemographic Factors in a Cross-Sectional Study of Natives and Immigrants in Spain." *Journal of Immigrant and Minority Health* 24 (3): 730–40. https://doi.org/10.1007/s10903-021-01226-3.

Benezra, Amber. 2020. "Race in the Microbiome." *Science, Technology, & Human Values* 45 (5): 877–902. https://doi.org/10.1177/0162243920911998.

Benson, Peter. 2008. "EL CAMPO: Faciality and Structural Violence in Farm Labor Camps." *Cultural Anthropology* 23 (4): 589–629. https://doi.org/10.1111/j.1548-1360.2008.00020.x.

Bhowmik, Miron Kumar, Rebecca Y. M. Cheung, and Ming Tak Hue. 2018. "Acculturative Stress and Coping Strategies among Mainland Chinese University Students in Hong Kong: A Qualitative Inquiry." *The American Journal of Orthopsychiatry* 88 (5): 550–62. https://doi.org/10.1037/ort0000338.

Bilal, Usama, Jessica Jones-Smith, Julia Diez, Robert S. Lawrence, David D. Celentano, and Manuel Franco. 2018. "Neighborhood Social and Economic Change and Retail Food Environment Change in Madrid (Spain): The Heart Healthy Hoods Study." *Health & Place* 51 (May): 107–17. https://doi.org/10.1016/j.healthplace.2018.03.004.

Blum, Dani. 2023. "The Mediterranean Diet Really Is That Good for You. Here's Why." *The New York Times*, January 6, 2023, sec. Well. https://www.nytimes.com/2023/01/06/well/eat/mediterranean-diet-health.html.

Boateng, Godfred O., Cassandra L. Workman, Joshua D. Miller, Maricianah Onono, Torsten B. Neilands, and Sera L. Young. 2022. "The Syndemic Effects of Food Insecurity, Water Insecurity, and HIV on Depressive Symptomatology among Kenyan Women." *Social Science & Medicine*, Rethinking syndemics through time, space, and method., 295 (February): 113043. https://doi.org/10.1016/j.socscimed.2020.113043.

Boero, V. 2021. *Access to Food in 2020. Results of Twenty National Surveys Using the Food Insecurity Experience Scale (FIES)*. Rome, Italy: FAO. https://doi.org/10.4060/cb5623en.

Bombak, Andrea E. 2013. "Self-Rated Health and Public Health: A Critical Perspective." *Frontiers in Public Health* 1: 15. https://doi.org/10.3389/fpubh.2013.00015.

Borho, Andrea, Eva Morawa, Gregor Martin Schmitt, and Yesim Erim. 2021. "Somatic Distress among Syrian Refugees with Residence Permission in Germany: Analysis of a Cross-Sectional Register-Based Study." *BMC Public Health* 21 (1): 896. https://doi.org/10.1186/s12889-021-10731-x.

Bourdieu, Pierre. 1977. *Outline of a Theory of Practice*. Cambridge University Press.

Braveman, Paula A., Catherine Cubbin, Susan Egerter, Sekai Chideya, Kristen S. Marchi, Marilyn Metzler, and Samuel Posner. 2005. "Socioeconomic Status in Health Research: One Size Does Not Fit All." *JAMA* 294 (22): 2879–88. https://doi.org/10.1001/jama.294.22.2879.

Brenner, Philip S., and John DeLamater. 2016. "Lies, Damned Lies, and Survey Self-Reports? Identity as a Cause of Measurement Bias." *Social Psychology Quarterly* 79 (4): 333–54. https://doi.org/10.1177/0190272516628298.

Brooks, R. C., S. J. Simpson, and D. Raubenheimer. 2010. "The Price of Protein: Combining Evolutionary and Economic Analysis to Understand Excessive Energy Consumption." *Obesity Reviews* 11 (12): 887–94. https://doi.org/10.1111/j.1467-789X.2010.00733.x.

Cardel, M. I., S. L. Johnson, J. Beck, E. Dhurandhar, A. D. Keita, A. C. Tomczik, G. Pavela, et al. 2016. "The Effects of Experimentally Manipulated Social Status on Acute Eating Behavior: A Randomized, Crossover Pilot Study." *Physiology & Behavior*, Proceedings of the SSIB 2015 Annual Meeting, 162 (August): 93–101. https://doi.org/10.1016/j.physbeh.2016.04.024.

Cardona, Mónica Suárez. 2017. "ENSE Encuesta Nacional de Salud España 2017," 37.

Carney, Megan A., and Keegan C. Krause. 2020. "Immigration/Migration and Healthy Publics: The Threat of Food Insecurity." *Palgrave Communications* 6 (1): 1–12. https://doi.org/10.1057/s41599-020-0461-0.

Cayuela, Ana, Martínez Martínez, José Miguel, Laia Ferrer Serret, Emily B. Felt, Jordi Casabona, Francisco Collazos Sanchez, and Elena Ronda-Pérez. 2017. "Proyecto PELFI: Reclutamiento y características sociodemográficas de las familias inmigradas y autóctonas de las sub-cohortes de Alicante y Barcelona," February. http://rua.ua.es/dspace/handle/10045/63076.

Centro de Investigaciones Sociológicas (CIS). 2021. "Encuesta sobre la salud mental de los/as españoles/as durante la pandemia de la COVID-19." Centro de Investigaciones Sociológicas (CIS). https://consaludmental.org/centro-documentacion/encuesta-salud-mental-covid19-cis/.

Cervantes, Richard C., Amado M. Padilla, Lucy E. Napper, and Jeremy T. Goldbach. 2013. "Acculturation-Related Stress and Mental Health Outcomes Among Three Generations of Hispanic Adolescents." *Hispanic Journal of Behavioral Sciences* 35 (4): 451–68. https://doi.org/10.1177/0739986313500924.

Chan, Selina Ching. 2010. "Food, Memories, and Identities in Hong Kong." *Identities* 17 (2–3): 204–27. https://doi.org/10.1080/10702891003733492.

Cheon, Bobby K., and Ying-Yi Hong. 2017. "Mere Experience of Low Subjective Socioeconomic Status Stimulates Appetite and Food Intake." *Proceedings of the National Academy of Sciences* 114 (1): 72–77. https://doi.org/10.1073/pnas.1607330114.

Codesal, Diana Mata. 2010. "Eating abroad, remembering (at) home. Three foodscapes of Ecuadorian migration in New York, London and Santander." *Anthropology of food*, no. 7 (December). https://doi.org/10.4000/aof.6642.

Congostrina, Alfonso L. 2020. “Fruit Pickers on Spain’s Coronavirus Outbreak: ‘What Terrifies Me Is Not Being Able to Feed My Children.’” *EL PAÍS*, June 25, 2020, sec. Society. https://english.elpais.com/society/2020-06-25/fruit-pickers-on-spains-coronavirus-outbreak-what-terrifies-me-is-not-being-able-to-feed-my-children.html.

Corrado, Alessandra, and Letizia Palumbo. 2022. “Essential Farmworkers and the Pandemic Crisis: Migrant Labour Conditions, and Legal and Political Responses in Italy and Spain.” In *Migration and Pandemics: Spaces of Solidarity and Spaces of Exception*, edited by Anna Triandafyllidou, 145–66. IMISCOE Research Series. Cham: Springer International Publishing. https://doi.org/10.1007/978-3-030-81210-2_8.

Coveney, Max, Pilar García-Gómez, Eddy Van Doorslaer, and Tom Van Ourti. 2016. “Health Disparities by Income in Spain before and after the Economic Crisis.” *Health Economics* 25 (Suppl 2): 141–58. https://doi.org/10.1002/hec.3375.

Crockett, Lisa J., Maria I. Iturbide, Rosalie A. Torres Stone, Meredith McGinley, Marcela Raffaelli, and Gustavo Carlo. 2007. “Acculturative Stress, Social Support, and Coping: Relations to Psychological Adjustment among Mexican American College Students.” *Cultural Diversity and Ethnic Minority Psychology* 13 (4): 347–55. https://doi.org/10.1037/1099-9809.13.4.347.

Darmon, Nicole, and Adam Drewnowski. 2008. “Does Social Class Predict Diet Quality?” *The American Journal of Clinical Nutrition* 87 (5): 1107–17. https://doi.org/10.1093/ajcn/87.5.1107.

Davern, Michael, Holly Rodin, Timothy J Beebe, and Kathleen Thiede Call. 2005. “The Effect of Income Question Design in Health Surveys on Family Income, Poverty and Eligibility Estimates.” *Health Services Research* 40 (5 Pt 1): 1534–52. https://doi.org/10.1111/j.1475-6773.2005.00416.x.

De Irala-Estévez, J., M. Groth, L. Johansson, U. Oltersdorf, R. Prättälä, and M. A. Martínez-González. 2000. “A Systematic Review of Socio-Economic Differences in Food Habits in Europe: Consumption of Fruit and Vegetables.” *European Journal of Clinical Nutrition* 54 (9): 706–14. https://doi.org/10.1038/sj.ejcn.1601080.

Devereaux, Camille, Chelsea Yager, Andrew C. Pickett, Matthew L. Smith, Joel Martin, and Ali Boolani. 2021. “Predictors of Feelings of Anxiety in Graduate Allied Health Students: An Exploratory Study.” *Journal of Allied Health* 50 (2): e73–77.

Diabetes. 2019. “European Diabetes Guidelines Highlight Benefits of Exercise and Mediterranean Diet,” September 2, 2019. https://www.diabetes.co.uk/news/2019/sep/european-diabetes-guidelines-highlight-benefits-of-exercise-and-mediterranean-diet-92888532.html.

Diaz, Pedro Juan. 2022. “ASTI Alicante Publica Su Informe Anual Sobre La Población Extranjera En La Provincia de Alicante 2022.” *Asti-Alicante* (blog). July 19, 2022. https://astialicante.org/asti-publica-informe-poblacion-extranjera-alicante-2022/.

Díaz-Méndez, Cecilia. 2014. “‘Food and Social Change: Signs of Change in Spanish Eating Habits’, Italian Sociological Review, 4 (2), 207-220.” *Italian Sociological Review* 4 (January): 207-220.

Dickinson, Maggie. 2019. *Feeding the Crisis: Care and Abandonment in America’s Food Safety Net*. Univ of California Press.

Díez, Julia, Usama Bilal, Alba Cebrecos, Amanda Buczynski, Robert S. Lawrence, Thomas Glass, Francisco Escobar, Joel Gittelsohn, and Manuel Franco. 2016. “Understanding Differences in the Local Food Environment across Countries: A Case Study in Madrid

(Spain) and Baltimore (USA).” *Preventive Medicine* 89 (August): 237–44. https://doi.org/10.1016/j.ypmed.2016.06.013.

Dorn, Aaron van, Rebecca E Cooney, and Miriam L Sabin. 2020. “COVID-19 Exacerbating Inequalities in the US.” *Lancet (London, England)* 395 (10232): 1243–44. https://doi.org/10.1016/S0140-6736(20)30893-X.

