

Unhealthy lifestyles among older adults: exploring transitions in Mexico and the US

Rebeca Wong · Mary Beth Ofstedal ·
Kathryn Yount · Emily M. Agree

Published online: 5 November 2008
© Springer-Verlag 2008

Abstract Lifestyle risk factors are important precursors of old age disease and disability, and the population level impact of these factors likely differs across countries that vary in their economic growth and the attributes of the populations that adopt and abandon unhealthy lifestyles. This paper describes the stage of “lifestyle transition” among older adults in two countries with vastly different trajectories of socio-economic development. A series of hypotheses are proposed on the socioeconomic patterns of health risk factors that would be expected in the two countries, given their economic circumstances and the historical timing of policy interventions that were initiated to mitigate lifestyle risks in these populations. The paper compares the prevalence of smoking tobacco, drinking alcohol, obesity, and lack of physical exercise, as well as the socioeconomic and demographic covariates of these risk factors, among adults aged 55 and older in Mexico and

the United States. The findings indicate that smoking- and physical-activity-related transitions toward healthier lifestyles are well under way among older adults in the United States but not in Mexico, whereas a trend toward reduced levels of obesity has just begun in the United States but not in Mexico. There is no evidence of a transition in heavy alcohol drinking in either country among older adults.

Keywords Lifestyle · Obesity · Smoking · Alcohol · Exercise · Mexico · United States

Introduction

Lifestyle risk factors such as obesity, smoking, a lack of exercise, or alcohol abuse, are largely preventable and have costly consequences, especially later in life. It is widely recognized that differences in lifestyle contribute to health differentials in populations. However, little is known about how these risk factors differently affect the individual and social burden of aging across countries that have different demographic and epidemiological profiles and that have experienced economic, social, and institutional changes at different paces. In this paper, we study the prevalence and socioeconomic correlates of four important lifestyle risk factors (smoking tobacco, heavy alcohol drinking, obesity, and a lack of exercise) among older adults in the United States and Mexico. These countries are interesting cases because they are tightly linked geographically, socially, and economically. The availability of detailed, comparable data on older adults for these two countries is fairly recent, however, and offers a unique opportunity for a comparative study on aging.

Our research is guided by a conceptual framework that integrates a life course perspective with the economic

R. Wong (✉)
Sealy Center on Aging, University of Texas Medical Branch,
Jennie Sealy Building, Room 3.232, 301 University Boulevard,
Galveston, TX 77555, USA
e-mail: rewong@utmb.edu

M. B. Ofstedal
Survey Research Center and Population Studies Center,
University of Michigan, 426 Thompson Street,
Ann Arbor, MI 48106, USA

K. Yount
Departments of Global Health and Sociology, Emory University,
1518 Clifton Rd., NE, Room 724, Atlanta, GA 30322, USA

E. M. Agree
Department of Population, Family, and Reproductive Health,
Johns Hopkins Bloomberg School of Public Health,
615 North Wolfe Street, Room E4646,
Baltimore, MD 21205, USA

model of health production. According to life course models, individual attributes and social influences shape lifestyle decisions throughout the life course. A precocious transition to adulthood, measured by early age at first childbearing or employment for example, increases the number and types of stressors on an individual, which may foster the adoption of risky lifestyles. Likewise, the experiences of divorce or widowhood later in life may influence the adoption of lifestyle risks.

Although individuals construct their own life course through decisions that they make, historical and social circumstances also shape these decisions. Thus, to the life course framework that recognizes individual and social influences, we add the health production approach from economics to model health and health-related outcomes (Becker 1965; Grossman 1971). According to this approach, contextual factors such as public policies, public health messages, and cultural norms also influence if, when, and for how long, lifestyle risks are adopted by an individual. We therefore propose that there is a “lifestyle transition,” similar to the demographic transition, wherein different historical influences lead to higher or lower prevalence of lifestyle risks among those in different socio-economic settings. We expect that these two countries will be at different stages in this lifestyle transition because structural factors such as urbanization and economic growth, as well as ideational factors such as “Western” consumerism, will condition the adoption of lifestyle risk behaviors at critical life stages of individuals.

The paper is organized as follows: we first introduce the conceptual framework that guides the present study and then summarize findings from prior studies of lifestyle risk factors. We then provide a brief overview of the US and Mexican settings with respect to health and health behaviors among the current generations of older adults. We describe the patterns of lifestyle risk factors and their major socioeconomic covariates among older adults to characterize the relative stages of lifestyle transitions at which the two populations are. Although the transition paths may not be linear or unidirectional, and certainly the relative standing of one country compared to the other may differ across lifestyles, this perspective helps to understand the health differentials and burden of aging in the two countries. We then present the hypotheses to be tested, describe the data, methods, and results, and conclude with a discussion of the findings and of our planned future work on this subject.

Background

Epidemiologists, sociologists, and economists have used the concept of lifestyle to refer to behaviors that trigger or

reduce health inequalities (Contoyannis and Jones 2004). The term refers to a general way of living based on interactions between living conditions and individual behaviors, as determined by sociocultural factors and personal attributes (World Health Organization 1986). Here, we focus on behaviors and factors that affect health and, to some extent, involve individual choices. Other attributes of an individual’s environment (especially social) determine these choices and shape the ultimate consequences of this lifestyle in later life.

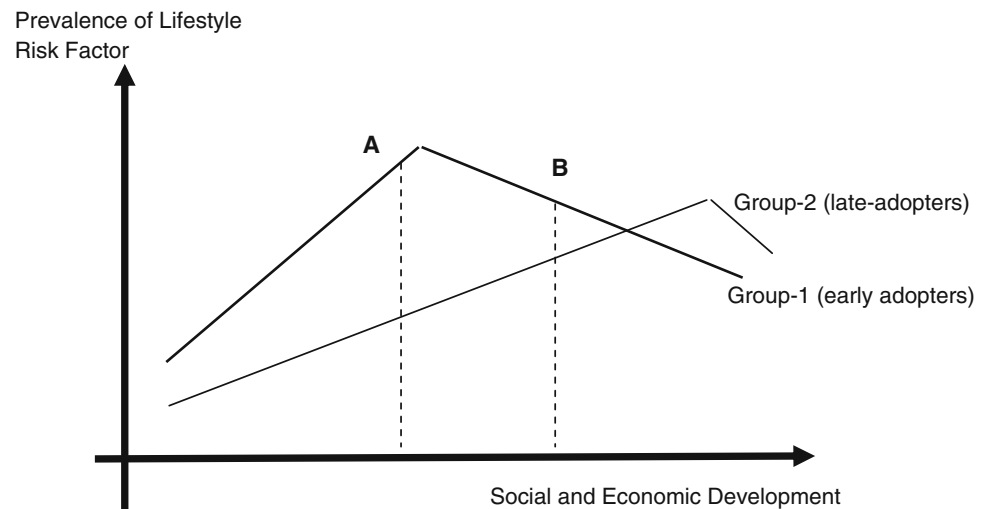
Conceptual framework

We focus here on the roles of individual life-course traits, as well as the past and current contexts, on the practice of risky lifestyles and/or the existence of health-risk conditions in old age. Similar to Wheaton and Clarke (2003), we use a perspective that stresses the trickle-down effects of social context on the quality of individual lives and life chances. Important social and economic changes include the expansion of schooling, increases in income, industrialization and urbanization, shifts in the allocation of personal time, major technological innovations such as radio, television, and automobiles, and the infusion of ideas about ‘modernity’ and patterns of consumption from elsewhere. With such changes, new generations adopt different lifestyles, facilitated by their higher schooling and autonomy, more time spent in public settings, interacting with peers, and working outside the home. Change occurs at different rates among geographical and/or cultural subgroups, however, because variation in cultural beliefs, norms, and social roles produces time lags in the adoption of new ideas (Thornton and Fricke 1987), and in our case, new lifestyles.

In Fig. 1 we present a highly-stylized (or illustrative) pattern of consumption followed by two groups in different stages of what we term the ‘lifestyle transition.’ An example of this type of transition is the ‘nutrition transition’ (Popkin 1993, 2002; Rivera et al. 2002). Movement along the horizontal axis occurs with economic growth, macro-social change, and related structural changes. These ideational and socioeconomic changes are associated with an increase in lifestyle risk factors in populations that acquire the economic means to adopt new patterns of consumption. For example, as processed-foods, fat-rich diets, and more-sedentary lifestyles emerge and proliferate, there may be a fall in levels of physical activity and a rise in levels of overweight/obesity. Group-1 represents the pioneers who adopt the lifestyle first and Group-2 are the late-adopters (the groups that are exposed later to external ideas about consumption and/or who cannot afford the expense of adopting such lifestyles early-on).

