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Article

Disparities in functional disability among Arab Americans by nativity, immigrant arrival cohort, and country of birth

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ABSTRACT

This study contributes to a growing literature that documents the importance of arrival cohort and country of birth for differentiating the health of U.S. immigrants. We use nationally-representative data from nine years of the American Community Survey (2008–2016) to examine if an immigrant health advantage exists among Arab Americans ages 40+ ($n = 49,867$) and test if differences among the foreign-born vary by arrival cohort (pre-1991, 1991–2000, and 2001+). Results from multivariate logistic regression models find that foreign-born Arab Americans have higher odds of physical and self-care disability, and this varies by immigrant arrival cohort. The post-2001 cohort had the highest odds of both disabilities, while the earlier two cohorts did not differ from the native-born after adjustments for covariates. Compositional differences in birthplace, particularly the large influx of immigrants from Iraq in the most recent cohort, explained these differences. Political instabilities globally have contributed to a growing number of U.S. immigrants with vulnerabilities that might be overlooked when arrival cohorts are not considered.

1. Introduction

A growing body of research documents the importance of arrival cohorts for understanding health outcomes among U.S. immigrants. Changes in the legal, economic and social environments in both sending and destination countries can result in compositional differences among arrival cohorts on key factors related to health, including exposure to trauma and violent conflict, varying levels of human capital, and differential access to resources such as work and healthcare (Bakhtiari, 2018; Gubernskaya, Bean, & Hook, 2013; Hamilton, Palermo, & Green, 2015). Research on the largest population of Mexican immigrants has found that cohorts arriving prior to the 1986 Immigration Reform and Control Act (IRCA) experienced lower rates of disability than the cohort arriving in the post-IRCA period, a time that was characterized by increased levels of border security, precarious labor market conditions, and greater threats of deportation (Martinez et al., 2015). Studies on black (Elo, Mehta, & Huang, 2011; Hamilton & Green, 2017), Asian (Kaushal, 2009; Ro, Geronimus, Bound, Griffith, & Gee, 2015), and other Hispanic (Fenelon, Chinn, & Anderson, 2017; Giuntella, 2016; Salazar et al., 2016) immigrants have likewise demonstrated variability in health within these broad categories based on arrival cohort and country of birth.

Compared to studies on racial/ethnic minorities, much less attention has been paid to the health of white immigrants, a group whose origins has shifted over the past few decades from western European to diverse world regions, including the Middle East and North Africa (Auclair & Batalova, 2013). The passage of the 1965 Immigration and Nationality Act lifted national origin restrictions, and subsequent immigration from the Arab world increased dramatically (Abdelhady, 2014; Cumoletti & Batalova, 2018; Foad, 2013). Between 1980 and 2015, the size of the Arab population in the U.S. tripled from 610,000 to 1.8 million, and over one half (56%) are foreign born (American Community Survey 2010–2014; Cumoletti & Batalova, 2018; de la Cruz & Brittingham, 2003). In contrast to the immigrant health advantage documented among other racial/ethnic groups, foreign-born Arab Americans appear less healthy than other foreign- and U.S.-born whites across a host of outcomes, including poorer functional health (Dallo, Al Snih, & Ajrouch, 2009), worse self-rated health (Read, Amick, & Donato, 2005), and higher prevalence of chronic diseases, including obesity, heart disease, asthma, and ulcers (Dallo & Kindratt, 2016).

To date, research on Arab Americans has focused on differences between the foreign- and native-born with less attention to mounting evidence on the importance of immigrant arrival cohort. In addition, few studies have explored whether changes in the birth origins of Arab

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immigrants over time contribute to disparities among them. The current study aims to address these gaps and contribute to the literature by examining how immigration affects the health of a group classified as white and by assessing whether comparisons based on nativity (foreign-born vs. native-born) mask diversity among immigrant arrival cohorts. We identify three historical periods in the post-1965 era that coincide with global events and changes in U.S. immigration policy that affected the composition and flow of Arab immigrants based on their timing of arrival in the U.S.: 1) prior to the 1991 Gulf War; 2) between 1991 and 2000 (prior to 9/11 terrorist attacks); and 3) from 2001 to present. The analysis uses nationally-representative data to answer three related questions: 1) To what extent do Arab Americans exhibit an immigrant health advantage in disability?; 2) To what extent do nativity-based differences in disability vary across immigrant arrival cohort?; and 3) To what extent do compositional differences in region of birth contribute to arrival cohort patterns?