Dressler, William W., Mauro C. Balieiro, Rosane P. Ribeiro, and José Ernesto dos Santos. 2016. “Culture and the Immune System: Cultural Consonance in Social Support and C-Reactive Protein in Urban Brazil.” *Medical Anthropology Quarterly* 30 (2): 259–77. https://doi.org/10.1111/maq.12213.

Drewnowski, Adam, and Nicole Darmon. 2005. “The Economics of Obesity: Dietary Energy Density and Energy Cost2.” *The American Journal of Clinical Nutrition* 82 (1): 265S-273S. https://doi.org/10.1093/ajcn/82.1.265S.

Drewnowski, Adam, and SE Specter. 2004. “Poverty and Obesity: The Role of Energy Density and Energy Costs.” *The American Journal of Clinical Nutrition* 79 (1): 6–16. https://doi.org/10.1093/ajcn/79.1.6.

“ENSE Cuestionario Adulto.” 2017. Encuesta Nacional de Salud en Espana 2017.

Esteban-Gonzalo, Laura, Óscar L. Veiga, Enrique Regidor, David Martínez, Ascensión Marcos, and Maria Elisa Calle. 2015. “Immigrant Status, Acculturation and Risk of Overweight and Obesity in Adolescents Living in Madrid (Spain): The AFINOS Study.” *Journal of Immigrant and Minority Health* 17 (2): 367–74. https://doi.org/10.1007/s10903-013-9933-2.

“EU Unemployment.” 2018. European Commission Statistics. Unemployment Rates, Seasonally Adjusted, March 2018 (%). March 2018. http://ec.europa.eu/eurostat/statistics-explained/index.php/Unemployment_statistics.

Evangelidou, S. 2019. “Community Engagement towards the Development of Health Promotion Tools: Summary Findings of Metaplan Sessions in Barcelona.” *European Journal of Public Health* 29 (Supplement_4): ckz185.090. https://doi.org/10.1093/eurpub/ckz185.090.

Fang, Carolyn Y., Eric A. Ross, Harsh B. Pathak, Andrew K. Godwin, and Marilyn Tseng. 2014. “Acculturative Stress and Inflammation Among Chinese Immigrant Women:” *Psychosomatic Medicine* 76 (5): 320–26. https://doi.org/10.1097/PSY.0000000000000065.

Fassin, Didier. 2011. “Policing Borders, Producing Boundaries. The Governmentality of Immigration in Dark Times.” *Annual Review of Anthropology* 40: 213–26. https://www.jstor.org/stable/41287729.

“FIES | WHO.” 2013. World Health Oragnization Agriculture Organization of the United Nations. Food Insecurity Experience Scale, Voices of the Hungry Project. 2013. http://www.fao.org/in-action/voices-of-the-hungry/fies/en/.

Finlay, B. Brett, Katherine R. Amato, Meghan Azad, Martin J. Blaser, Thomas C. G. Bosch, Hiutung Chu, Maria Gloria Dominguez-Bello, et al. 2021. “The Hygiene Hypothesis, the COVID Pandemic, and Consequences for the Human Microbiome.” *Proceedings of the National Academy of Sciences* 118 (6): e2010217118. https://doi.org/10.1073/pnas.2010217118.

“Food Security Policy Brief.” 2006. FAO Agriculture and Development Economics Division. https://www.fao.org/fileadmin/templates/faoitaly/documents/pdf/pdf_Food_Security_Cocept_Note.pdf.

Galobardes, Bruna, Alfredo Morabia, and Martine S. Bernstein. 2001. “Diet and Socioeconomic Position: Does the Use of Different Indicators Matter?” *International Journal of Epidemiology* 30 (2): 334–40. https://doi.org/10.1093/ije/30.2.334.

Gálvez, Alyshia. 2018. *Eating NAFTA: Trade, Food Policies, and the Destruction of Mexico*. Univ of California Press.

Gans, Kim M., Elizabeth Ross, Claudia W. Barner, Judith Wylie-Rosett, Jerome McMurray, and Charles Eaton. 2003. “REAP and WAVE: New Tools to Rapidly Assess/Discuss Nutrition with Patients.” *The Journal of Nutrition* 133 (2): 556S-62S. https://doi.org/10.1093/jn/133.2.556S.

García, Angela S. 2017. “Labour Market Limbo: The Uneven Integration of Co-Ethnic Argentine Immigrants in Spain.” *International Migration* 55 (1): 175–88. https://doi.org/10.1111/imig.12313.

García, San Juanita. 2017. “Bridging Critical Race Theory and Migration: Moving beyond Assimilation Theories.” *Sociology Compass* 11 (6): n/a-n/a. https://doi.org/10.1111/soc4.12484.

Gardea-Resendez, Manuel, Stacey J. Winham, Francisco Romo-Nava, Alfredo Cuellar-Barboza, Matthew M. Clark, Ana Cristina Andreazza, Alejandra Cabello-Arreola, et al. 2022. “Quantification of Diet Quality Utilizing the Rapid Eating Assessment for Participants-Shortened Version in Bipolar Disorder: Implications for Prospective Depression and Cardiometabolic Studies.” *Journal of Affective Disorders* 310 (August): 150–55. https://doi.org/10.1016/j.jad.2022.05.037.

Garth, Hanna. 2020. *Food in Cuba: The Pursuit of a Decent Meal*. Stanford University Press.

Gay, Roxane. 2017. *Hunger: A Memoir of (My) Body*. HarperCollins.

Gielis, Ruben. 2009. “A Global Sense of Migrant Places: Towards a Place Perspective in the Study of Migrant Transnationalism.” *Global Networks* 9 (2): 271–87. https://doi.org/10.1111/j.1471-0374.2009.00254.x.

Gil, Andres G., and William A. Vega. 1996. “Two Different Worlds: Acculturation Stress and Adaptation among Cuban and Nicaraguan Families.” *Journal of Social and Personal Relationships* 13 (3): 435–56. https://doi.org/10.1177/0265407596133008.

Gómez, Manuel V. 2020. “April Jobless Claims Surge in Spain Due to Coronavirus Effects.” *EL PAÍS*, May 5, 2020, sec. Economy And Business. https://english.elpais.com/economy_and_business/2020-05-05/april-jobless-claims-surge-in-spain-due-to-coronavirus-effects.html.

González, M., M. del Mar Bibiloni, A. Pons, I. Llompart, and J. A. Tur. 2012. “Inflammatory Markers and Metabolic Syndrome among Adolescents.” *European Journal of Clinical Nutrition* 66 (10): 1141–45. https://doi.org/10.1038/ejcn.2012.112.

Goodman, Alan H., and Thomas Leland Leatherman. 1998. *Building a New Biocultural Synthesis: Political-Economic Perspectives on Human Biology*. University of Michigan Press.

Goodman, E. 1999. “The Role of Socioeconomic Status Gradients in Explaining Differences in US Adolescents’ Health.” *American Journal of Public Health* 89 (10): 1522–28. https://doi.org/10.2105/AJPH.89.10.1522.

Gotsens, Mercè, Davide Malmusi, Nazmy Villarroel, Carmen Vives-Cases, Irene Garcia-Subirats, Cristina Hernando, and Carme Borrell. 2015. “Health Inequality between Immigrants and Natives in Spain: The Loss of the Healthy Immigrant Effect in Times of

Economic Crisis." *European Journal of Public Health* 25 (6): 923–29. https://doi.org/10.1093/eurpub/ckv126.

Gozzer, Stefania. 2020. "'Estamos en la primera línea de batalla': el drama de las cuidadoras y limpiadoras latinoamericanas en medio de la pandemia de coronavirus en España." *BBC News Mundo*, April 2, 2020, sec. América Latina. https://www.bbc.com/mundo/noticias-america-latina-52076051.

Gracia Arnaiz, Mabel. 2001. "Nutritional Discourse in Food Advertising: Between Persuasion and Cacophony." *Anthropology of Food*, no. Issue 0 (April). http://journals.openedition.org/aof/989.

Gracia-Arnaiz, Mabel. 2010. "Fat Bodies and Thin Bodies. Cultural, Biomedical and Market Discourses on Obesity." *Appetite* 55 (2): 219–25. https://doi.org/10.1016/j.appet.2010.06.002.

———. 2013. "Thou Shalt Not Get Fat: Medical Representations and Self-Images of Obesity in a Mediterranean Society." *Health* 05 (July): 1180. https://doi.org/10.4236/health.2013.57159.

———. 2017. "Taking Measures in Times of Crisis: The Political Economy of Obesity Prevention in Spain." *Food Policy* 68 (April): 65–76. https://doi.org/10.1016/j.foodpol.2017.01.001.

———. 2021. "Eating Issues in a Time of Crisis: Re-Thinking the New Food Trends and Challenges in Spain." *Trends in Food Science & Technology* 116 (October): 1179–85. https://doi.org/10.1016/j.tifs.2021.06.003.

———. 2022. "The Precarisation of Daily Life in Spain: Austerity, Social Policy and Food Insecurity." *Appetite* 171 (April): 105906. https://doi.org/10.1016/j.appet.2021.105906.

Greenhalgh, Susan. 2019a. "Making China Safe for Coke: How Coca-Cola Shaped Obesity Science and Policy in China." *BMJ* 364 (January): k5050. https://doi.org/10.1136/bmj.k5050.

———. 2019b. "Soda Industry Influence on Obesity Science and Policy in China." *Journal of Public Health Policy* 40 (1): 5–16. https://doi.org/10.1057/s41271-018-00158-x.

Gualdi-Russo, Emanuela, Luciana Zaccagni, Vanessa S. Manzon, Sabrina Masotti, Natascia Rinaldo, and Meriem Khyatti. 2014. "Obesity and Physical Activity in Children of Immigrants." *European Journal of Public Health* 24 Suppl 1 (August): 40–46. https://doi.org/10.1093/eurpub/cku111.

Guallar-Castillón, Pilar, Miriam Gil-Montero, Luz M. León-Muñoz, Auxiliadora Graciani, Ana Bayán-Bravo, José M. Taboada, José R. Banegas, and Fernando Rodríguez-Artalejo. 2012. "Magnitude and Management of Hypercholesterolemia in the Adult Population of Spain, 2008-2010: The ENRICA Study." *Revista Espanola De Cardiologia (English Ed.)* 65 (6): 551–58. https://doi.org/10.1016/j.recesp.2012.02.005.

Guendelman, Maya D., Sapna Cheryan, and Benoît Monin. 2011. "Fitting In but Getting Fat: Identity Threat and Dietary Choices Among U.S. Immigrant Groups." *Psychological Science* 22 (7): 959–67. http://www.jstor.org/stable/25835482.