Epidemic levels of consumption may or may not be present, but as social awareness grows of the detrimental

Fig. 1 Stylized path of lifestyle risk factors by stage of social and economic development



Examples: A (Mexico); B (United States)

health consequences of these lifestyles, public policies and/or pro-health advertising may emerge, after which people begin to adopt pro-healthy lifestyles. The groups who can afford to switch patterns of consumption (e.g., the wealthy) and who are the most motivated to make a social change (such as the more-schooled, or the most affected by their poor health) will also be the first to abandon these risky lifestyles or to avoid them altogether. In the highly stylized Fig. 1, dashed-line A represents a poorer, more culturally isolated country (Mexico) in which the widespread adoption of a lifestyle risk behavior/factor has not yet occurred, and where the gap in the prevalence of this risk is large between Group-1 and Group-2 (e.g., men and women). Dashed-line B represents a wealthier country (the US) in which this behavioral transition has begun, and in which the risk behavior/factor has fallen in Group-1 but is still rising in Group-2; the gap between the two groups is narrower than in the other country. Figure 1 depicts the trajectory of a 'prototypical' lifestyle risk factor, and we note that tobacco, excessive alcohol consumption, a lack of exercise, or obesity may follow different paths. Also, the relative standing of sub-groups may differ according to the risk factor (e.g., men may adopt smoking earlier in the transition than do women; women may adopt more sedentary lifestyles earlier than do men). But the paths represented in a stylized manner allow us to consider between- and within-country differences.

The determinants of lifestyle risk factors in later life will depend not only on the individual's life course conditions and exposure to stresses, but also on the duration and timing of exposure to social contexts that may influence these practices. The time in an individual's life course at which pro-health lifestyle influences emerge will affect the path of adoption of risks. That is, the earlier these

influences occur, the less likely it is that risky lifestyles will be adopted. Pro-health policies and/or messages should have differential impact according to the way in which they are designed to reach the population. For example, typical anti-smoking messages are disseminated through mass media (magazines, radio, television, and newspapers), and are likely to reach the highly educated, urban residents first. The speed at which individuals adopt pro-health practices may depend on the pace and geographic "saturation" of relevant media messages and level of technology available.

Across successive age cohorts, the patterns of lifestyle are likely to differ depending on the timing and duration of the cohort's exposure to pro-health policies, and also on health and survival selection processes. Cohorts who are born before the pro-healthy lifestyle transition begins, or very early in the transition, will adopt unhealthy lifestyles at higher rates, and will abandon them more slowly, compared to another, younger cohort. This cohort difference arises because the younger cohort would be exposed to pro-health surroundings earlier in their life course. The gap in prevalence across successive age cohorts could be indicative of changes that are associated with the lifestyles of various generations. Narrow age gaps would indicate a homogeneous environment either before or after the pro-health transition, while comparatively wider gaps could indicate that the transition is underway. Note that the transitions, as represented in Fig. 1, entail first an increase and then a decrease in the prevalence of unhealthy behaviors. On the other hand, regardless of the transition stage, over the life course, those who have practiced poor health behaviors may be more likely to experience health shocks in old age, which induce them to give up their unhealthy practices. This, in addition to selective mortality among those with unhealthy behaviors, would result in

relatively lower observed prevalence of unhealthy lifestyles in older ages, as previous research has found (Elder and Johnson 2003).

Social environments can predispose adolescents to health risk behaviors (Blum et al. 2000; Chopak et al. 1998; Lee and Cubbin 2002). In the US, many risk behaviors tend to be initiated in adolescence and continue through adulthood (Fahs et al. 1999). Individuals are most apt, for example, to initiate tobacco use and alcohol abuse during critical periods of the transition to adulthood. Drinking and smoking reflect a desire to be independent and adult-like, especially among current older cohorts, who came of age before evidence on the dangers of smoking and other risky habits was widely known. In the US and in Mexico, the ages of 12–21 appear to mark the most important window for the adoption of these health risks, with the risk of smoking peaking between 15 and 17, and alcohol abuse peaking in the later teens (18–21). Poor dietary habits and sedentary lifestyles also often are established during childhood and youth, and older adolescents in the US tend to be less physically active than their younger peers (Lee and Cubbin 2002). Individual attributes such as gender, schooling, socioeconomic status in childhood and adulthood, and peer influences have been shown to be associated with the existence of these health risk conditions and behaviors in adulthood. The social context, such as urban residence and other attributes of the neighborhood of residence, are powerful determinants of poor dietary habits and physical activity among adults (see, for example, Brownson et al. 2001; DiPietro 2001; Grzywacz and Marks 2001; Lee and Cubbin 2002; Ross 2000; Yen and Kaplan 1998).

In general, men are more likely than women to adopt risky behaviors (Simantov et al. 2000). Tobacco use, for example, is more common among men than women in Mexico and the US (Vazquez-Segovia et al. 2002). Conversely, women tend to be less physically active than are men (Lee and Cubbin 2002). In the US, more schooling has been associated with the earlier adoption of risk behaviors such as smoking, as well as with the earlier cessation of smoking, and with lower lifetime exposure among those with more schooling. In the US, adults with more schooling less often smoke and more often exercise, get health check-ups, and drink moderately (Ross and Wu 1995). Other studies in the US show schooling's negative association with obesity (e.g., Himes 2004; Wray et al. 2005) and positive associations with health-enhancing behaviors (Kenkel 1991; Wray et al. 2005). Early in the 'lifestyle transition,' however, schooling may encourage poor lifestyles such as obesity, drinking, and smoking, in part because more schooled individuals work in higher paying, non-farm work that involves lower energy expenditures or intensity (Fafchamps and Quisumbing 1999; Higgins and

Alderman 1997; Yang 1997), and more exposure to public life and related stresses. Those with more schooling also may have been more exposed to Western culture, which may influence their views about modern lifestyles and patterns of consumption (Thornton 2001, 2005).

Studies in Western contexts (Ross and Wu 1995; Wray et al. 2005) have shown that socioeconomic status in childhood and adulthood are inversely related to the health risks and behaviors that are the focus here, though women may be more vulnerable than men to social-class effects on obesity in later life. In contrast, in Mexico a positive relationship is observed, which may reflect the adoption of "luxury" behaviors among higher SES groups, who entered their adolescent years when such behaviors were seen as "modern." Vazquez-Segovia et al. (2002), for example, found that tobacco consumption was more likely in high-income than in low-income households. Other aspects of the macro-social context, such as policies and exposure to the media, also strongly influence individual health behaviors, as they can shape personal attitudes and social norms. Thus, we expect that major country-level differences are present between Mexico and the United States that should correlate with the large economic differences that exist in the countries. But, within each country, vast differences in lifestyle also should exist. By examining the patterns of differences across groups within each country, and across countries, we should add to our understanding of the health and health behavior differentials in population aging.

Studies on the predictors of lifestyle risk factors come largely from industrialized countries. Although cross-national studies that use common methods and measures can be analytically powerful, such health studies are rare (Hermalin 2002; National Research Council 2001; Smith et al. 2003). Few studies have adopted a comparative approach to understand how broader socioeconomic and policy contexts shape lifestyle risks. Given the high rates of immigration from Mexico and Central America to the US and the potentially severe implications for individuals and health-care systems of adopting risky lifestyles, rigorous analyses of the determinants of risky lifestyles in Mexico and the US are especially needed.

The US and Mexican contexts

Given this general discussion, a consideration of the two specific contexts in which we are exploring risky lifestyles in old age further helps to frame our hypotheses. Mexico, like most of Latin America, is undergoing major health and demographic changes, with an accelerating rate of population aging since 2000. A peculiarity of population aging in Latin America is its rapid pace compared to that in the US. A typical country in the region, for example, should

transition from having 8–15% of its population above age 60 in less than two-fifths of the time in which the US made this change (Palloni et al. 2002). Another attribute of population aging in Mexico is that chronic conditions have emerged in some subgroups while under-nutrition and infectious diseases have persisted in others. The development of the Mexican health system and other social sectors over the last century resulted in unequal access to education and health care, with a large and persistent divide by social class and urban versus rural areas (Ham Chande 2003; Lozano et al. 1993; Montes de Oca 2001). In sum, Mexicans aged 50 and older today have lived through dramatic social, economic, political, and technological changes that have coincided with and perhaps fueled marked demographic and epidemiological change. These rapid changes and vast inequalities imply that life course experiences vary widely within and across birth cohorts.

With respect to major lifestyle risk factors that affect public health, Mexico and the US exhibit different profiles for some risks and similar profiles for others. The prevalence of tobacco smoking among those aged 18–60 years, for example, has been falling in the US while it is stable in Mexico. In both countries, the majority of smokers are men, but rates of smoking also have risen among women and teens (Tapia-Conyer et al. 2001; World Health Organization 2000), with an overall prevalence of around 25% in the latter groups in Mexico (Sepulveda 2002; Tapia-Conyer et al. 2001).