2. Background

The geographic origins of the foreign-born population have become increasingly diverse in recent decades and shifted attention to the importance of region of birth and period of arrival for understanding health outcomes among U.S. immigrants. Studies that once documented consistent patterns of better health on arrival with declining health over time (i.e., the healthy immigrant effect), now find much more varied health trajectories among U.S. immigrants when they are disaggregated by region of birth and arrival cohort (Reynolds, Chernenko, & Read, 2016). Varying levels of economic development and political stability in the sending region, coupled with unique historical relations with the U.S., has contributed to more wide-ranging socioeconomic and health profiles among immigrants from different regions of birth (Almeida, Biello, Pedraza, Wintner, & Viruell-Fuentes, 2016). Timing of entry is salient because the legal, economic, and social environments in both sending and destination countries can result in compositional differences among arrival cohorts on key factors related to health, including exposure to trauma and violent conflict, varying levels of human capital, and differential access to resources such as work and healthcare (Hamilton et al., 2015; Ro et al., 2015).

Such has been the case for Arab immigrants arriving in the U.S. in recent decades (Foad, 2013; Inhorn, 2018). The 1965 Immigration and Nationality Act marked the opening of emigration from the Middle East after a 40-year moratorium following the 1924 Johnson-Reed Act (Migration Policy Institute, 2013). A driving force in emigration from Arabic-speaking countries since that time has been political and economic instability. While the Arab world encompasses 17 countries, the vast majority of Arab immigrants in the U.S. today hail from Lebanon, Egypt, Syria, and Palestine, with a smaller but rapidly growing segment from Iraq (Asi and Beaulieu, 2013). The presence and intensity of instability in these countries has varied over time, as has the level of U.S. involvement in Middle East conflicts and degree of restrictiveness of U.S. immigration policies toward the Arab world (Inhorn, 2018). As shown in Fig. 1 these regional events, coupled with changes in U.S. immigration policies, have altered the national origin composition of Arab immigrants entering the U.S. in different arrival cohorts.¹ The first period, pre-1991, witnessed the migration of Arab immigrants who were able to flee regional turmoil caused by the Israeli-Palestinian conflict, Lebanese Civil War, and Iraq-Iran War (Foad, 2013; Samhan, 1999). Nearly two-thirds of Arab immigrants arriving during this period were from Egypt, Lebanon, Iraq, and Jordan. Since the U.S. had minimal direct involvement in these conflicts, the context of reception for immigrants in this arrival cohort was less hostile than for those

arriving in subsequent years.

The second period, 1991–2001, saw the U.S. become more directly involved in Middle East conflicts, notably the first Gulf War in Iraq in 1991. Economic sanctions in Iraq, along with a rise in religious fundamentalism across the region initiated immigration to the U.S. from Egypt, Syria, and Iraq (Abdelhady, 2014). The third period, post-2001, saw worsening conditions for Arab immigrants in the sending countries and on arrival in the U.S. The 2003 U.S. invasion in Iraq and a ripple of regime overthrows in the Arab Spring saw a growing number of Arab refugees arriving in the U.S., with Iraqis comprising almost one-third of refugees admitted in 2014 (Mossaad, 2016). Heightened hostility toward Arab Americans in the post-9/11 era resulted in more deeply entrenched negative bias that created more challenging contexts of assimilation for this cohort (Haboush & Barakat, 2014).

Important to the situation of functional health is that when a country experiences prolonged instability, it can influence whether and what type of work was available, access to clean water, nutrition and medical care, as well as elevated exposure to toxins and environmental hazards (Levy & Sidel, 2013). These situations can also increase the likelihood of physical injuries that would compromise mobility and functional health. Given changes in the migration contexts of Arab immigrants over time, differentiating the experiences of arrival cohorts may yield important patterns in how immigrant status links to functional health.