Guijarro, Carlos, Elia Perez-Fernandez, Beatriz Gonzalez-Pineiro, Victoria Melendez, Maria Jose Goyanes, M. Esther Renilla, Maria Luisa Casas, Isabel Sastre, Maria Velasco, and Alcorcon COVID Investigators. 2020. "Risk for COVID-19 among Migrants from Different Areas of the World in Spain: A Population-Based Cohort Study in a Country with Universal Health Coverage." *MedRxiv*, June, 2020.05.25.20112185. https://doi.org/10.1101/2020.05.25.20112185.

Gundersen, Craig, and James P. Ziliak. 2015. “Food Insecurity And Health Outcomes.” *Health Affairs* 34 (11): 1830–39. https://doi.org/10.1377/hlthaff.2015.0645.

Hadley, Craig, and Deborah L. Crooks. 2012. “Coping and the Biosocial Consequences of Food Insecurity in the 21st Century.” *American Journal of Physical Anthropology* 149 Suppl 55: 72–94. https://doi.org/10.1002/ajpa.22161.

Harris, Kathleen Mullan, and Thomas W. McDade. 2018. “The Biosocial Approach to Human Development, Behavior, and Health Across the Life Course.” *RSF: The Russell Sage Foundation Journal of the Social Sciences* 4 (4): 2–26. https://doi.org/10.7758/RSF.2018.4.4.01.

Hawkes, Corinna, Sharon Friel, Tim Lobstein, and Tim Lang. 2012. “Linking Agricultural Policies with Obesity and Noncommunicable Diseases: A New Perspective for a Globalising World.” *Food Policy* 37 (3): 343–53. https://doi.org/10.1016/j.foodpol.2012.02.011.

Hedgecoe, Guy. 2015. “The Legacy of Franco.” POLITICO. November 20, 2015. https://www.politico.eu/article/the-legacy-of-franco-spanish-dictator-40-years/.

Hennink, Monique M., Bonnie N. Kaiser, and Vincent C. Marconi. 2017. “Code Saturation Versus Meaning Saturation: How Many Interviews Are Enough?” *Qualitative Health Research* 27 (4): 591–608. https://doi.org/10.1177/1049732316665344.

Hernando Rovirola, Cristina, Florianne Gaillardin, Laia Ferrer Serret, Ana Cayuela Mateo, Elena Ronda Pérez, and Jordi Casabona Barbarà. 2017. “[Facilitators of participation and implementation of the immigrant families’ PELFI Sub-Cohort].” *Gaceta Sanitaria*, September. https://doi.org/10.1016/j.gaceta.2017.07.010.

Hicks, Kathryn, and William R. Leonard. 2014. “Developmental Systems and Inequality: Linking Evolutionary and Political-Economic Theory in Biological Anthropology.” *Current Anthropology* 55 (5): 523–50. https://doi.org/10.1086/678055.

Hierro, María. 2016. “Latin American Migration to Spain: Main Reasons and Future Perspectives.” *International Migration* 54 (1): 64–83. https://doi.org/10.1111/imig.12056.

Himmelgreen, David A., Allison Cantor, Sara Arias, and Nancy Romero Daza. 2014. “Using a Biocultural Approach to Examine Migration/Globalization, Diet Quality, and Energy Balance.” *Physiology & Behavior*, Eating Patterns, Diet Quality and Energy Balance, 134 (July): 76–85. https://doi.org/10.1016/j.physbeh.2013.12.012.

Himmelgreen, David, Nancy Romero-Daza, Jacquelyn Heuer, William Lucas, Abraham A. Salinas-Miranda, and Theresa Stoddard. 2022. “Using Syndemic Theory to Understand Food Insecurity and Diet-Related Chronic Diseases.” *Social Science & Medicine*, Rethinking syndemics through time, space, and method., 295 (February): 113124. https://doi.org/10.1016/j.socscimed.2020.113124.

Hinchliffe, Stephen, Mark A. Jackson, Katrina Wyatt, Anne E. Barlow, Manuela Barreto, Linda Clare, Michael H. Depledge, et al. 2018. “Healthy Publics: Enabling Cultures and Environments for Health.” *Palgrave Communications* 4 (1): 1–10. https://doi.org/10.1057/s41599-018-0113-9.

Hoke, Morgan K., and Thomas McDade. 2014. “Biosocial Inheritance: A Framework for the Study of the Intergenerational Transmission of Health Disparities.” *Annals of Anthropological Practice* 38 (2): 187–213. https://doi.org/10.1111/napa.12052.

Holmboe-Ottesen, Gerd, and Margareta Wandel. 2012. “Changes in Dietary Habits after Migration and Consequences for Health: A Focus on South Asians in Europe.” *Food & Nutrition Research* 56 (1): 18891. https://doi.org/10.3402/fnr.v56i0.18891.

Holtzman, Jon D. 2008. “Food and Memory.” SSRN Scholarly Paper. Rochester, NY. https://papers.ssrn.com/abstract=1081411.

hooks, bell. 1992. “Eating the Other: Desire and Resistance.” In *Black Looks: Race and Representation*, 21–39. Turnaround.

Hooper, Kate. 2019. “Spain’s Labor Migration Policies in the Aftermath of Economic Crisis.” Migrationpolicy.Org. April 10, 2019. https://www.migrationpolicy.org/research/spain-labor-migration-aftermath-economic-crisis.

Hrdy, Sarah Blaffer. 2007. “Evolutionary Context of Human Development: The Cooperative Breeding Model.” *Family Relationships: An Evolutionary Perspective*, 39–68. https://books.google.com/books?hl=en&lr=&id=gAitxqSxOxkC&oi=fnd&pg=PA39&dq=hrdy+evolutionary+context+of+human+development&ots=XmIVP1Yady&sig=WdH7ZLBzmhCbThzAhto_hOhLzNo.

“INEbase / Demografía y población /Fenómenos demográficos /Estadística de migraciones / Últimos datos.” n.d. INE. Accessed June 13, 2023. https://www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica_C&cid=1254736177000&menu=ultiDatos&idp=1254735573002.

“Informe del Consumo Alimentario en Espana 2018.” 2019. Madrid, Espana: Ministerio de Agricultura, Pesca y Alimentación. https://www.mapa.gob.es/es/alimentacion/temas/consumo-y-comercializacion-y-distribucion-alimentaria/panel-de-consumo-alimentario/ultimos-datos/default.aspx.

Johnston, Carol S, Courtney Bliss, Jessica R Knurick, and Cameron Scholtz. 2018. “Rapid Eating Assessment for Participants [Shortened Version] Scores Are Associated with Healthy Eating Index-2010 Scores and Other Indices of Diet Quality in Healthy Adult Omnivores and Vegetarians.” *Nutrition Journal* 17 (September): 89. https://doi.org/10.1186/s12937-018-0399-x.

Jones, Andrew D. 2017. “Food Insecurity and Mental Health Status: A Global Analysis of 149 Countries.” *American Journal of Preventive Medicine* 53 (2): 264–73. https://doi.org/10.1016/j.amepre.2017.04.008.

Jones, Andrew D., Francis M. Ngure, Gretel Pelto, and Sera L. Young. 2013. “What Are We Assessing When We Measure Food Security? A Compendium and Review of Current Metrics.” *Advances in Nutrition* 4 (5): 481–505. https://doi.org/10.3945/an.113.004119.

Kamdar, Nipa, Gala True, Laura Lorenz, Aaron Loeb, and Daphne C. Hernandez. 2022. “Getting Food to the Table: Challenges, Strategies, and Compromises Experienced by Low-Income Veterans Raising Children.” *Journal of Hunger & Environmental Nutrition* 17 (1): 32–52. https://doi.org/10.1080/19320248.2020.1855284.

Katsiaficas, Dalal, Carola Suárez-Orozco, Selcuk R. Sirin, and Taveeshi Gupta. 2013. “Mediators of the Relationship between Acculturative Stress and Internalization Symptoms for Immigrant Origin Youth.” *Cultural Diversity & Ethnic Minority Psychology* 19 (1): 27–37. https://doi.org/10.1037/a0031094.

Kiecolt-Glaser, Janice K. 2010. “Stress, Food, and Inflammation: Psychoneuroimmunology and Nutrition at the Cutting Edge.” *Psychosomatic Medicine* 72 (4): 365–69. https://doi.org/10.1097/PSY.0b013e3181dbf489.

Kim, Andrew Wooyoung, Emma K. Adam, Sonny A. Bechayda, and Christopher W. Kuzawa. 2020. “Early Life Stress and HPA Axis Function Independently Predict Adult Depressive Symptoms in Metropolitan Cebu, Philippines.” *American Journal of Physical Anthropology* 173 (3): 448–62. https://doi.org/10.1002/ajpa.24105.

Koselka, Elizabeth. 2018. “Eat and Embody: Exploring Links between Changing Food Environments and Deepening Health Inequity at Two Mediterranean Cities.” In *Food and the Mediation of Health*. San Jose, CA.

———. 2019. “Effects of Social Change on Eating Habits and Health in Spain.” In *Health Policies and Practices: Contemporary Challenges*. Portland, OR.

Koselka, Elizabeth, and William R. Leonard. 2022. “Unpacking Stress among Food Industry Workers during the Covid-19 Pandemic.” *American Journal of Human Biology* 34 (S2): 33. https://doi.org/10.1002/ajhb.23740.

Koselka, Elizabeth, Pilar Moron Esteve, William R. Leonard, and Elena Ronda Pérez. 2023. “Examining Migration-Related Stress Exposure and Diet Change Processes in Two Generations of Latinos in Alicante, Spain.” *American Journal of Human Biology* 35 (S1): 25. https://doi.org/10.1002/ajhb.23894.

Kowalkowska, Joanna, Malgorzata A. Slowinska, Dariusz Slowinski, Anna Dlugosz, Ewa Niedzwiedzka, and Lidia Wadolowska. 2013. “Comparison of a Full Food-Frequency Questionnaire with the Three-Day Unweighted Food Records in Young Polish Adult Women: Implications for Dietary Assessment.” *Nutrients* 5 (7): 2747–76. https://doi.org/10.3390/nu5072747.

Kroenke, Kurt, Robert L. Spitzer, Janet B. W. Williams, and Bernd Löwe. 2009. “An Ultra-Brief Screening Scale for Anxiety and Depression: The PHQ–4.” *Psychosomatics* 50 (6): 613–21. https://doi.org/10.1016/S0033-3182(09)70864-3.

Kuzawa, Christopher W., Harry T. Chugani, Lawrence I. Grossman, Leonard Lipovich, Otto Muzik, Patrick R. Hof, Derek E. Wildman, Chet C. Sherwood, William R. Leonard, and Nicholas Lange. 2014. “Metabolic Costs and Evolutionary Implications of Human Brain Development.” *Proceedings of the National Academy of Sciences* 111 (36): 13010–15. http://www.pnas.org/content/111/36/13010.short.

Kuzawa, Christopher W., and Clarence C. Gravlee. 2016. “Beyond Genetic Race: Biocultural Insights into the Causes of Racial Health Disparities.” In *New Directions in Biocultural Anthropology*, 89–105. John Wiley & Sons, Ltd. https://doi.org/10.1002/9781118962954.ch5.