The prevalence of obesity among US adults increased over 33%, from 23% in 1988–1994 to 30% in 1999–2000 (NHANES III and IV). By 1990 among older adults, 13% of those over age 80 were obese by standard measures (Himes 2004). In Mexico, the rate of obesity among women 18–49 years increased by more than 150% during the 1990s, from 9 to 24% (Rivera et al. 2002).

Mexico lags behind the US in the adoption of regulations and programs that promote healthy lifestyles. Only in 1984, for example, did the Mexican Health Law prohibit the sale of cigarettes to youth under age 18. In the US, the 1964 Surgeon General report on the adverse health effects of smoking marked the beginning of a fairly rapid trend toward tobacco-free lifestyles. By the 1990s, policies focused on the protection of non-smokers from second-hand exposure to smoke. Regarding physical exercise in Mexico, information on national trends is lacking, as is a national program or policy that promotes it for health reasons. In the US in 1996, the US Surgeon General recommended that people of all ages include at least 30 min of moderately intense physical activity in their day. With respect to alcohol drinking, regulations in Mexico aim to control sales, but few address prevention or education among users, and in general, public policies on the subject are few and largely unknown, especially in rural and

indigenous communities. No public policies exist to promote the healthy nutritional content of food in Mexico; federal nutritional policies still focus on securing food sufficiency among the poor (Barquera et al. 2001).

Hypotheses

The above theoretical and contextual discussion motivates our overarching hypothesis that the US should be at a later stage in lifestyle transitions relative to Mexico. This frames our cross-national comparison of the determinants of lifestyle risk factors and we postulate the following related hypotheses:

1. We expect that the prevalence of ever and former smoking will be higher in the US than in Mexico, but that the prevalence of current smoking will be higher in Mexico than in the US.
2. We expect that gender, schooling, income, and urban residence will be associated with the practice of risky lifestyles in both settings. Specifically,
 - (a) The prevalence of smoking and alcohol consumption will be higher among men than women in both settings, and the prevalence of obesity and a lack of exercise will be higher among women than men in both settings.
 - (b) Schooling, income/wealth, and urban residence will be negatively associated with risky lifestyles in the US, but will be positively associated with risky lifestyles in Mexico.
3. We expect that differences in the prevalence of lifestyle risks by gender, schooling, income/wealth, and residence will be wider in Mexico than in the US, consistent with the idea that, as the transition progresses, prevalence converges across groups—as “late-adopters” take up the behavior and “earlier adopters” begin to abandon it.
4. We expect that gaps in the prevalence of unhealthy lifestyles/conditions—especially smoking and obesity—will be wider among subsequent age cohorts in the US than in Mexico.

Sample and data

For this analysis, we use survey data from the 2000 wave of the US health and retirement study (HRS) and the 2001 wave of the Mexican health and aging study (MHAS). Both the HRS and MHAS are panel studies. The HRS, which began in 1992, conducts interviews every 2 years and has added to the sample over time. The sample size for the 2000 wave of the HRS is 17,386 adults aged 55 or older, which represents a wave-specific response rate of 87% and

a cumulative response rate (since the start of the study) of 69%. The MHAS began in 2001 and included one follow-up in 2003. The sample size for the MHAS is 10,001 adults aged 55 and older, representing a response rate of 90%.

Importantly, the two surveys use identical batteries of questions for smoking and alcohol drinking, including respondent's past and current practices. Both also included self-reports of height and weight, physical activity, disability (NAGI and ADL/IADL limitations), and hospitalizations. The surveys shared an emphasis on economic characteristics, including income and wealth, and characteristics of the living environment of the older respondent.

Table 1 describes in detail the variables used in this analysis. Briefly, our outcome variables are simple prevalence measures constructed from binary (yes/no) measures of each lifestyle risk factor. While it is possible with the data to construct more nuanced measures of risk prevalence (such as current smoker, former smoker, never smoker), the comparisons across groups and cohorts make more detailed measures unwieldy.

To address our specific hypotheses, our main explanatory variables include the respondent's age, sex, urban versus rural residence, education, income, and assets. The latter three variables were constructed using as cutpoints the tertiles for the educational, income, and asset distributions for each country separately. Thus, for example, associations of a lifestyle outcome with being in the highest tertile of education are interpreted with respect to the lowest educational tertile within each country.

Several socio-demographic and economic attributes also are included to control for their known associations with one or more of the lifestyle risk factors that we consider in this analysis. These attributes include demographic characteristics (the respondent's race/ethnicity for the US only, immigrant/migrant status; social ties (the respondent's age at first marriage, age at first birth, prior experience of divorce or widowhood, number of marriages, current marital status, number of living children, and number of living siblings); health inputs (childhood health and current access to health care); and other socioeconomic attributes in childhood and adulthood (childhood SES, respondents' completed level of schooling, as well as baseline measures of current income, net worth, home ownership, and availability of health insurance).

Statistical methods

Using this comparable set of variables, in the first part of the analysis we produce descriptive analyses of the main variables of interest in our study, the lifestyle risk factors. For the cases of tobacco and alcohol consumption, we describe not only their overall prevalence in old age, but

also the patterns followed through the life course, as we have exactly the same questions for age at initiation and number of cigarettes smoked.

Finally, we examine the socioeconomic covariates of these older adults' lifestyles. As we posed in our specific hypotheses, stages of lifestyle transitions would be evident by patterns of behaviors that vary across gender, education, income/wealth, urban/rural residence, and age groups. We estimate separate multivariate regression (logit) models in each country for current smoking, heavy drinking, obesity, and a lack of exercise, controlling for factors that capture demographic attributes, social support, health inputs, and socioeconomic influences (during childhood and at baseline), as listed in Table 1. We calculate the adjusted odds ratios for each of the main socioeconomic attributes, and compare these odds ratios across the two countries.

Results

Descriptive patterns

Tables 2 and 3 summarize the four lifestyle variables among adults aged 55 and older in Mexico and the United States, by gender and age groups, respectively. By gender, the unadjusted prevalence of smoking and former-smoking are consistent with the tobacco transition having started earlier in the US than in Mexico (hypothesis 1). For example, higher percentages of older men and women in the US than in Mexico report having ever smoked (59 versus 42% overall), whereas current smoking is more common among older adults in Mexico (17 versus 14% in the US) and former smoking is much more common in the US (44%) than in Mexico (25%). The gender gap in smoking also is smaller in the US than in Mexico, in part because men are more likely to smoke in Mexico than in the US (27 versus 16%), whereas women smoke more often in the US than in Mexico (14 versus 9%).

With respect to alcohol consumption, the share that currently drinks is larger in the US (48%) than in Mexico (31%). This cross-country difference holds for men and women, but is especially pronounced for women. The percentage who report that they had four or more drinks at a time is similar for men in the US and Mexico (about 14–15%). For women, however, the percentage is higher in the US (4%) than in Mexico (1%). The prevalence of obesity among older adults is roughly the same in both countries (22–23%). However, slightly more men are obese in the US than in Mexico (23 versus 18%), whereas slightly more women are obese in Mexico than in the US (26 versus 24%). A sedentary lifestyle (without vigorous physical exercise) is more commonly reported among older adults in Mexico than in the US. This difference is especially

Table 1 Definition of variables for analyses

Demographic attributes

Age in three age groups 65–74, 75up (vs. age 55–64)

Sex: 1 if male, 0 if female

Race/ethnicity: black, hispanic (vs. non-black, non-hispanic)—for health and retirement study (HRS) only

Place of birth: Born in US (coded 1 = yes, 0 = no)—for HRS only

SES during childhood: for HRS, we use non-rural residence (1 = non-rural, 0 = rural. For Mexican health and aging study (MHAS) we use an indicator of socioeconomic status in childhood (= 1 if the residence dwelling around age 10 had toilet, 0 = no)

Residence at baseline: 1 if urban or suburban, 0 = rural

Social support

Coupleness status at baseline: 1 if married or partnered; 0 otherwise

Number of times married: count of no. of times married.

Ever divorced as of baseline: 1 if yes, 0 otherwise—for HRS only

Number of living children at baseline: count of no. of living children

Health inputs

Health during childhood: for HRS we use self-rating of health (1 = excellent...to...5 = poor). For Mexico we use two dummy indicators, whether the person had a serious health problem around age 10 that limited their activities, and whether the person had one of the following around age 10: tuberculosis, rheumatic fever, polio, or typhoid fever

Health insurance coverage at baseline: 1 if any coverage; 0 if no coverage

SES influences

Rating of financial well-being during childhood: for HRS only (1 = pretty well off, 3 = average, 5 = poor)

Financial problems during childhood (1 if any problems mentioned; 0 otherwise)

R's education in ordered categories of years of educational achievement: For HRS the categories are medium (12 years), high (>12 years) versus low (<12 years). For MHAS the categories are: medium (6 years), high (>7 years) versus low (<6 years)

Household income (tertiles) at baseline: medium (middle third), high (highest third) versus lowest third

Assets (tertiles) at baseline: medium (middle third), high (highest third) versus lowest third

Home ownership at baseline: 1 = yes, 0 = no

Self-rated health: SRHealth (1 = excellent...to...5 = poor)

Risk factors (dependent variables): dummy variables (1 = yes, 0 = no) for

Current smoker (1 if current smoker, 0 otherwise)

Heavy drinker (1 if R consumed an average of 8 or more drinks/week during the last 3 months; 0 otherwise)

Obesity (1 if BMI \geq 30, 0 otherwise).