3. Methods

3.1. Data

We used data from the 2008 to 2016 one-year files of the American Community Survey (ACS) Public Use Microdata Sample (PUMS). The ACS is a nationally-representative dataset that contains detailed information on ancestry and birthplace, which allows us to identify foreign- and native-born Arab Americans. Each microdata file is a stratified subsample of the full Census that represents approximately 1% of all housing units in the United States (Ruggles, Genadek, Goeken, Grover, & Sobek, 2017).

We designated respondents as native-born Arabs if they were born in the U.S. and reported an Arab ancestry based on the Office of Management and Budget's (OMB) classification schema (Asi & Beaulieu, 2013; Brittingham & de la Cruz, 2005; de la Cruz & Brittingham, 2003). We classified respondents as foreign-born Arabs if they reported an Arab ancestry and were born in one of the following countries identified in the ACS: Algeria, Egypt, Iraq, Jordan, Kuwait, Lebanon, Morocco, Palestine, Saudi Arabia, Syria, United Arab Emirates, or the Yemen Arab Republic (i.e., OMB countries included in the ACS). Our analysis focused on Arab persons aged 40 or older, as many health problems begin to manifest themselves during midlife (Martin & Schoeni, 2014). The final sample size was 49,867 Arab individuals (16,826 U.S.-born and 33,041 foreign-born). The foreign-born group was then divided into three groups based on arrival cohort: pre-1991 ($n = 18,980$), 1991–2000 ($n = 7,786$), and 2001 and forward ($n = 6,275$).

3.2. Measures

The main outcome variables were two types of disability: self-care disability and physical disability. The first was based on a question that asked respondents whether, because of a physical, mental, or emotional condition, they had difficulty dressing or bathing (self-care disability), and the second asked if they had serious difficulty walking or climbing stairs (physical disability). We focused on these variables because they are commonly used measures of activities of daily living and functional limitations (Elo et al., 2011) and have known reliability and validity in studies of Arab populations (Dallo et al., 2009). Respondents were coded as having a disability if they answered affirmatively to these

¹ Author calculations from the American Community Survey. Calculations for adults ages 40+ were similar to those for ages 25+ with respect to national origin composition across cohorts.

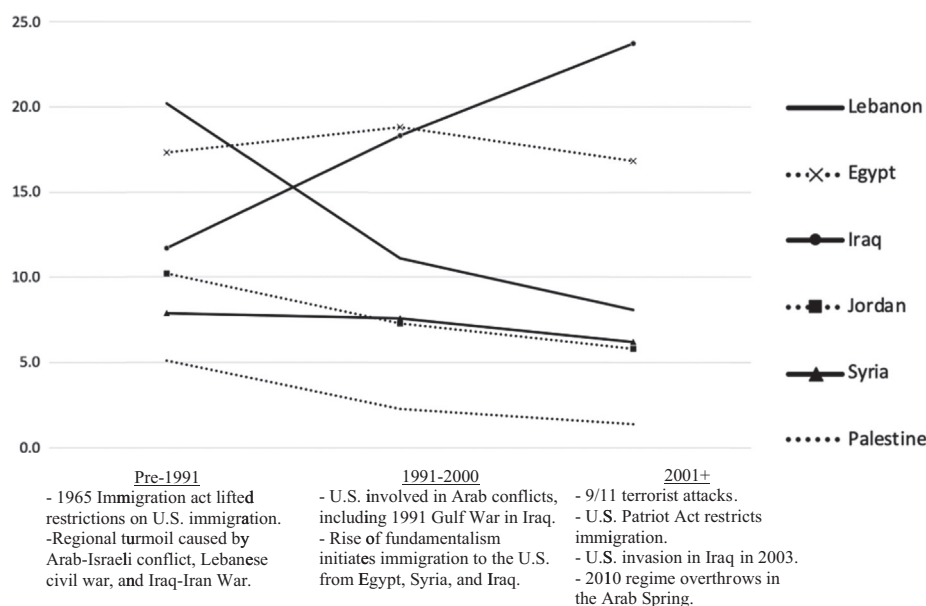


Fig. 1. Major Birthplaces for Arab immigrants by arrival cohort, Aged 25+, ACS 2008–2016. Y-axis: Percentage of Arab immigrant population.

questions.