Laster Pirtle, Whitney N. 2020. “Racial Capitalism: A Fundamental Cause of Novel Coronavirus (COVID-19) Pandemic Inequities in the United States.” *Health Education & Behavior* 47 (4): 504–8. https://doi.org/10.1177/1090198120922942.

“Latest Report: Registered Unemployment.” 2020. Spanish Ministry of Labour, Migrations & Social Security. http://www.mitramiss.gob.es/en/index.htm.

Leatherman, Thomas L., and Alan Goodman. 2005. “Coca-Colonization of Diets in the Yucatan.” *Social Science & Medicine (1982)* 61 (4): 833–46. https://doi.org/10.1016/j.socscimed.2004.08.047.

Leatherman, Thomas L., Morgan K. Hoke, and Alan H. Goodman. 2016. “Local Nutrition in Global Contexts: Critical Biocultural Perspectives on the Nutrition Transition in Mexico.” In *New Directions in Biocultural Anthropology*, 49–65. John Wiley & Sons, Ltd. https://doi.org/10.1002/9781118962954.ch3.

Leatherman, Tom, and Allen Goodman. 2011. “Critical Biocultural Approaches in Medical Anthropology.” In *A Companion to Medical Anthropology*, edited by Merrill Singer and Pamela Erickson. Blackwell Publishing. http://www.blackwellreference.com.turing.library.northwestern.edu/subscriber/uid=55/tocnode?query=critical+biocultural+approaches+in+medical&widen=1&result_number=1

&from=search&fuzzy=0&type=std&id=g9781405190022_chunk_g97814051900227&slop=1&authstatuscode=202.

Leonard, William R. 2014. “The Global Diversity of Eating Patterns: Human Nutritional Health in Comparative Perspective.” *Physiology & Behavior*, Eating Patterns, Diet Quality and Energy Balance, 134 (July): 5–14. https://doi.org/10.1016/j.physbeh.2014.02.050.

Leonard, William R., and Marcia L. Robertson. 1992. “Nutritional Requirements and Human Evolution: A Bioenergetics Model.” *American Journal of Human Biology* 4 (2): 179–95. https://doi.org/10.1002/ajhb.1310040204.

———. 1994. “Evolutionary Perspectives on Human Nutrition: The Influence of Brain and Body Size on Diet and Metabolism.” *American Journal of Human Biology* 6 (1): 77–88. https://doi.org/10.1002/ajhb.1310060111.

Leonard, William R., J. Josh Snodgrass, and Marcia L. Robertson. 2007. “Effects of Brain Evolution on Human Nutrition and Metabolism.” *Annual Review of Nutrition* 27 (1): 311–27. https://doi.org/10.1146/annurev.nutr.27.061406.093659.

León-Muñoz, Luz M., Pilar Guallar-Castillón, Auxiliadora Graciani, Esther López-García, Arthur E. Mesas, M. Teresa Aguilera, José R. Banegas, and Fernando Rodríguez-Artalejo. 2012. “Adherence to the Mediterranean Diet Pattern Has Declined in Spanish Adults.” *The Journal of Nutrition* 142 (10): 1843–50. https://doi.org/10.3945/jn.112.164616.

Li, Yuzhu. 2015. “Food Habits of a Chinese Immigrant Population Living in Portugal.” M.Sc., Portugal: Universidade do Porto (Portugal). https://www.proquest.com/docview/2689297172/abstract/EC13492E95E8401BPQ/1.

Llácer, A., J. Del Amo, A. García-Fulgueiras, V. Ibáñez-Rojo, R. García-Pino, I. Jarrín, D. Díaz, et al. 2009. “Discrimination and Mental Health in Ecuadorian Immigrants in Spain.” *Journal of Epidemiology & Community Health* 63 (9): 766–72. https://doi.org/10.1136/jech.2008.085530.

Lopez-Campos, Jose Luis, Francisco Casas-Maldonado, Maria Torres-Duran, Agustin Medina-Gonzálvez, Maria Luisa Rodriguez-Fidalgo, Ines Carrascosa, Myriam Calle, et al. 2021. “Results of a Diagnostic Procedure Based on Multiplex Technology on Dried Blood Spots and Buccal Swabs for Subjects With Suspected Alpha1 Antitrypsin Deficiency.” *Archivos de Bronconeumología* 57 (1): 42–50. https://doi.org/10.1016/j.arbres.2020.04.014.

Loustaunau, Lola. 2021. “Essential Work, Disposable Workers: Experiences of Immigrant and Refugee Food Processing Workers During the COVID-19 Pandemic in Rural Washington.” University of Oregon Labor Education & Research Center,. https://lerc.uoregon.edu/2021/04/02/essential-work-disposable-workers/.

Luan, Hui, Leia M. Minaker, and Jane Law. 2016. “Do Marginalized Neighbourhoods Have Less Healthy Retail Food Environments? An Analysis Using Bayesian Spatial Latent Factor and Hurdle Models.” *International Journal of Health Geographics* 15 (1): 29. https://doi.org/10.1186/s12942-016-0060-x.

Lytle, Leslie A., and Rebeccah L. Sokol. 2017. “Measures of the Food Environment: A Systematic Review of the Field, 2007–2015.” *Health & Place* 44 (Supplement C): 18–34. https://doi.org/10.1016/j.healthplace.2016.12.007.

Maharaj, Varsha, Andrew Tomita, Lindokuhle Thela, Mpho Mhlongo, and Jonathan K. Burns. 2017. “Food Insecurity and Risk of Depression Among Refugees and Immigrants in

South Africa." *Journal of Immigrant and Minority Health* 19 (3): 631–37. https://doi.org/10.1007/s10903-016-0370-x.

Maleska, Aleksandra, Christophe Hirtz, Elise Casteleyn, Orianne Villard, Jacques Ducos, Antoine Avignon, Ariane Sultan, and Sylvain Lehmann. 2017. "Comparison of HbA1c Detection in Whole Blood and Dried Blood Spots Using an Automated Ion-Exchange HPLC System." *Bioanalysis* 9 (5): 427–34. https://doi.org/10.4155/bio-2016-0278.

Malmusi, Davide, Carme Borrell, and Joan Benach. 2010. "Migration-Related Health Inequalities: Showing the Complex Interactions between Gender, Social Class and Place of Origin." *Social Science & Medicine* 71 (9): 1610–19. https://doi.org/10.1016/j.socscimed.2010.07.043.

Marín-Guerrero, A. C., Fernando Rodríguez-Artalejo, P. Guallar-Castillón, Esther López-García, and Juan L. Gutiérrez-Fisac. 2015. "Association of the Duration of Residence with Obesity-Related Eating Habits and Dietary Patterns among Latin-American Immigrants in Spain." *British Journal of Nutrition* 113 (2): 343–49. https://doi.org/10.1017/S0007114514003614.

Marmot, Michael. 2015. *The Health Gap: The Challenge of an Unequal World*. Bloomsbury Publishing USA.

Marmot, Michael, Sharon Friel, Ruth Bell, Tanja AJ Houweling, and Sebastian Taylor. 2008. "Closing the Gap in a Generation: Health Equity through Action on the Social Determinants of Health." *The Lancet* 372 (9650): 1661–69. https://doi.org/10.1016/S0140-6736(08)61690-6.

Martin, M. S., E. Maddocks, Y. Chen, S. E. Gilman, and I. Colman. 2016. "Food Insecurity and Mental Illness: Disproportionate Impacts in the Context of Perceived Stress and Social Isolation." *Public Health* 132 (March): 86–91. https://doi.org/10.1016/j.puhe.2015.11.014.

Martín, María. 2020. "El hambre aprieta a los inmigrantes irregulares." *EL PAÍS*, May 9, 2020, sec. España. https://elpais.com/espana/2020-05-09/el-hambre-aprieta-a-los-inmigrantes-irregulares.html.

Martínez, Airín D. 2013. "Reconsidering Acculturation in Dietary Change Research among Latino Immigrants: Challenging the Preconditions of US Migration." *Ethnicity & Health* 18 (2): 115–35. https://doi.org/10.1080/13557858.2012.698254.

Martínez-González, M. A., B. Holgado, M. Gibney, J. Kearney, and J. A. Martínez. 2000. "Definitions of Healthy Eating in Spain as Compared to Other European Member States." *European Journal of Epidemiology* 16 (6): 557–64. https://www.jstor.org/stable/3582369.

McClure, Elizabeth S, Pavithra Vasudevan, Zinzi Bailey, Snehal Patel, and Whitney R Robinson. 2020. "Racial Capitalism Within Public Health—How Occupational Settings Drive COVID-19 Disparities." *American Journal of Epidemiology* 189 (11): 1244–53. https://doi.org/10.1093/aje/kwaa126.

McDade, Thomas W. 2014. "Development and Validation of Assay Protocols for Use with Dried Blood Spot Samples." *American Journal of Human Biology* 26 (1): 1–9. https://doi.org/10.1002/ajhb.22463.

McDade, Thomas W., and Kathleen Mullan Harris. 2022. "From Society to Cells and Back Again: New Opportunities for Discovery at the Biosocial Interface." *Discover Social Science and Health* 2 (1): 4. https://doi.org/10.1007/s44155-022-00007-z.

McDade, Thomas W., Elizabeth M. McNally, Richard D'Aquila, Brian Mustanski, Aaron Miller, Lauren A. Vaught, Nina L. Reiser, Elena Bogdanovic, Aaron S. Zelikovich, and Alexis R. Demonbreun. 2020. "Enzyme Immunoassay for SARS-CoV-2 Antibodies in Dried Blood Spot Samples: A Minimally-Invasive Approach to Facilitate Community- and Population-Based Screening." medRxiv. https://doi.org/10.1101/2020.04.28.20081844.

M'charek, Amade. 2013. "BEYOND FACT OR FICTION: On the Materiality of Race in Practice." *Cultural Anthropology* 28 (3): 420–42. https://doi.org/10.1111/cuan.12012.

Meloni, Maurizio. 2022. "A Biosocial Return to Race? A Cautionary View for the Postgenomic Era." *American Journal of Human Biology*.

Mena, Francisco J., Amado M. Padilla, and Margarita Maldonado. 1987. "Acculturative Stress and Specific Coping Strategies among Immigrant and Later Generation College Students." *Hispanic Journal of Behavioral Sciences* 9 (2): 207–25. https://doi.org/10.1177/07399863870092006.

Méndez, Cecilia Díaz. 2015. "Food and Social Change: Signs of Change in Spanish Eating Habits." *Italian Sociological Review* 4 (2): 207. http://www.italiansociologicalreview.com/ojs/index.php?journal=ISR&page=article&op=view&path%5B%5D=83.