Physically inactive (1 if does not exercise vigorously at least 3 times per week, 0 otherwise).

Similar definition is used for MHAS and HRS, except when noted

pronounced among women. About 23% of women in Mexico compared to 40% in the US report that they engage in vigorous exercise. These rates are 44 and 51% among men in Mexico and the US, respectively. Overall, we find that men drink and smoke more than women, and that women are more sedentary in both settings.

The unadjusted statistics by age group in Table 3 show that older cohorts have a lower prevalence of all of the unhealthy lifestyle risk factors than do younger ones. However, a closer look yields interesting findings. First, there seems to be a lot more smoking cessation in the US than in Mexico. Among those with the highest smoking prevalence, the cohort age 55–64, there are three former smokers for every smoker in the US (62/20), compared to 2 (39/20) in Mexico. For the oldest age cohort, the ratio is nine in the US compared to three in Mexico. Second, the age of initiating smoking is on average younger for each successive cohort, and this age is younger in the US

than in Mexico. Among those aged 55–64, the mean age of first smoking is 17.6, compared to 20.4 in Mexico. Third, obesity rates are quite similar across countries, but the rates of physical exercise are notably higher across all age cohorts in the US than in Mexico.

Multivariate analysis of lifestyle risk factors

Table 4 presents a summary of the adjusted odds-ratios estimated for key explanatory variables in multivariate logit models of each lifestyle outcome. In both countries, younger cohorts are more likely to smoke currently, drink heavily, and be obese than the older cohorts. The exception is current lack of exercise, for which older cohorts are more inactive than the younger ones.

Controlling for all other factors, we find similar effects of gender in Mexico and the US for each of the risk factors.

Table 2 Means and percentages for risk factors by sex. Adults age 55 and older, Mexico and US

Measure	Mexico-MHAS 2001			US-HRS 2000		
	Men	Women	Total	Men	Women	Total
Lifestyle risk factors						
Smoking						
Percentage who currently smoke	27.0	8.7	17.2	15.6	13.6	14.5
Percentage who ever smoked	63.6	22.9	41.7	71.5	48.4	58.5
Mean age started smoking	19.0	24.0	20.5	17.0	19.5	18.2
Drinking						
Percentage who currently drink	47.8	16	30.7	57	41.3	48.2
Percentage who had 4+ drinks at a time in last 3 mos	14.9	0.9	7.3	14.2	3.7	8.3
Obesity ^a						
Percentage obese	18.5	25.6	22	22.9	23.9	23.5
Mean BMI	26.5	27.3	26.9	27.4	26.9	27.1
Exercise						
Percentage participating in vigorous exercise 3+ times per week on average in last year	44.4	23.0	32.7	51	39.8	44.8

Source: Authors' calculations using the MHAS 2001 and the HRS 2000, weighted

^a Obese are those who report a body mass index (BMI) higher than 30

Table 3 Means and percentages for risk factors by age group. Adults age 55 and older, Mexico and US

Measure	Mexico-MHAS 2001			US-HRS 2000		
	Age 55–64	Age 65–74	Age 75+	Age 55–64	Age 65–74	Age 75+
Lifestyle risk factors						
Smoking						
Percentage who currently smoke	20.0	15.0	13.0	20.4	13.5	5.3
Percentage who ever smoked	39.2	43.9	44.3	62.2	59.8	50.2
Mean age started smoking	20.4	20.0	21.2	17.6	18.5	19.5
Drinking						
Percentage who currently drink	35.5	26.8	20.3	53.6	48.8	37.8
Percentage who had 4+ drinks at a time in last 3 mos	8.6	6.4	3.5	11.8	7.5	3.1
Obesity ^a						
Percentage obese	24.0	21.3	14.1	29.1	23.5	13.3
Mean BMI	27.4	26.6	25.6	28.0	27.2	25.5
Exercise						
Percentage participating in vigorous exercise 3+ times per week on average in last year	38.5	30.1	20.4	49.6	45.8	34.8

Source: Authors' calculations using the MHAS 2001 and the HRS 2000, weighted

^a Obese are those who report a BMI higher than 30

Men are more likely than women to smoke and drink heavily in both countries, and this gender difference is especially pronounced for heavy drinking in Mexico. Women are more likely than men to be obese and sedentary in both the US and Mexico. Also in both countries, urban residents have a higher risk of not exercising than do rural counterparts. More years of schooling is associated with healthy lifestyles in the US, with the exception of heavy drinking, which is more likely among those with a higher level of schooling compared to their less-educated

counterparts. Education is less consistently associated with healthy outcomes in Mexico. While older Mexicans with more years of schooling are less likely to be obese, there are no educational differences in patterns of heavy drinking or non-exercise, and the opposite association is found between education and smoking in the two countries, that is, better educated Mexicans are more likely to smoke.

Controlling for all other factors, the level of household assets is strongly associated with healthy lifestyles in both countries. In the US, as with schooling, higher household

Table 4 Odds-ratios for the effects of main socioeconomic characteristics on lifestyle risk factors

	Current smoking		Heavy drinking		Obese		Inactivity	
	Mexico	US	Mexico	US	Mexico	US	Mexico	US
Age 55–64	–	–	–	–	–	–	–	–
Age 65–74	0.76***	0.56***	0.60***	0.87	0.73***	0.70***	1.49***	1.09*
Age 75+	0.56***	0.18***	0.21**	0.61***	0.52***	0.52***	2.81***	1.56***
Male (vs. female)	3.85***	1.32***	15.32***	3.60***	0.61***	0.93	0.45***	0.71***
Urban (vs. rural)	1.03	1.04	1.11	1.34***	1.05	0.98	1.31***	1.14**
Education								
Lowest tertile	–	–	–	–	–	–	–	–
Middle tertile	1.02	0.84*	1.03	1.06	1.08	0.98	0.99	0.82**
Highest tertile	1.25*	0.61***	0.98	1.28*	0.80*	0.85**	0.93	0.79***
Income								
Lowest tertile	–	–	–	–	–	–	–	–
Middle tertile	0.95	0.88	1.02	1.12	1.21*	0.96	0.91	0.76***
Highest tertile	0.97	0.76*	1.33*	1.23	1.23*	0.86*	0.99	0.74***
Assets								
Lowest tertile	–	–	–	–	–	–	–	–
Middle tertile	0.88	0.50***	0.94	1.28*	1.26**	0.74***	0.96	0.74***
Highest tertile	0.81*	0.93***	0.87	1.51***	1.20*	0.58	0.87*	0.59***

Additional controls for both countries include variables to capture: demographic factors, childhood health status, childhood socioeconomic circumstances, current health status and current home ownership

Controls for MHAS include marital status, number of marriages, number of living children, whether had any serious health problems before age 10; had tuberculosis, rheumatic fever, polio, typhoid fever before age 10; whether the dwelling had toilet at the age of 10; current health insurance and home ownership

Controls for HRS include race/ethnicity, rural residence during childhood, foreign born, marital status, number of marriages, ever divorced, number of living children, self-rated health during childhood, self-rated financial well being during childhood, current health insurance, and home ownership

Source: Authors' calculations using the Mexican Health and Aging Study (MHAS) 2001 and the Health and Retirement Study (HRS) 2000

* Significant at $P < 0.05$; **Significant at $P < 0.01$; ***Significant at $P < 0.001$

wealth is associated with all healthy lifestyles except for this measure of alcohol consumption. This same pattern for the effect of wealth is apparent in Mexico.