We examine differences in physical and self-care disability among Arabs by nativity and immigrant arrival cohort. Nativity is a dichotomous variable indicating whether individuals are U.S.-born (reference) or foreign-born. Immigrant arrival cohort was created using a continuous variable in the ACS that reports the year in which a foreign-born individual entered the U.S. (“When did this person come to live in the United States?”). We identify three distinct periods of immigration from the Middle East in the post-1965 era that coincide with regional conflicts and changes in U.S. immigration policy that influenced the composition and flow of immigrants over time: 1) prior to 1991; 2) between 1991 and 2000; and 3) 2001 to present.

We include birthplace to assess changes in the region of origin of Arab immigrants arriving in the U.S. over time. Arab immigrants were classified into one of the following seven categories based on their response to the ACS question that asked, “Where was this person born?”: Lebanon (reference), Egypt, Iraq, Jordan, Syria, Palestine, and other. The other category contains birthplaces with percentages too small for meaningful analyses (e.g., Algeria 1.7%, Kuwait 1.8%, Saudi Arabia 1.1%); we include the “other” category in the analyses but do not attempt to interpret the findings.

Following prior research on immigrant health, we control for several sociodemographic and immigration characteristics that may mediate the association between nativity and health (Hamilton & Hummer, 2011). Demographic factors included age (years); age squared; gender; and marital status (married = ref, separated/divorced, widowed, never married/single). Socioeconomic factors included educational attainment (less than high school = ref, high school graduate, some college, college degree or more) and poverty status (401% or above = ref, 139–400%, 138% and below). Recent research has established the necessity of including both arrival cohort and duration in the U.S. when estimating immigrant health (Hamilton et al., 2015). We control for duration of residence using a continuous variable in the ACS that measures how long a foreign-born individual has been living in the U.S. (collapsed into categories for analysis: 0–10 years = ref, 11–20 years, 21 years or more). Finally, we control for citizenship status (U.S. citizen = ref, not a citizen) and English language proficiency (speaks English very well/well = ref, does not speak English well/at all) (Dallo, Booza, & Nguyen, 2015).

3.3. Analysis

To test our three research questions, the analysis begins with descriptive statistics for Arab Americans by nativity and immigrant arrival cohort. To compare the foreign-born and native-born as well as differences between arrival cohorts, we used the Pearson χ^2 test to evaluate categorical variables and the adjusted Wald test for continuous variables. Statistically significant differences are reported in Table 1. To test health differences between native-born Arabs and the three arrival cohorts while controlling for duration in the U.S., we analyze multiple cross-sections of data using the method developed by Borjas (1985) and used in many subsequent studies of immigrant arrival cohorts (Antecol & Bedard, 2006; Hamilton & Hummer, 2011; Hamilton et al., 2015; Ro et al., 2015). Specifically, we use the following logistic regression equation:

$$Y_i = X_i\beta + A_i\gamma + C_i\delta + R_i\phi + T_i\pi + \epsilon_i$$

where Y is a binary indicator of having a physical disability (or a self-care disability) and X is a vector of covariates (age, age squared, gender, marital status, educational attainment, poverty status, citizenship status, and English language proficiency). A is a vector of dummy variables representing duration in the U.S., C is a vector of dummy variables representing the three arrival cohorts, and R is a vector of dummy variables identifying place of birth. T represents a vector of dummy variables indicating the survey wave. For native-born Arabs, arrival cohort, duration in the U.S., and birthplace are all set to zero. The estimation equation for the native-born group is:

$$Y_i = X_i\beta + T_i\pi + \epsilon_i$$

Note that all analyses were conducted by pooling observations for native- and foreign-born Arabs in each survey wave. Pooling in this manner introduces the restriction that the period and other covariates in the model are estimated as being the same for both native-born individuals and immigrants. In other words, all covariates are predicted for native-born Arabs and used as a baseline to establish differences in arrival cohort, duration in the U.S., and birthplace effects for foreign-born Arabs. Restricting period in this manner allows for a separate analysis of arrival cohort and duration among immigrants (Antecol & Bedard, 2006; Hamilton et al., 2015).