Miller, Tracy M., Madiha F. Abdel-Maksoud, Lori A. Crane, Al C. Marcus, and Tim E. Byers. 2008. "Effects of Social Approval Bias on Self-Reported Fruit and Vegetable Consumption: A Randomized Controlled Trial." *Nutrition Journal* 7 (1): 18. https://doi.org/10.1186/1475-2891-7-18.

Mintz, Sidney W., and Christine M. Du Bois. 2002. "The Anthropology of Food and Eating." *Annual Review of Anthropology* 31 (1): 99–119. https://doi.org/10.1146/annurev.anthro.32.032702.131011.

Mintz, Sidney Wilfred. 1986. *Sweetness and Power: The Place of Sugar in Modern History*. Penguin.

Montero, M. Del Pilar, Ana Isabel Mora-Urda, Karim Anzid, Mohamed Cherkaoui, and M. Dolores Marrodan. 2017. "Diet Quality of Moroccan Adolescents Living in Morocco and Spain." *Journal of Biosocial Science* 49 (2): 173–86. https://doi.org/10.1017/S0021932016000183.

Moragues-Faus, Ana, and Claudia Rocío Magaña-González. 2022. "Alimentando Un Futuro Sostenible: Estudio Sobre La Inseguridad Alimentaria En Hogares Españoles Antes y Durante La COVID-19." Barcelona: Universidad de Barcelona. https://web.ub.edu/web/actualitat/w/primer-estudi-sobre-inseguretat-alimentaria-en-llars-espanyoles-.

Moreno, L. A., A. Sarría, and B. M. Popkin. 2002. "The Nutrition Transition in Spain: A European Mediterranean Country." *European Journal of Clinical Nutrition* 56 (10): 992–1003. https://doi.org/10.1038/sj.ejcn.1601414.

Muñoz-Navarro, Roger, Antonio Cano-Vindel, Paloma Ruiz-Rodríguez, Leonardo Adrián Medrano, César González-Blanch, Juan Antonio Moriana, Antonio Capafons Bonet, and Esperanza Dongil-Collado. 2017. "Modelo jerárquico de diagnóstico y derivación de los trastornos mentales comunes en centros de atención primaria. Una propuesta a partir del ensayo clínico PsicAP." *Ansiedad y Estrés* 23 (2): 124–29. https://doi.org/10.1016/j.anyes.2017.10.002.

Nichols, William J., and H. Rosi Song. 2013. *Toward a Cultural Archive of La Movida: Back to the Future*. Rowman & Littlefield.

Nollenberger, Núria Rodríguez-Planas, Natalia. 2014. “A Precarious Position: The Labor Market Integration of New Immigrants in Spain.” Migrationpolicy.Org. March 25, 2014. https://www.migrationpolicy.org/research/precarious-position-labor-market-integration-new-immigrants-spain.

Odoms-Young, Angela M. 2018. “Examining the Impact of Structural Racism on Food Insecurity: Implications for Addressing Racial/Ethnic Disparities.” *Family & Community Health* 41 (Suppl 2 FOOD INSECURITY AND OBESITY): S3–6. https://doi.org/10.1097/FCH.0000000000000183.

“Online Survey Software.” n.d. Qualtrics. Accessed February 8, 2021. https://www.qualtrics.com/core-xm/survey-software/.

Operario, Don, Nancy E. Adler, and David R. Williams. 2004. “Subjective Social Status: Reliability and Predictive Utility for Global Health.” *Psychology & Health* 19 (2): 237–46. https://doi.org/10.1080/08870440310001638098.

Ortiz-Miranda, Dionisio, Olga Moreno Pérez, and Eladio Arnalte Alegre. 2016. “Food and Nutrition Security Discursive Frames in the Context of the Spanish Economic Crisis.” *Food Security* 8 (3): 665–77. https://doi.org/10.1007/s12571-016-0574-x.

Park, Sang Hyun, Ji Sung Yoon, Kyu Chang Won, and Hyoung Woo Lee. 2012. “Usefulness of Glycated Hemoglobin as Diagnostic Criteria for Metabolic Syndrome.” *Journal of Korean Medical Science* 27 (9): 1057–61. https://doi.org/10.3346/jkms.2012.27.9.1057.

Pascual, C. 2023. “Los Extranjeros Disparan El Padrón: Alicante Ya Tiene 362.045 Personas Con Residencia Oficial.” *Información,* April 1, 2023, sec. Alicante. https://www.informacion.es/alicante/2023/04/01/extranjeros-disparan-padron-alicante-85471082.html.

Patil, Crystal L., Craig Hadley, and Perpetue Djona Nahayo. 2009. “Unpacking Dietary Acculturation among New Americans: Results from Formative Research with African Refugees.” *Journal of Immigrant and Minority Health* 11 (5): 342–58. https://doi.org/10.1007/s10903-008-9120-z.

Patterson, Joanne G., Jennifer Russomanno, Andreas A. Teferra, and Jennifer M. Jabson Tree. 2020. “Disparities in Food Insecurity at the Intersection of Race and Sexual Orientation: A Population-Based Study of Adult Women in the United States.” *SSM - Population Health* 12 (December): 100655. https://doi.org/10.1016/j.ssmph.2020.100655.

Pedrós Barnils, Núria, Eva Eurenius, and Per E. Gustafsson. 2020. “Self-Rated Health Inequalities in the Intersection of Gender, Social Class and Regional Development in Spain: Exploring Contributions of Material and Psychosocial Factors.” *International Journal for Equity in Health* 19 (1): 85. https://doi.org/10.1186/s12939-020-01202-7.

Peppin, Hayley. 2022. “Why You Should Embrace the Mediterranean Diet | Harper’s BAZAAR.” *Harper’s Bazaar Australia* (blog). January 7, 2022. https://harpersbazaar.com.au/mediterranean-diet-best-diet-2022/.

Pérez, Elena Ronda, Fernando G. Benavides, Katia Levecque, John G. Love, Emily Felt, and Ronan Van Rossem. 2012. “Differences in Working Conditions and Employment Arrangements among Migrant and Non-Migrant Workers in Europe.” *Ethnicity & Health* 17 (6): 563–77. https://doi.org/10.1080/13557858.2012.730606.

Phelan, Jo C., Bruce G. Link, and Parisa Tehranifar. 2010. “Social Conditions as Fundamental Causes of Health Inequalities: Theory, Evidence, and Policy Implications.” *Journal of Health and Social Behavior* 51 Suppl: S28-40. https://doi.org/10.1177/0022146510383498.

Phillips, Lynne. 2006. “Food and Globalization.” *Annual Review of Anthropology* 35 (1): 37–57. https://doi.org/10.1146/annurev.anthro.35.081705.123214.

Piperata, Barbara A., Sofia A. Ivanova, Pedro Da-gloria, Gonçalo Veiga, Analise Polsky, Jennifer E. Spence, and Rui S. S. Murrieta. 2011. “Nutrition in Transition: Dietary Patterns of Rural Amazonian Women during a Period of Economic Change.” *American Journal of Human Biology* 23 (4): 458–69. https://doi.org/10.1002/ajhb.21147.

“Plataforma de Estudios Longitudinales de Familias Inmigrantes (PELFI) Cuestionario Adulto Principal: Basal.” 2015. 2015. https://www.ciberesp.es/media/810660/cuestionario_adulto-ppal_basal.pdf.

Popkin, Barry M., Linda S. Adair, and Shu Wen Ng. 2012. “Global Nutrition Transition and the Pandemic of Obesity in Developing Countries.” *Nutrition Reviews* 70 (1): 3–21. https://doi.org/10.1111/j.1753-4887.2011.00456.x.

Popkin, Barry M., Kiyah Duffey, and Penny Gordon-Larsen. 2005. “Environmental Influences on Food Choice, Physical Activity and Energy Balance.” *Physiology & Behavior*, Purdue University Ingestive Behavior Research Center Symposium. Dietary Influences on Obesity: Environment, Behavior and Biology, 86 (5): 603–13. https://doi.org/10.1016/j.physbeh.2005.08.051.

Popovic-lipovac, Ana, and Barbara Strasser. 2015. “A Review on Changes in Food Habits Among Immigrant Women and Implications for Health.” *Journal of Immigrant and Minority Health* 17 (2): 582–90. https://doi.org/10.1007/s10903-013-9877-6.

Quesada, James, Laurie Kain Hart, and Philippe Bourgois. 2011. “Structural Vulnerability and Health: Latino Migrant Laborers in the United States.” *Medical Anthropology* 30 (4): 339–62. https://doi.org/10.1080/01459740.2011.576725.

Qureshi, A., F. Collazos, H. W. Revollo, S. Valero, and M. Ramos. 2008. “Factor Structure of the Barcelona Immigration Stress Scale.” *European Psychiatry*, 16th AEP Congress, 23 (April): S280. https://doi.org/10.1016/j.eurpsy.2008.01.588.

Rao, Mayuree, Ashkan Afshin, Gitanjali Singh, and Dariush Mozaffarian. 2013. “Do Healthier Foods and Diet Patterns Cost More than Less Healthy Options? A Systematic Review and Meta-Analysis.” *BMJ Open* 3 (12): e004277. https://doi.org/10.1136/bmjopen-2013-004277.

Reardon, Jenny, and Kim TallBear. 2012. “‘Your DNA Is Our History’: Genomics, Anthropology, and the Construction of Whiteness as Property.” *Current Anthropology* 53 (S5): S233–45. https://doi.org/10.1086/662629.

Restrepo-Mesa, Sandra L., Alejandro Estrada-Restrepo, Laura I. González-Zapata, and Andrés A. Agudelo-Suárez. 2015. “Newborn Birth Weights and Related Factors of Native and Immigrant Residents of Spain.” *Journal of Immigrant and Minority Health* 17 (2): 339–48. https://doi.org/10.1007/s10903-014-0089-5.

Revollo, Hilda-Wara, Adil Qureshi, Francisco Collazos, Sergi Valero, and Miguel Casas. 2011. “Acculturative Stress as a Risk Factor of Depression and Anxiety in the Latin American Immigrant Population.” *International Review of Psychiatry* 23 (1): 84–92. https://doi.org/10.3109/09540261.2010.545988.

Reyes, Beatriz. 2021. “The SACNAS Seminar Series: Beatriz O. Reyes.” Presented at the University of UTAH SACNAS Chapter, November 9.

Reyes, Beatriz O. 2023. “Indigenous People Navigating Healthcare in a Dystopian Society.” Presented at the Medical Humanities & Bioethics Montgomery Lectures, Chicago, Illinois, April 13. https://planitpurple.northwestern.edu/event/589350.

Rinken, Claudia Finotelli and Sebastian. 2023. “A Pragmatic Bet: The Evolution of Spain’s Immigration System.” Migrationpolicy.Org. April 4, 2023. https://www.migrationpolicy.org/article/spain-immigration-system-evolution.

Riosmena, Fernando, Reanne Frank, Ilana Redstone Akresh, and Rhiannon A. Kroeger. 2012. “U.S. Migration, Translocality, and the Acceleration of the Nutrition Transition in Mexico.” *Annals of the Association of American Geographers* 102 (5): 1209–18. https://www.jstor.org/stable/23275596.