We are next interested in examining the gaps in lifestyle patterns across age cohorts and gender, education, and income/asset groups to inform our understanding of lifestyle transitions. Thus, we calculate the predicted probability of each lifestyle risk factor, holding all variables constant at their mean by age groups, gender, schooling, and asset groups, for each country. We illustrate the main patterns in Figs. 2, 3, 4, 5, and 6 (the full set of predicted probabilities is available upon request). First, the patterns of smoking in Fig. 2a and b suggest that the transition from high to low smoking prevalence has started in the US but has not quite begun or progressed as much in Mexico. Across all age cohorts, the prevalence of smoking is higher among the more educated in Mexico and is lower among the more educated in the US. Also, the gender gap in smoking is narrower in the US than in Mexico, regardless of the age cohort and/or educational level. Finally, the

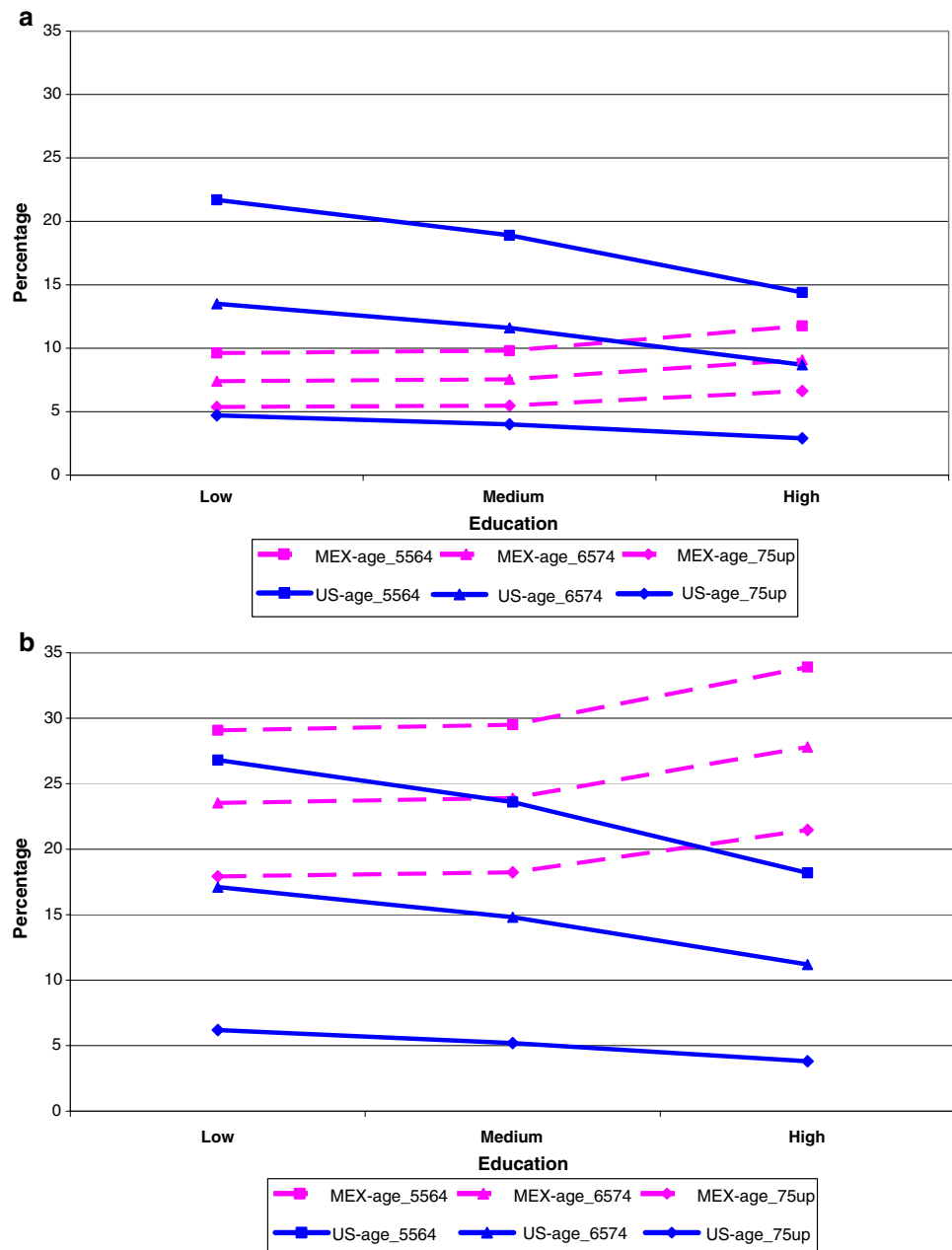
gap among the age cohorts is narrower in Mexico than in the US.

The patterns shown in Fig. 3a and b illustrate that obesity falls with schooling in the US, but only among those at the highest levels, whereas obesity seems to be most prevalent among those with an intermediate level of schooling in Mexico. Overall the differentials across grades of schooling and gender are larger in Mexico than in the US. With respect to income (Fig. 4a, b), the level of obesity rises with income in Mexico, whereas it declines slightly with income in the US. Finally, the age gaps across the two countries appear narrower in Mexico overall.

Heavy drinking of alcohol (Fig. 5a, b) increases with schooling in the US but is invariant to schooling in Mexico. In addition, among women, drinking is more prevalent overall in the US than in Mexico. The age gaps among men are interesting, as they appear wider for Mexican men than US men.

The lack of exercise in Mexico is much higher than in the US, even after controlling for health and socioeconomic

Fig. 2 a Predicted probabilities of smoking by education and Age WOMEN—Mexico and USA. **b** Predicted probabilities of smoking by education and Age MEN—Mexico and USA



characteristics. Age gaps in both countries are apparent; the oldest cohorts are more sedentary than the younger ones. Figure 6a and b illustrate that there is no evidence of income gradients in Mexico, while there is a relatively higher risk of not exercising in low income groups in the US.

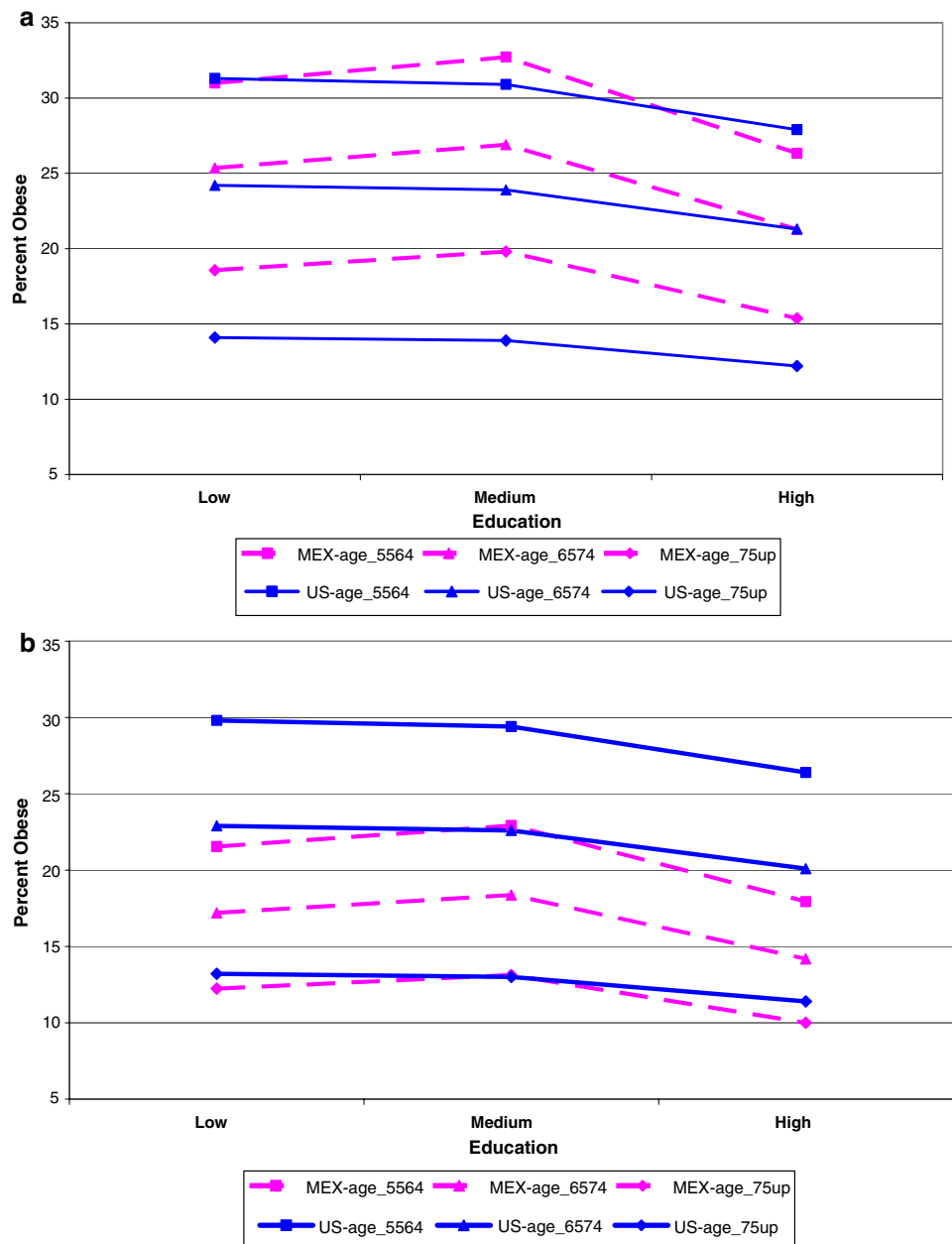
Discussion

This paper systematically compares the social and economic covariates of important lifestyle risk factors and behaviors—smoking, episodic heavy drinking, non-exercise, and obesity—across older populations in Mexico and the United

States. This explicitly comparative analysis provides a unique lens by which to explore how and why the life course determinants of important health risk behaviors may vary by cultural, institutional, and ideational contexts.