We used multivariate logistic regression models to predict physical disability (Table 2) and self-care disability (Table 3) among native- and foreign-born Arab Americans. The analysis first compared foreign-born

Table 1

Descriptive statistics for non-hispanic Arab Americans by nativity and arrival cohort, aged 40+ (n = 49,867).

	Native-born	Foreign-born	Foreign-born by arrival cohort		
	(n = 16,826), %	(n = 33,041), %	Pre-1991 (n = 18,980), %	1991–2000 (n = 7786), %	2001 + (n = 6275), %
Health indicators					
Physical disability	10.8	11.5	12.1 ^{a, b}	9.5 ^{a, d}	12.3 ^a
Self-care disability	4.4	5.7***	6.0 ^{a, b}	4.4 ^d	6.2 ^a
Demographic characteristics					
Age, mean (SD)	57.9 (13.1)	55.1 (11.7)***	57.8 (11.7) ^{b, c}	51.5 (10.7) ^{a, d}	52.8 (11.3) ^a
Female	50.6	43.0***	39.3 ^{a, b, c}	44.9 ^d	49.8 ^a
Marital status					
Married	62.1	73.5***	73.5 ^{a, b, c}	78.0 ^a	77.8 ^a
Separated/divorced	17.2	12.1***	12.1 ^{a, b, c}	9.7 ^{a, d}	6.9 ^a
Widowed	8.2	8.5	8.5 ^{a, b}	6.3 ^{a, d}	9.4 ^a
Never married/single	12.5	5.9***	5.9 ^a	6.0 ^{a, d}	6.0 ^a
Socioeconomic characteristics					
Education					
Less than high school	4.8	19.9***	17.5 ^{a, b, c}	20.6 ^{a, d}	24.7 ^a
High school graduate	21.5	20.0**	18.7 ^{a, b, c}	20.7	22.2
Some college	28.5	19.8***	21.8 ^{a, b, c}	18.2 ^{a, d}	16.7 ^a
College degree or more	45.3	40.4***	42.0 ^{a, c}	40.4 ^{a, d}	36.4 ^a
Poverty					
401% or above	55.2	34.7***	44.0 ^{a, b, c}	29.6 ^{a, d}	18.1 ^a
139–400%	31.6	35.2***	34.3 ^{a, b}	38.1 ^{a, d}	34.0 ^a
138% or below	13.3	30.1***	21.7 ^{a, b, c}	32.3 ^{a, d}	47.9 ^a
Immigration characteristics					
Birthplace					
Lebanon	–	16.0	20.5 ^{b, c}	11.5 ^d	10.2
Egypt	–	18.9	17.8 ^b	21.4 ^d	18.7
Iraq	–	17.8	11.8 ^{b, c}	19.2 ^d	30.6
Jordan	–	8.5	10.5 ^{b, c}	7.1 ^d	5.2
Syria	–	7.93	8.1	8.0	7.4
Palestine	–	3.5	5.0 ^{b, c}	2.3 ^d	1.0
Duration in U.S.					
0–10 years	–	20.2	–	5.61	85.07
11–20 years	–	24.0	3.13	77.34	14.93
21+ years	–	55.8	96.87	17.05	–
Limited English proficiency	–	19.7	9.8 ^{a, b, c}	20.2 ^{a, d}	42.9 ^a
Not a U.S. citizen	–	24.5	8.0 ^{b, c}	21.9 ^d	67.2

Data: ACS 2008–2016.

Note: Sample sizes are unweighted. Estimates are weighted. SD = standard deviation. Additional Arab countries of birth had cell sizes too small for meaningful analyses. We include them in the models in an “other” category but do not attempt to interpret the results.

Statistically significant differences between native-born and foreign-born Arabs at * $p < 0.05$, ** $p < 0.01$, and *** $p \leq 0.001$.

^a = Statistically significant difference at $p \leq 0.05$ (χ^2 or Wald test) between the native-born and the arrival cohort.

^b = between < 1991 cohort and 1991–2000 cohort.

^c = between < 1991 cohort and 2001+ cohort.

^d = between 1991–2000 cohort and 2001+ cohort.