Robinson, Cedric J. 1983. *Black Marxism: The Making of the Black Radical Tradition*. Univ of North Carolina Press.

Rodríguez-Mireles, Silvia, Beatriz G. López-Valcárcel, Lluís Serra-Majem, Aránzazu Hernández-Yumar, Patricia Barber-Pérez, Jaime Pinilla-Domínguez, Santiago Rodríguez-Feijoo, and Alejandro Rodríguez-Caro. 2018. “Effect of Tourism Pressure on the Mediterranean Diet Pattern.” *Nutrients* 10 (10): 1338. https://doi.org/10.3390/nu10101338.

Rodríguez-Muñoz, María de la Fe, Natalia Ruiz-Segovia, Cristina Soto-Balbuena, Huynh-Nhu Le, María Eugenia Olivares-Crespo, and Nuria Izquierdo-Méndez. 2020. “The Psychometric Properties of the Patient Health Questionnaire-4 for Pregnant Women.” *International Journal of Environmental Research and Public Health* 17 (20): 7583. https://doi.org/10.3390/ijerph17207583.

Rolfe, Pamela, and Loveday Morris. 2020. “Spain Goes on Nationwide Lockdown as Coronavirus Cases Surge.” *Washington Post*, March 14, 2020. https://www.washingtonpost.com/world/europe/coronavirus-spain-nationwide-lockdown/2020/03/14/3bec8690-6619-11ea-8a8e-5c5336b32760_story.html.

Rubio, Jordi, and Luis Felipe Castilleja. 2020. “Queues for Spain’s Food Banks Swell as Coronavirus Cases Dwindle.” *Reuters*, June 4, 2020. https://www.reuters.com/article/us-health-coronavirus-spain-poverty-idUSKBN23B0TG.

Rudmin, Floyd. 2009. “Constructs, Measurements and Models of Acculturation and Acculturative Stress.” *International Journal of Intercultural Relations*, Critical Acculturation Psychology, 33 (2): 106–23. https://doi.org/10.1016/j.ijintrel.2008.12.001.

Sargent, Carolyn, and Stéphanie Larchanché. 2011. “Transnational Migration and Global Health: The Production and Management of Risk, Illness, and Access to Care.” *Annual Review of Anthropology* 40: 345–61. https://www.jstor.org/stable/41287737.

Schatzkin, Arthur, Victor Kipnis, Raymond J. Carroll, Douglas Midthune, Amy F. Subar, Sheila Bingham, Dale A. Schoeller, Richard P. Troiano, and Laurence S. Freedman. 2003. “A Comparison of a Food Frequency Questionnaire with a 24-Hour Recall for Use in an Epidemiological Cohort Study: Results from the Biomarker-Based Observing Protein and Energy Nutrition (OPEN) Study.” *International Journal of Epidemiology* 32 (6): 1054–62. https://doi.org/10.1093/ije/dyg264.

Schiller, Nina Glick, Linda Basch, and Cristina Szanton Blanc. 1995. “From Immigrant to Transmigrant: Theorizing Transnational Migration.” *Anthropological Quarterly* 68 (1): 48–63. https://doi.org/10.2307/3317464.

Schröder, Helmut, Jaume Marrugat, Juan Vila, Maria I. Covas, and Roberto Elosua. 2004. “Adherence to the Traditional Mediterranean Diet Is Inversely Associated with Body Mass Index and Obesity in a Spanish Population.” *The Journal of Nutrition* 134 (12): 3355–61. https://doi.org/10.1093/jn/134.12.3355.

Segal-Isaacson, C J, Judith Wylie-Rosett, and Kim M. Gans. 2004. “Validation of a Short Dietary Assessment Questionnaire: The Rapid Eating and Activity Assessment for Participants Short Version (REAP-S).” *The Diabetes Educator* 30 (5): 774–81. https://doi.org/10.1177/014572170403000512.

Serra-Mallol, Christophe, Fabrice Wacalie, Akila Nedjar-Guerre, Guillaume Wattelez, Stéphane Frayon, and Olivier Galy. 2021. “‘Eating Well’ in Pacific Islands Countries and Territories: A Qualitative and Normative Approach to Food Cultures in New Caledonia.” *Appetite* 163 (August): 105192. https://doi.org/10.1016/j.appet.2021.105192.

Shankar-Krishnan, Nithya, Albert Fornieles Deu, and David Sánchez-Carracedo. 2021. “Associations Between Food Insecurity And Psychological Wellbeing, Body Image, Disordered Eating And Dietary Habits: Evidence From Spanish Adolescents.” *Child Indicators Research* 14 (1): 163–83. https://doi.org/10.1007/s12187-020-09751-7.

Simpson, Stephen J., and David Raubenheimer. 2012. *The Nature of Nutrition: A Unifying Framework from Animal Adaptation to Human Obesity*. Princeton University Press.

Smith, Michael D., and Dennis Wesselbaum. 2020. “COVID-19, Food Insecurity, and Migration.” *The Journal of Nutrition* 150 (11): 2855–58. https://doi.org/10.1093/jn/nxaa270.

Sofi, Francesco, Rosanna Abbate, Gian Franco Gensini, and Alessandro Casini. 2010. “Accruing Evidence on Benefits of Adherence to the Mediterranean Diet on Health: An Updated Systematic Review and Meta-Analysis.” *The American Journal of Clinical Nutrition* 92 (5): 1189–96. https://doi.org/10.3945/ajcn.2010.29673.

Sousa, Emily, Andrés Agudelo-Suárez, Fernando G. Benavides, Marc Schenker, Ana M. García, Joan Benach, Carlos Delclos, et al. 2010. “Immigration, Work and Health in Spain: The Influence of Legal Status and Employment Contract on Reported Health Indicators.” *International Journal of Public Health* 55 (5): 443–51. https://doi.org/10.1007/s00038-010-0141-8.

“Spain Country Health Profile 2021.” 2021. State of Health in the EU. Brussels: OECD/European Observatory on Health Systems and Policies. https://health.ec.europa.eu/system/files/2021-12/2021_chp_es_english.pdf.

StataCorp. 2017. “Stata Statistical Software: Release 15.” Stata Statistical Software. College Station, TX: StataCorp LLC.

Strand, Mattias. 2023. “Food and Trauma: Anthropologies of Memory and Postmemory.” *Culture, Medicine, and Psychiatry* 47 (2): 466–94. https://doi.org/10.1007/s11013-022-09785-2.

Strings, Sabrina. 2019. *Fearing the Black Body*. NYU Press. https://nyupress.org/9781479886753/fearing-the-black-body.

Teruya, Stacey A., and Shahrzad Bazargan-Hejazi. 2013. “The Immigrant and Hispanic Paradoxes: A Systematic Review of Their Predictions and Effects.” *Hispanic Journal of Behavioral Sciences* 35 (4): 486–509. https://doi.org/10.1177/0739986313499004.

“The Unequal Impact of COVID-19: A Spotlight on Frontline Workers, Migrants and Racial/Ethnic Minorities.” n.d. OECD. Accessed June 12, 2023. https://www.oecd.org/coronavirus/policy-responses/the-unequal-impact-of-covid-19-a-spotlight-on-frontline-workers-migrants-and-racial-ethnic-minorities-f36e931e/.

“The Unequal Impact of COVID-19: A Spotlight on Frontline Workers, Migrants and Racial/Ethnic Minorities - OECD.” 2022. OECD Tackling Coronavirus (Covid-19): Contributing a Global Effort. Organisation for Economic Co-operation and Development

(OECD). https://read.oecd-ilibrary.org/view/?ref=1133_1133188-lq9ii66g9w&title=The-unequal-impact-of-COVID-19-A-spotlight-on-frontline-workers-migrants-and-racial-ethnic-minorities.

Tomás-Sábado, Joaquín, Montserrat Antonin, Adil Qureshi, and Francisco Collazos. 2007. "Construction and Preliminary Validation of the Barcelona Immigration Stress Scale." *Psychological Reports* 100 (3): 1013–23. https://doi.org/10.2466/pr0.100.3.1013-1023.

Tovar, Alison, Aviva Must, Nesly Metayer, David M. Gute, Alex Pirie, Raymond R. Hyatt, and Christina D. Economos. 2013. "Immigrating to the US: What Brazilian, Latin American and Haitian Women Have to Say About Changes to Their Lifestyle That May Be Associated with Obesity." *Journal of Immigrant and Minority Health* 15 (2): 357–64. https://doi.org/10.1007/s10903-012-9665-8.

Tsing, Anna Lowenhaupt. 2015. *The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins*. Princeton University Press. https://press.princeton.edu/books/paperback/9780691220550/the-mushroom-at-the-end-of-the-world.

Tull, Eugene S., Anne Thurland, Ronald E. LaPorte, and Earle C. Chambers. 2003. "Acculturation and Psychosocial Stress Show Differential Relationships to Insulin Resistance (HOMA) and Body Fat Distribution in Two Groups of Blacks Living in the US Virgin Islands." *Journal of the National Medical Association* 95 (7): 560–69. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2594649/.

Vallejo, Miguel A., Laura Vallejo-Slocker, Enrique G. Fernández-Abascal, and Guillermo Mañanes. 2018. "Determining Factors for Stress Perception Assessed with the Perceived Stress Scale (PSS-4) in Spanish and Other European Samples." *Frontiers in Psychology* 9: 37. https://doi.org/10.3389/fpsyg.2018.00037.

Vega, Miguel Ángel García. 2020. "More Unemployment and Lower Wages: Coronavirus Crisis Dimming the Prospects of Young People in Spain." EL PAÍS. May 18, 2020. https://english.elpais.com/economy_and_business/2020-05-18/more-unemployment-and-lower-wages-coronavirus-crisis-dimming-the-prospects-of-young-people-in-spain.html.

Velasco, Irene Hernández. 2020. "Las colas del hambre por la crisis del coronavirus inundan Madrid." *BBC News Mundo*, May 25, 2020, sec. Internacional. https://www.bbc.com/mundo/noticias-internacional-52780033.

Viruell-Fuentes, Edna A. 2007. "Beyond Acculturation: Immigration, Discrimination, and Health Research among Mexicans in the United States." *Social Science & Medicine* 65 (7): 1524–35. https://doi.org/10.1016/j.socscimed.2007.05.010.

Waller, Göran. 2015. "Self-Rated Health in General Practice: A Plea for Subjectivity." *The British Journal of General Practice* 65 (632): 110–11. https://doi.org/10.3399/bjgp15X683833.

Wells, Jonathan C.K. 2012. "Obesity as Malnutrition: The Role of Capitalism in the Obesity Global Epidemic." *American Journal of Human Biology* 24 (3): 261–76. https://doi.org/10.1002/ajhb.22253.