Overall, observed patterns of lifestyle risk factors are compatible with our theoretical characterization of a ‘lifestyle transition’ that varies with economic growth and macro-social change. For example, among older adults, we find strong evidence of a move toward anti-smoking behavior that has started in the US, but not yet in Mexico. The clearest evidence is the association of schooling with current smoking, in that more schooled older adults are more likely to smoke in Mexico than the less schooled, and

Fig. 3 a Predicted probabilities of obesity by education and Age WOMEN—Mexico and US.
b Predicted probabilities of obesity by education and Age MEN—Mexico and US

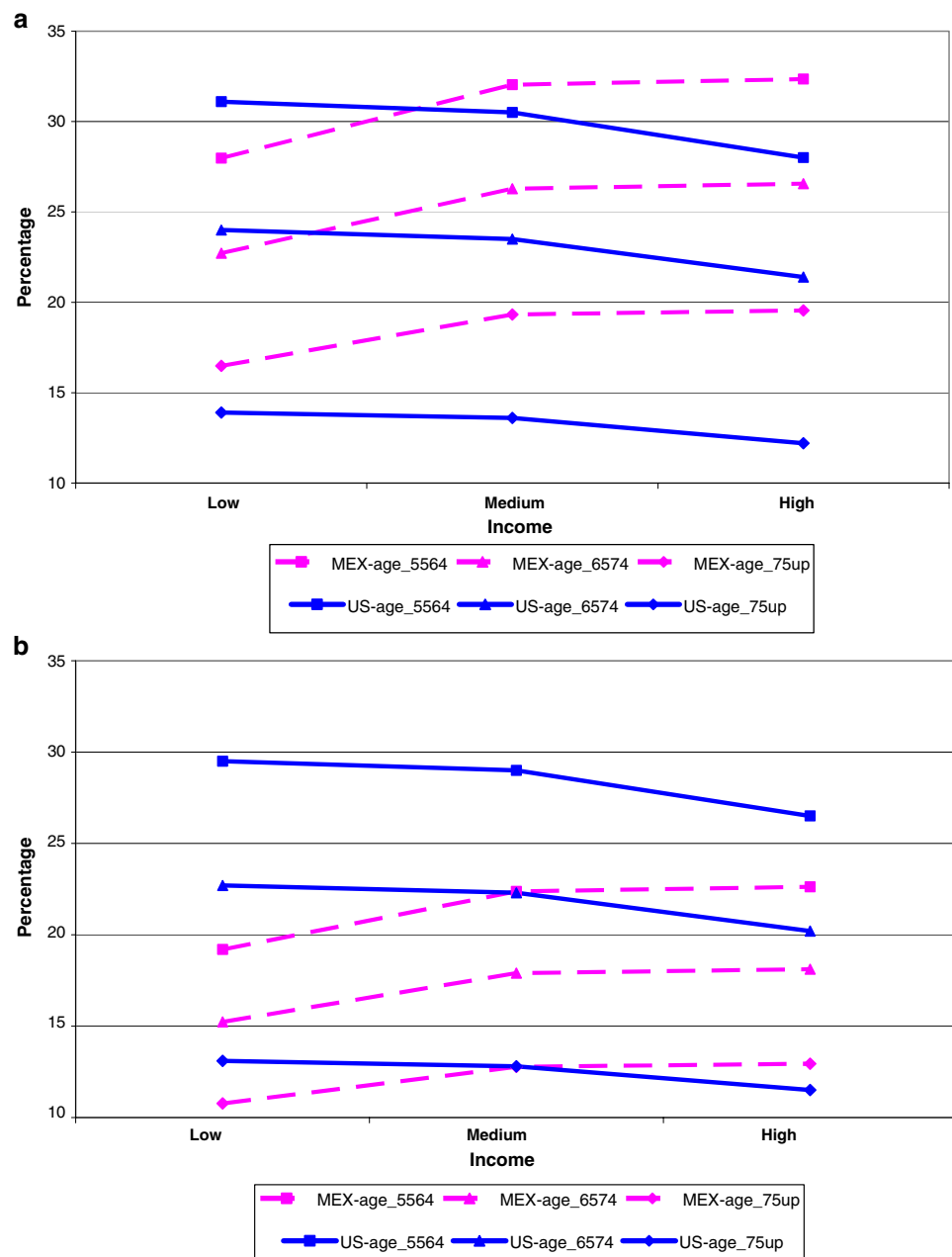


the reverse pattern is found in the US. More schooling can be interpreted as a marker for the forefront position, since the most educated in a population can be expected to be the earliest adopters of unhealthy behaviors that initially appear ‘modern,’ and the first group to abandon those behaviors once their adverse health effects are known. The differentials we observe in our analysis are consistent with lower levels of smoking uptake and higher prevalence of cessation among more educated cohorts in the US, or earlier adoption of healthy lifestyle patterns during the transition. Similarly, those who are wealthier are less likely to smoke in the US, but there is no wealth differential in patterns of smoking in Mexico. The smaller gender gap in

smoking in the US corroborates our third hypothesis that sub-group gaps in risk behaviors converge over time as “late-adopters” take up the behavior and “earlier adopters” begin to abandon it. We speculate also that the lower differentials in smoking across age groups in Mexico than in the US may be a reflection of the relative fewer anti-smoking public policies and communication campaigns in Mexico compared to the US.

Contrary to our expectations, we find that the US compared to Mexico exhibits patterns that might reflect a less healthy lifestyle with respect to alcohol consumption. Better schooling and higher income are associated with recent episodic heavy drinking in the US, whereas no clear

Fig. 4 a Predicted probabilities of obesity by income and Age WOMEN—Mexico and US. **b** Predicted probabilities of obesity by income and Age MEN—Mexico and US