Arab Americans to native-born Arab Americans (Models 1 through 3) and then examined the extent to which there was variation among the foreign-born by immigrant arrival cohort (Models 4 through 6). We sequentially added three blocks of covariates (demographic, socioeconomic, and immigration characteristics) as a means to determine if certain factors were more useful in explaining observed differences in disability. The Bayesian information criterion method (BIC) was used for model selection. The first model included demographic characteristics (age, age-squared, sex, and marital status), the second added socioeconomic variables (education and poverty), and the third model added immigration characteristics (birthplace, English language proficiency, citizenship status, and duration in the U.S.). All models control for survey year. The results from the logistic regression equations are presented as odds ratios (OR) with 95% confidence intervals (CI) in Tables 2 and 3, and as predicted probabilities in Figs. 2 and 3. All analyses were conducted using Stata 15.1 (StataCorp, 2017) and include sample weights provided by the ACS to make the estimates representative of the U.S. population.

4. Results

In Table 1, unadjusted estimates for physical and self-care disability were slightly higher for foreign-born Arab Americans (11.5% and 5.7%, respectively) relative to the native-born (10.8% and 4.4%). Disability among the foreign-born further varied by immigrant arrival cohort with the pre-1991 and post-2001 cohorts having significantly higher estimates than the native-born for physical (12.1% and 12.3%, respectively) and self-care (6.0% and 6.2%, respectively) disability. The middle cohort (1991–2000) had slightly lower rates of physical disability (9.5%) but did not differ statistically from the native-born with respect to self-care disability (4.4%).

There was also variability in the sociodemographic composition of the cohorts that was masked when aggregated into the foreign-born category. Compared to the later two arrival cohorts, the earliest cohort (pre-1991) was older (mean age of 57.8), had slightly higher levels of educational attainment (42.0% had a college degree or more), lower rates of poverty (21.7%), and higher rates of English language proficiency (90.2%). The majority of this cohort were U.S. citizens (92.0%) who had immigrated from Lebanon (20.5%) and Egypt (17.8%), with smaller numbers coming from Iraq (11.8%), Jordan (10.5%) and Syria

Table 2

Odds ratios of physical disability by nativity and immigrant arrival cohort among Arab Americans Aged 40+ (n = 49,867).