Wheeler, Sarah Ann, Daniel Gregg, and Mrinila Singh. 2019. "Understanding the Role of Social Desirability Bias and Environmental Attitudes and Behaviour on South Australians' Stated Purchase of Organic Foods." *Food Quality and Preference* 74 (June): 125–34. https://doi.org/10.1016/j.foodqual.2019.01.007.

Willett, W. C., F. Sacks, A. Trichopoulou, G. Drescher, A. Ferro-Luzzi, E. Helsing, and D. Trichopoulos. 1995. "Mediterranean Diet Pyramid: A Cultural Model for Healthy

Eating." *The American Journal of Clinical Nutrition* 61 (6): 1402S-1406S. https://doi.org/10.1093/ajcn/61.6.1402S.

Williams, Sharon R., and Thomas W. McDade. 2009. "The Use of Dried Blood Spot Sampling in the National Social Life, Health, and Aging Project." *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences* 64B (Suppl 1): i131–36. https://doi.org/10.1093/geronb/gbn022.

Williamson, Laura. 2023. "Mediterranean Lifestyle, Not Just Diet, May Greatly Improve Health." *American Heart Association News*, February 28, 2023. https://www.heart.org/en/news/2023/02/28/mediterranean-lifestyle-not-just-diet-may-greatly-improve-health.

Wilson, Alyce, and Andre Renzaho. 2015. "Intergenerational Differences in Acculturation Experiences, Food Beliefs and Perceived Health Risks among Refugees from the Horn of Africa in Melbourne, Australia." *Public Health Nutrition* 18 (1): 176–88. https://doi.org/10.1017/S1368980013003467.

Winkleby, M A, D E Jatulis, E Frank, and S P Fortmann. 1992. "Socioeconomic Status and Health: How Education, Income, and Occupation Contribute to Risk Factors for Cardiovascular Disease." *American Journal of Public Health* 82 (6): 816–20. https://doi.org/10.2105/AJPH.82.6.816.

Wise, A., and S. Velayutham. 2009. *Everyday Multiculturalism*. Springer.

Worthman, Carol M., and Brandon Kohrt. 2005. "Receding Horizons of Health: Biocultural Approaches to Public Health Paradoxes." *Social Science & Medicine*, The Social Production of Health: Critical Contributions from Evolutionary, Biological and Cultural Anthropology: Papers in Memory of Arthur J. Rubel, 61 (4): 861–78. https://doi.org/10.1016/j.socscimed.2004.08.052.

Wrangham, Richard, and NancyLou Conklin-Brittain. 2003. "'Cooking as a Biological Trait.'" *Comparative Biochemistry and Physiology Part A: Molecular & Integrative Physiology* 136 (1): 35–46. https://doi.org/10.1016/S1095-6433(03)00020-5.

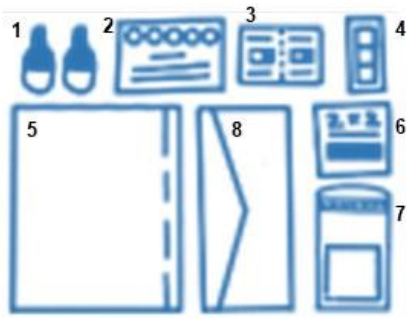
Xavier, Adrianne Lickers. 2017. "Longhouse to the Greenhouse." In *Food Leadership: Leadership and Adult Learning for Global Food Systems Transformation*, edited by Catherine Etmanski, 3–16. International Issues in Adult Education. Rotterdam: SensePublishers. https://doi.org/10.1007/978-94-6351-050-9_1.

Yancy, Clyde W. 2020. "COVID-19 and African Americans." *JAMA*, April. https://doi.org/10.1001/jama.2020.6548.

Yates-Doerr, Emily. 2015. *The Weight of Obesity: Hunger and Global Health in Postwar Guatemala*. Univ of California Press.

APPENDIX I

INSTRUCCIONES



¿Qué hay en su kit?

1. 2 lancetas de un sólo uso
2. 1 tarjeta para muestra de sangre (Whatman)
3. 2 toallitas de alcohol
4. 1 apósito adhesivo
5. 1 paño
6. 1 gasa
7. 1 bolsita de plástico con desecante
8. 1 sobre prefranqueado de devolución

Paso por paso

Lavarse las manos con jabón y agua tibia y dejamos secar al aire.

Colocar el paño sobre una mesa para crear un espacio sin contaminación. Abrir la tarjeta Whatman para que quede lista para paso 7.

Frotar / agitar ambas manos para conseguir mejor fluidez de gotas de sangre (*paso importante*!)

Desinfectar el dedo medio o anular de la mano no dominante con la toallita con alcohol. Dejar secar.

Retirar la tapa de la lanceta. Presionar el extremo (sin tapa) contra el dedo (en su borde externo lejos del centro de yema)

Limpiar la primera gota con la gasa (*recomendamos no utilizar la primera gota*)

Colocar el dedo con la gota sobre el PRIMER círculo de la tarjeta Whatman, dejar caer una GRAN gota suavemente *(no presionar!)*

Rellenar el resto de círculos de la tarjeta: una gota – un circulo. *Si necesita más sangre realice un suave masaje en el dedo desde la base hacia la punta + limpiar entre gotas con gasa*

Colocar el apósito adhesivo sobre la zona de punción.

Escribir en la tarjeta NAME= CÓDIGO (aparece junto a su nombre y apellidos en el sobre de envío). FECHA y HORA de realización. Dejarla secar (sin tapar) entre 4 y 12 horas

Colocar la tarjeta seca en la bolsa con desecante. Introducir en el sobre de devolución prefranqueado: TARJETA + HOJA DE INSTRUCCIONES cumplimentada

Cerrar el sobre y depositar en un buzón de correos.

Northwestern University | Universitat d'Alacant Universidad de Alicante

ESTUDIO MCES

MIGRACIÓN, ESTRÉS, COMIDA Y SALUD

Recomendaciones de utilización del kit

1. Aconsejamos la realización de la toma de muestra sanguínea, de forma preferente, separada al menos 4 horas (aprox) desde la última comida, siendo el momento ideal previo al desayuno.
2. Para cumplimentar los **datos** de la tarjeta de muestra sanguínea, aconsejamos escribir cada uno de ellos al principio, previamente al depósito de las gotas de sangre, de forma que facilite su lectura y mediante la utilización de bolígrafo o rotulador no borrable.
3. **Los datos** necesarios para cumplimentar la tarjeta son los siguientes:
    - Name: Código personal (adjudicado de manera individual y que podrá encontrar tanto en nuestros correos electrónicos de información y seguimiento del proyecto que especialmente le enviaremos como en el sobre de envío, justo a continuación de su nombre y apellidos.
    - Date: Fecha y hora de realización de la prueba

Cuestionario

1. En los últimos 14 días ¿Se ha encontrado usted enfermo/a?

    Sí No

    Si se ha encontrado enfermo/a en los últimos 14 días ¿Cuáles fueron sus síntomas?

    _____

2. En los últimos 7 días ¿Se ha encontrado usted enfermo/a?

    Sí No

    Si se ha encontrado enfermo/a en los últimos 14 días ¿Cuáles fueron sus síntomas?

    _____

Firma, Nombre y Apellido

_____

¿Cómo recibiré mi tarjeta de regalo digital?

Una vez recibamos el sobre de devolución correctamente con el contenido adecuado (tarjeta de muestra y hoja informativa cumplimentada con sus datos), recibirá en su correo electrónico personal, que previamente nos ha facilitado, la Tarjeta Regalo Digital.

Nota: (no debe preocuparse por la dirección ya que, tal y como puede comprobar, el sobre de devolución está preparado con todos los datos del Proyecto y de la Universidad)

CURRICULUM VITAE

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Education

PhD, Anthropology, Northwestern University, 2023

Graduate Certificate in Society, Biology, and Health

Committee: William R Leonard (Advisor), Thomas W. McDade, Sera L. Young, Elena Ronda Pérez

MA, Anthropology, Northwestern University, 2022

BA, Anthropology & Spanish, University of Michigan, 2012

Appointments

2023-2024	(Upcoming) US Fulbright Scholar, Spain
2024	(Upcoming) Health Services Research Fellow, Center of Innovation for Veteran Centered & Value-Driven Care in Seattle
2023-2024	Honorary Associate Researcher, Public Health, University of Alicante, Spain
2023, 2022	Instructor of Record, Department of Anthropology, Northwestern University
2019	Instructor of Record, Chicago Field Studies Program in Public Health, Northwestern University
2019-2023	Fellow, Slivka Residential College of Science & Engineering, Northwestern University
2017-2019	Assistant Chair, Slivka Residential College of Science and Engineering, Northwestern U
2014-2016	Child Nutrition Programs Specialist, Northern Illinois Food Bank (Geneva, IL)
2013	Grocery Team Specialist, Whole Foods Market (Naperville, IL)

Grants

2022	Conference Travel Grant, The Graduate School, Northwestern University ($1,600)
2020	Doctoral Dissertation Research Improvement Grant, National Science Foundation ($25,192)

2020422: "Eating to fit in: Impacts of acculturative stress on diet change and metabolic health among immigrant young adults in Spain"

2020 Dissertation Fieldwork Grant, Wenner-Gren Foundation for Anthropology ($19,996)
10013: "Social hierarchies of diet and their effects on adolescent health in Spain"

2020 Earle Dissertation Research Grant, Northwestern University (awarded $15,000, but declined)
"Eating to fit in: Impacts of migration stress on diet change and metabolic health among immigrant young adults in Spain"

2020 Graduate Research Grant, Northwestern University ($3,000)

2020 LeCron Foster & Friends of Anthropology at Northwestern Summer Research Grant ($1,236)

2018 Summer Language Grant, Northwestern University ($2,000)

Fellowships & Awards

2023, 2022 Conference Travel Award, Human Biology Association ($500)

2022 Student Poster Award, Interdisciplinary Association for Population Health Sciences 2022 Conference, Minneapolis, MN

2022 Science in Human Culture Research Cluster Award ($400)

2022, 2019 Society, Biology & Health Research Cluster Award ($400)

2021-present Graduate Affiliate, Science and Human Culture Research Cluster

2017-present Graduate Affiliate, Society, Biology & Health Research Cluster

2018, 2017 Graduate Student Dissertation Research Travel Award, Buffett Institute for Global Studies at Northwestern University ($5,000)

2018 Society, Biology & Health Research Fellowship, Northwestern University ($30,000)

2017 University Fellowship, The Graduate School ($30,000)

2014 Child Hunger Corps Fellowship, Feeding America ($30,000)

2013 US Fulbright Fellowship, English Teaching Assistant at Instituto de Educación Secundario Colmenarejo, Madrid, Spain ($18,964)

2010, 2011 Academic All-American Award, National Collegiate Athletic Association (NCAA)

2009-2012 Academic All-Big Ten Award, The Big Ten Conference

Publications

1. *(Under review)* **Koselka E**, Leonard WR, Experiences and expressions of stress among US food industry workers during the 2020 Covid-19 pandemic. *American Journal of Human Biology*.
2. (*Under review*) Rosen F, Settel L, Irvine F, **Koselka E**, Miller JD, Young SL, Associations between food insecurity and child and parental physical, nutritional, psychosocial, and economic well-being globally during the first 1000 days: A scoping review. *Maternal and Child Nutrition.*
3. **Koselka E**, Lee A, Cetrone H, Minasov A, Santoso M, Leonard WR, Horton TH. (2019). Walking Green: Developing an evidence base for Nature Prescriptions. *International Journal of Environmental Research & Public Health*. 16(22), 4338.
4. Benazizi IF, MB Blasco, **E Koselka,** JM Martinez, ER Perez. (2019). What is the diet of the immigrant population in Spain? Results of a systematic literature review. *Anales del Sistema Sanitario de Navarra*. 55-68.