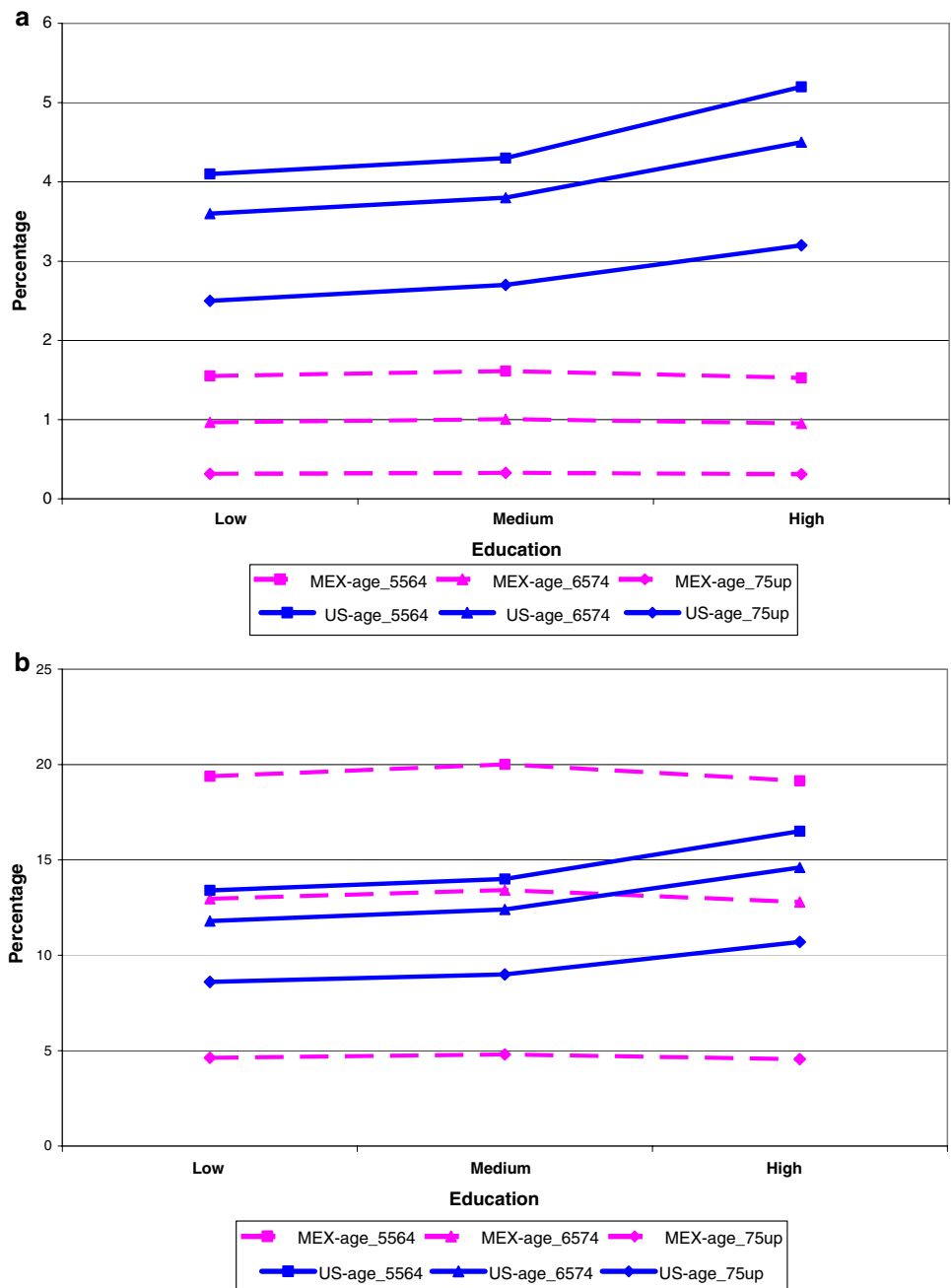


socioeconomic differentials are apparent in Mexico. We also find wider age gaps among men in Mexico than in the US, and although these gaps may capture life course and period differences, if they in part capture secular changes across successive cohorts, then the different cohorts of Mexican men may have experienced these changes more so than have US men. Alternatively, the survival of men who drink heavily may have been higher in the US than in Mexico. This influence effectively would select out heavier drinkers from Mexico, especially in the older age groups, which would explain these surprising age patterns. Overall, we find no evidence, using the indicator of episodic heavy

drinking, that alcohol consumption has undergone a pro-health transition in the US or Mexico.

Both tobacco and alcohol consumption are less pervasive among Mexican women than their US counterparts, which can be an advantage for their old age health. This difference may be due in part to a difference across cultures in what is deemed appropriate gender behavior with respect to smoking and drinking. It would be important to assess if these attitudes remain as macro-economic and social change proceeds, and as Mexican women start to achieve the levels of labor market participation that US women have reached.

Fig. 5 a Predicted probabilities of drinking heavily by education and Age WOMEN—Mexico and US. **b** Predicted probabilities of drinking heavily by education and Age MEN—Mexico and US

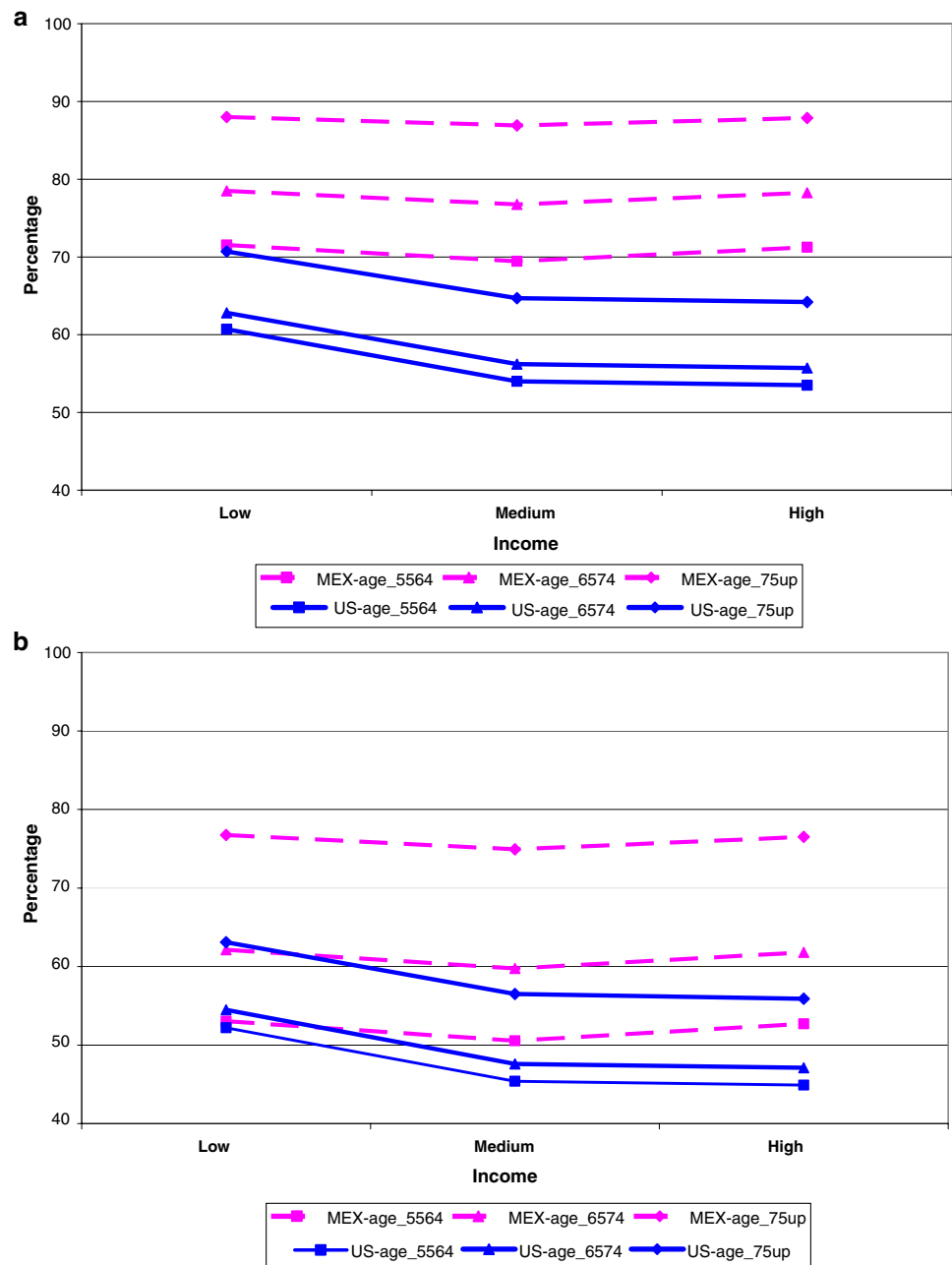


Consistent with previous research and our expectations, women have higher risks of being obese and of not exercising than do men in both countries. Indicative too of a later stage in the nutrition transition in the US, we find that more schooling and greater wealth are associated with a lower prevalence of obesity and with less physical exercise. In contrast, in Mexico, only more schooling is associated with a lower likelihood of obesity and a more active lifestyle. Greater wealth still is positively associated with obesity in Mexico. This finding may indicate that a transition towards healthier nutrition has started among older adults in the US, but not yet in Mexico. Overall, our results on obesity are

consistent with the idea that social and policy changes that impact on patterns of obesity occurred earlier and have been more extensive in the US than in Mexico.

Except for heavy drinking, all age gaps are wider in the US than in Mexico, consistent with the hypothesis that subsequent age cohorts would exhibit significant differences in lifestyle patterns as transitions start to take place. If this is true though, the pattern we find for drinking, for which the age differences are wider in Mexico than in the US, would indicate that more changes are occurring in Mexico with regard to this risk behavior than in the US. The other result that supports this interpretation is that

Fig. 6 a Predicted probabilities of not exercising by income and age WOMEN—Mexico and US. **b** Predicted probabilities of not exercising by income and Age MEN—Mexico and US



more years of education and higher income are associated with a higher risk of this measure for recent episodic heavy drinking in the US, which suggests that there is no transition yet towards a healthier lifestyle for this outcome in the US. One problem with these findings is that, although the measure that we use for heavy drinking is well established in research as indicative of excessive alcohol use (Wechsler and Austin 1998) and has been shown to be associated with specific health effects (Puddey et al. 1999), it focuses on the amount of alcohol consumed in a single episode and thus may not distinguish chronic heavy drinkers from those who only irregularly have 4 or more alcoholic drinks. Alcohol consumption also has been

shown to have a complex socioeconomic gradient, often being higher at the lowest and highest ends of the continuum and a recent analysis of the 1958 British cohort study shows evidence that SES differentials may change with age, confounding cohort patterns of drinking (Jefferis et al. 2007). These challenges suggest that some caution in the interpretation of our findings is warranted.

One limitation of the study is that although as mentioned in the conceptual framework, within-country contextual factors are important determinants of lifestyle risk factors, we do not include community characteristics in this paper and postpone this for future work. Rather, we assume that these contextual differences are captured by other individual

factors included in the models. Also, our analyses of the association between lifestyle and socioeconomic covariates across diverse settings are purely descriptive and based on cross-sectional data. Our comparative analysis also is limited to the national context, when institutional, policy and ideological effects likely vary within countries in ways that our data and analyses cannot capture. Finally, our findings are based on self-reports of behaviors and conditions that may be differentially misclassified or underreported across contexts. Still, this analysis has permitted an exploration of the potential processes that underlie lifestyle transitions in aging populations, as well as the production of health differentials among older adults. If the patterns of unhealthy risk factors are indicative of possible transitions, our findings on differences in the prevalence of smoking, obesity, and physical exercise provide evidence that a lifestyle transition has progressed further in the United States than in Mexico. Learning more about which specific national and sub-national contextual factors influence these patterns could lead to a better understanding of culturally appropriate policies that may accelerate transitions in other national settings. It will be important to perform comparative analyses through time to evaluate whether these patterns continue in the same direction as that signaled by our analyses across age cohorts and socioeconomic groups. Our future planned work will include also the modeling of the various lifestyle risk factors simultaneously, and efforts to account for the behavioral determinants (e.g., the endogeneity) of at least some of the important covariates in this analysis (such as schooling). We also plan to conduct analyses of more detailed outcomes that consider, for example, the time at initiation, duration, and intensity of health risk behaviors, and the incorporation of sub-national contextual factors and the timing of public health policies as powerful determinants of healthy and unhealthy lifestyles.

Acknowledgments This research was partly supported by NIA/NIH grant #R01AG25533 to Rebeca Wong; by NICHD/NIH infrastructure grants to the Michigan Population Studies Center #R24HD41028, to the Hopkins Population Research Center #R24HD42854, and to the Maryland Population Research Center #R24HD41041. The authors acknowledge excellent research assistance from María Pérez-Patrón from Johns Hopkins University and Cristóbal Ruiz-Tagle from University of Maryland. An earlier version of the paper was presented at the Population Association of America Meetings, New York, March 2007, and at the Annual Meeting of the International Network for Health Life Expectancy, St. Petersburg, May 2007. Helpful comments were received from audience participants at these meetings.

References

- Barquera S, Rivera-Dommarco J, Gasca-García A (2001) Food and nutrition policies and programs in Mexico. *Salud Pública de México* 43(5):464–477
- Becker GS (1965) A theory of the allocation of time. *Econ J* 75(299):493–517
- Blum RW, Beuhring T, Shew ML et al (2000) The effects of race/ethnicity, income, and family structure on adolescent risk behaviors. *Am J Public Health* 90(12):1879–1884
- Brownson RC, Baker EA, Housemann RA et al (2001) Environmental and policy determinants of physical activity in the United States. *Am J Public Health* 91(12):1995–2003
- Chopak JS, Vicary JR, Crockett LJ (1998) Predicting alcohol and tobacco use in a sample of rural adolescents. *Am J Health Behav* 22(5):334–341
- Contoyannis P, Jones AM (2004) Socio-economic status, health and lifestyle. *J Health Econ* 23(5):965–995
- DiPietro L (2001) Physical activity in aging: changes in patterns and their relationship to health and function. *J Gerontol Ser A Biol Sci Med Sci* 56:13–5622
- Elder G, Johnson M (2003) The life course and aging: challenges, lessons, and new directions. In: Settersten R Jr (ed) *Invitation to the life course: toward new understandings*. Baywood Publishing Co., Inc, Amityville, pp 49–84
- Fafchamps M, Quisumbing AR (1999) Human capital, productivity, and labor allocation in rural Pakistan. *J Hum Resources* 34(2):369–406
- Fahs PSS, Smith BE, Atav AS et al (1999) Integrative research review of risk behaviors among adolescents in rural, suburban, and urban areas. *J Adoles Health* 24(4):230–243
- Grossman M (1971) The economics of joint production in the household. NBER working paper 7145, Center for mathematical studies in business and economics, University of Chicago
- Grzywacz JG, Marks NF (2001) Social inequalities and exercise during adulthood: toward an ecological perspective. *J Health Soc Behav* 42(2):202–220
- Ham Chande R (2003) El envejecimiento en México: el siguiente reto de la transición demográfica. Colegio de la Frontera Norte, México
- Hermalin AI (2002) The well-being of the elderly in Asia: a four-country comparative study. University of Michigan Press, Ann Arbor
- Higgins PA, Alderman H (1997) Labor and women's nutrition—the impact of work effort and fertility on nutritional status in Ghana. *J Hum Resources* 32(3):577–595
- Himes CL (2004) Obesity in later life—an overview of the issues. *Res Aging* 26(1):3–12
- Jefferis BJMH, Manor O, Power C (2007) Social gradients in binge drinking and abstaining: trends in a cohort of British adults. *J Epidemiol Commun Health* 61(2):150–153
- Kenkel DS (1991) Health behavior, health knowledge, and schooling. *J Polit Econ* 99(2):287–305
- Lee RE, Cubbin C (2002) Neighborhood context and youth cardiovascular health behaviors. *Am J Public Health* 92(3):428–436
- Lozano R, Infante R, Schlaepfer R et al (1993) Desigualdad, pobreza y salud en México. Consejo Consultivo del Programa Nacional de Solidaridad, México
- Montes de Oca V (2001) Desigualdad estructural entre la población anciana de México: factores que han condicionado el apoyo institucional entre la población de edad 60 y más. *Estudios Demográficos y Urbanos* 48:585–614
- National Research Council (2001) *Preparing for an aging world: the case for cross-national research*. National Academy Press, Washington, DC
- Palloni A, Pinto-Aguirre G, Pelaez M (2002) Demographic and health conditions of ageing in Latin America and the Caribbean. *Int J Epidemiol* 31(4):762–771
- Popkin BM (1993) Nutritional patterns and transitions. *Popul Dev Rev* 19(1):138–157

- Popkin BM (2002) The shift in stages of the nutrition transition in the developing world differs from past experiences! *Public Health Nutr* 5(1A):205–214
- Puddey IB, Rakic V, Dimmitt SB et al (1999) Influence of pattern of drinking on cardiovascular disease and cardiovascular risk factors - a review. *Addiction* 94(5):649–663
- Rivera JA, Barquera S, Campirano F et al (2002) Epidemiological and nutritional transition in Mexico: rapid increase of non-communicable chronic diseases and obesity. *Public Health Nutr* 5(1A):113–122
- Ross CE (2000) Walking, exercising, and smoking: does neighborhood matter? *Soc Sci Med* 51(2):265–274
- Ross CE, Wu CL (1995) The links between education and health. *Am Sociol Rev* 60(5):719–745
- Sepulveda J (2002) The tobacco smoking epidemic in the Americas. *Salud Publica de Mexico* 44:s7–s10
- Simantov E, Schoen C, Klein JD (2000) Health-compromising behaviors: why do adolescents smoke or drink? Identifying underlying risk and protective factors. *Arch Pediatr Adolesc Med* 154(10):1025–1033
- Smith JP, Stafford F, Walker JR (2003) Introduction to the JHR's special issue on cross-national comparative research using panel surveys. *J Hum Resources* 38(2):231–240
- Tapia-Conyer R, Kuri-Morales P, Hoy-Gutierrez MJ (2001) An epidemiologic overview of smoking in Mexico. *Salud Publica de Mexico* 43(5):478–484
- Thornton A (2001) The developmental paradigm, reading history sideways, and family change. *Demography* 38(4):449–465
- Thornton A (2005) *Reading history sideways : the fallacy and enduring impact of the developmental paradigm on family life*. University of Chicago Press, Chicago
- Thornton A, Fricke TE (1987) Social change and the family: comparative perspectives from the West, China, and South Asia. *Sociol Forum* 2(4):746–779
- Vazquez-Segovia LA, Sesma-Vazquez S, Hernandez-Avila M (2002) Tobacco consumption in Mexican households: results from the national household income and expenditure survey, 1984–2000. *Salud Publica de Mexico* 44(1):s76–s81
- Wechsler H, Austin SB (1998) Binge drinking: the five/four measure. *J Stud Alcohol* 59(1):122–123
- Wheaton B, Clarke P (2003) Space meets time: integrating temporal and contextual influences on mental health in early adulthood. *Am Sociol Rev* 68(5):680–706
- World Health Organization (1986) *Lifestyles and health*. *Soc Sci Med* 22:117–124
- World Health Organization (2000) *World health statistics annual*. WHO, Geneva
- Wray LA, Ofstedal MB, Langa KM et al (2005) The effect of diabetes on disability in middle-aged and older adults. *J Gerontol Ser A Biol Sci Med Sci* 60(9):1206–1211
- Yang DT (1997) Education and off-farm work. *Econ Dev Cult Change* 45(3):613–632
- Yen IH, Kaplan GA (1998) Poverty area residence and changes in physical activity level: evidence from the Alameda County Study. *Am J Public Health* 88(11):1709–1712