Works in Preparation

1. **Koselka E**, Leonard WR, Food and nutrition inequality in Europe: a narrative literature review. *American Journal of Human Biology*.
2. **Koselka E**, Between local and global imaginings of the Mediterranean Diet: insights and history from Spain. *Appetite*.
3. **Koselka E**, Dimensions of adolescent resilience vary in multinational sample in Spain, deteriorate at 2-year follow-up. *PLoS One*.

Conference Presentations

1. **Koselka E,** WR Leonard, MP Morón Esteve, WR Leonard, and E Ronda Pérez. 2023. Examining migration-related stress exposure and diet change processes in two generations of Latinos in Alicante, Spain. 2023 Human Biology Association, Reno, NV.
2. **Koselka E,** ER Pérez. 2022. Costs and coping for food industry workers during the Coronavirus pandemic. 2022 Interdisciplinary Association for Population Health Sciences, Minneapolis, MN.
3. **Koselka E**, Eating upon resettlement in Alicante: anthropological project about the norms, stressors & preferences that influence eating for those who immigrated to Alicante. 2022. Public Health Working Group at University of Alicante. San Vicente de Raspeig, Alicante, Spain.
4. **Koselka E,** E Maududi, W Leonard. 2022. Unpacking stress among food industry workers during the Covid-19 pandemic. 2022 Human Biology Association, Denver, CO.
5. **Koselka E**, I Benazizi, ER Pérez. 2020. Does living in Spain improve immigrants' diet and metabolic health? 2020 Human Biology Association, Los Angeles, CA. [presentation not possible due to COVID-19 cancellation].

6. **Koselka E**, E Felt, ER Perez. 2019. Dimensions of adolescent resilience respond to social-ecological change in Spain. 2019 Human Biology Association, Cleveland, OH.
7. **Koselka E**. 2019. Effects of social change on food habits and metabolic health in Spain. 2019 Society for Applied Anthropology, Portland, OR.
8. **Koselka E**. 2018. Eat and embody: exploring links between changing food environments and deepening health inequity at two Mediterranean cities. 2018 American Anthropological Association, San Jose, CA.
9. **Koselka E**. HM Cetrone, A Minasov, AJ Lee, WR Leonard, TH Horton. 2018. Green exercise improves mood, reduces anxiety. 2018 Human Biology Association. Austin, TX.
10. Horton TH, **E Koselka**, AJ Lee, HM Cetrone, A Minasov, WR Leonard, MA Pereira, J Noguiera de Brito, JM Larson, IS Schneider. 2018. Lessons Learned: Implementation of longitudinal studies of green exercise. Intl Congress on Integrative Medicine & Health. Baltimore, MD.
11. Pérez ER, A Cayuela, **ED Koselka**, IF Benazizi, JM Martinez. 2018. Occupational risks for migrant workers in Spain. International Congress of Occupational Health. Dublin, Ireland.
12. **Koselka ED**, JB Lamplough. 2016. Making the healthy choice the easy choice. Illinois Food Bank Access, Capability and Engagement Conference. Geneva, IL.

Teaching & Mentoring

1. Instructor of Record, Northwestern University (Evanston) Summer 2023 & 2022 “Human Origins: An Introduction to Biological Anthropology” – ANTH 213
2. Instructor of Record, Northwestern University (Evanston) Fall 2019 “Field Studies in Public Health” – CFS 932
3. Teaching assistant to Thomas McDade, Northwestern University (Evanston) Spring 2019 “Social and Health Inequalities” – ANTH 221
4. Teaching assistant to Ana Aparicio, Northwestern University (Evanston) Winter 2019 “Senior Seminar” – ANTH 390
5. Teaching assistant to William Leonard, Northwestern University (Chicago) Fall 2018 “Introduction to International Public Health” – PUBHLTH 301
6. Teaching assistant to Elizabeth Smith, Northwestern University (Evanston) Spring 2018 “Culture and Society” – ANTH 211
7. Lead Teacher, Global Classrooms Model UN Program, Instituto de Educación Secundario Colmenarejo (Madrid, Spain) 2012 - 2013
8. Spanish Teacher, Ann Arbor Languages Partnership, University of Michigan School of Education and Ann Arbor Public Schools, 2010 - 2012

Students Advised

Esra Maududi (2022) & Jack Hume (2020) - *Baker Program Summer Research Grant, Northwestern U*

20 undergraduates on Executive Board (2017 - 2019), Slivka Residential College of Science & Engineering, Northwestern University

Hollyn Cetrone (2017) - *Undergraduate Research Grant and MPH, Northwestern University*

Rachel McBride (2015) - *MA Nutrition & Dietetics, Northern Illinois University*

Research Experience

Department of Community Nursing, Preventative Medicine & Public Health, and History of Science, University of Alicante, Elena Ronda Pérez (2017-2024)

- Designed and ran Estudio MCES - *la Migración, el Estrés, la Comida y la Salud* (Migration, Stress, Food & Health Study), to evaluate relationships between migration stress, diet change and metabolic health among Latinos in Alicante, Spain. Collected survey responses and dried-bloodspot samples from 125 parent-child pairs; conducting 30 interviews and analyzing data.
- Manage all study correspondence & reporting; hired/onboarded 1 Research Assistant (RA) in Alicante.
- Led data analysis for the Platform for Longitudinal Studies of Immigrant Families (PELFI - *Plataforma de Estudios Longitudinales de Familias Inmigrantes*) and gave talks describing mechanisms of health disparities among adults, and adolescent resilience changes over a 2-year period.

Department of Anthropology, Northwestern University, William Leonard, Thomas McDade & Sera Young

- Designed and ran study on essential food workers' conditions and coping during Covid-19: conducted 35 phone interviews; transcribed & analyzed data; trained 2 undergraduate researchers; prepared papers and presentations
- Collaborated and ran analysis for Screening for Covid Antibodies in Neighborhoods (SCAN) study, PI McDade (2022) comparing perceived exposure & SARS-CoV-2 antibody response between essential health workers; essential food workers; and remote workers in 2020.
- Led 5-member team of undergraduates through coding & analyzing interview data in the Singida Nutrition and Agroecology Project, PI Young (2017)

Walking Green Research Project, Northwestern University, Theresa Horton & William Leonard (2017-19)

- Onboarded & managed participants; administered surveys; collected & analyzed anthropometric, salivary cortisol & blood chemistry data; published results on health benefits of forested walks

- Mentored 4 undergraduate students on data collection, cleaning & analysis; advised them on grant applications, presentations, and publications

Child Nutrition Programs, Northern Illinois Food Bank (2014-16)

- Liaised between 500 community organizations, state officials, and USDA administrators to address and improve quality, efficacy, and ease of federal meal programs for children in Illinois.
- Managed 3-million-dollar budget; organized and led 120 food safety trainings per year for the Child and Adult Food Care Program (CACFP) and the Summer Food Service Program (SFSP)

Child Hunger Corps, Feeding America (2013-14)

- Conducted interviews, surveys, focus groups, and literature reviews to assemble coalitions in northern Illinois that could improve local children's food security.
- Facilitated the opening of two food pantries for students and families at Huntley Middle School and Northern Illinois University in DeKalb, IL,
- Piloted direct-to-school nutrition education program that encourages children ages 5-12 year to take an active role in the 15-minute preparation of healthy meals & snacks.

Academic Service

2021-2023	Human Biology Association Student Representative
2022	President, Anthropology Graduate Student Association, Northwestern University
2022, 2021	Ad hoc manuscript reviewer for Frontiers in Psychology, American Journal of Human Biology
2017	Board Member, Anthropology Graduate Students Association, Northwestern U

Conference & Meetings

2023	*Session organizer* - "What we gain: moving beyond the buzzwords to productive conversations on equity and inclusion" Panelists Robin Nelson, Risana Chowdhury & Rana Dajani. Human Biology Association, Reno, NV
2023	*Session organizer* - Human Biology Association student member reception. Reno, NV
2022	*Session organizer* - "Managing expectations of a dissertation or thesis" Panelists Zaneta Thayer & Andrea Wiley. Human Biology Association, Denver, CO
2022	*Session organizer* - Human Biology Association student member reception. Denver, CO
2022	Conference abstract reviewer for Interdisciplinary Association for Population Health Sciences
2021	*Session organizer* - HBA student-led workshop on Grant-writing. Panelists: Robin Bernstein, George (PJ) Perry, Katherine Clancy. 2021. Virtual.

2021 *Session organizer* - HBA student-led workshop on Job-seeking. Panelists Andrew Wooyoung Kim, Theresa Gildner, Jennifer Cullin, Kyle Wiley. 2021. Virtual.

Community Engagement

2020-present Member, Chicago Food Policy Action Council (Chicago, IL)

2020-present Member, Midwest Consortium for Equity, Research & Food Justice (Chicago, IL)

2016-2020 Volunteer, Northern Illinois Food Bank (Geneva, IL)

2018-2019 Youth Mentor, MetaMedia Digital Youth Center (Evanston, IL)

2014-2016 Member, DeKalb County Community Gardens (DeKalb, IL)

2014-2016 Wellness Committee Chair, Northern Illinois Food Bank (Geneva, IL)

2014-2016 Sustainability Committee Member, Northern Illinois Food Bank (Geneva, IL)

2009-2012 Women's Varsity Swim & Dive Team Representative, Student-Athlete Advisory Council, University of Michigan (Ann Arbor, MI)

Professional Associations

Human Biological Association

Interdisciplinary Association for Population Health Sciences

Medical Anthropology Young Scholars, European Association of Social Anthropology

American Anthropological Association

Society for Applied Anthropology

Skills

Language: Spanish (advanced), Catalan (intermediate), Valencian (intermediate)

Data analysis: Stata, R, Qualtrics, Atlas.ti, DeDoose, SPSS, Excel

References

William R. Leonard

Abraham Harris Professor of Anthropology and Director of the Program in Global Health Studies

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Professor of Anthropology and Global Health Studies, Institute for Policy Research Faculty Fellow

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Elena Ronda Pérez

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