	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)	Model 4 OR (95% CI)	Model 5 OR (95% CI)	Model 6 OR (95% CI)
Nativity (Native-born) ^a						
Foreign-born Arab	1.55 (1.42, 1.68)***	1.10 (1.00, 1.21)*	0.70 (0.56, 0.89)**			
Arrival cohort (Native-born)						
Foreign-born, < 1991				1.38 (1.26, 1.51)***	1.10 (1.00, 1.21)	0.97 (0.64, 1.48)
Foreign-born, 1991–2000				1.67 (1.47, 1.89)***	1.05 (0.92, 1.21)	0.77 (0.54, 1.09)
Foreign-born, 2001 +				2.04 (1.79, 2.31)***	1.15 (1.00, 1.33)*	0.68 (0.54, 0.87)**
Education (< HS)						
High school graduate		0.70 (0.62, 0.78)***	0.77 (0.68, 0.87)***		0.70 (0.62, 0.78)***	0.77 (0.69, 0.87)***
Some college		0.61 (0.54, 0.68)***	0.69 (0.61, 0.79)***		0.61 (0.54, 0.68)***	0.69 (0.61, 0.79)***
College degree or more		0.40 (0.36, 0.46)***	0.46 (0.40, 0.52)***		0.40 (0.36, 0.45)***	0.46 (0.40, 0.52)***
Poverty (401% or more)						
139–400%		1.74 (1.57, 1.92)***	1.71 (1.54, 1.89)***		1.73 (1.57, 1.92)***	1.71 (1.55, 1.90)***
138% or below		3.19 (2.86, 3.56)***	2.97 (2.65, 3.32)***		3.18 (2.84, 3.55)***	2.98 (2.66, 3.34)***
Birthplace (Lebanon)						
Egypt			1.50 (1.26, 1.79)***			1.51 (1.27, 1.80)***
Iraq			1.82 (1.54, 2.14)***			1.84 (1.56, 2.17)***
Jordan			1.48 (1.19, 1.85)**			1.48 (1.19, 1.85)**
Syria			1.00 (0.80, 1.23)			1.01 (0.81, 1.25)
Palestine			1.27 (0.99, 1.63)			1.26 (0.98, 1.62)
Low English proficiency			1.69 (1.49, 1.92)***			1.71 (1.50, 1.94)***
Not a U.S. citizen			0.88 (0.75, 1.02)			0.88 (0.76, 1.03)
Duration in U.S. (< 10 yrs)						
11–20 years			0.97 (0.80, 1.17)			0.87 (0.65, 1.17)
21 + years			1.15 (0.96, 1.38)			0.84 (0.57, 1.24)
Female	1.35 (1.25, 1.47)***	1.21 (1.11, 1.31)***	1.16 (1.06, 1.26)**	1.33 (1.22, 1.44)***	1.20 (1.11, 1.31)***	1.16 (1.07, 1.26)**
Age	1.06 (1.03, 1.09)***	1.09 (1.06, 1.12)***	1.07 (1.04, 1.10)***	1.07 (1.04, 1.10)***	1.09 (1.06, 1.12)***	1.07 (1.04, 1.10)***
Age squared	1.00 (1.00, 1.00)	1.00 (1.00, 1.00)	1.00 (1.00, 1.00)	1.00 (1.00, 1.00)	1.00 (1.00, 1.00)	1.00 (1.00, 1.00)
Marital status (married)						
Separated/divorced	1.90 (1.70, 2.13)***	1.64 (1.46, 1.84)***	1.69 (1.51, 1.90)***	1.96 (1.75, 2.19)***	1.64 (1.46, 1.84)***	1.68 (1.50, 1.89)***
Widowed	1.96 (1.75, 2.21)***	1.62 (1.43, 1.83)***	1.56 (1.38, 1.76)***	1.93 (1.71, 2.17)***	1.61 (1.43, 1.83)***	1.56 (1.37, 1.76)***
Never married/single	1.87 (1.60, 2.18)***	1.61 (1.38, 1.89)***	1.62 (1.38, 1.90)***	1.89 (1.62, 2.20)***	1.62 (1.38, 1.89)***	1.61 (1.38, 1.89)***
Survey year	1.00 (0.98, 1.01)	1.00 (0.98, 1.01)	0.99 (0.98, 1.01)	1.00 (0.98, 1.01)	1.00 (0.98, 1.01)	1.00 (0.98, 1.01)
Constant	0.00 (0.00, 0.00)***	0.00 (0.00, 0.00)***	0.00 (0.00, 0.00)***	0.00 (0.00, 0.00)***	0.00 (0.00, 0.00)***	0.00 (0.00, 0.00)***
BIC	3,201,066	3,027,521	2,996,082	3,193,101	3,027,249	2,995,196

Data: ACS 2008–2016.

Note: Estimates are weighted. OR = odds ratio; CI = confidence interval.

^a The reference category for the arrival cohort variables is different in Model 6 because of changes in model specification and the inclusion of duration of residence and country of birth. Native-born Arabs are the reference category for the arrival cohorts in Models 4 and 5. In Model 6, Lebanese immigrants who have resided in the U.S. for < 10 years are the reference category. To ease interpretation, we graph predicted probabilities in Fig. 2.

(8.1%). The second cohort likewise had high levels of educational attainment (40.4% had a college degree or more) but were more disadvantaged than the earlier cohort in terms of poverty rates (32.3%) and English language proficiency (79.8%). Three-fourths (78.1%) of this cohort were U.S. citizens, and Egypt (21.4%) and Iraq (19.2%) made up the largest sending countries, which coincided with sharp declines in those arriving from Lebanon (11.5%). The underprivileged status of the third and most recent arrival cohort (2001 +) was particularly striking. One-fourth (24.7%) had less than a high school education, two-thirds (67.2%) lacked U.S. citizenship, nearly one-half (47.9%) were living in poverty, and 42.9% lacked English language proficiency. This cohort was also more heavily comprised of immigrants from Iraq (30.6%).

The descriptive results in Table 1 provide initial evidence that Arab immigrants do not enjoy a health advantage over the native-born and that health among the foreign-born further varies by arrival cohort. We next examine these questions in the multivariate context and test our third research question regarding the extent to which compositional differences in country of birth contributes to arrival cohorts patterns. Table 2 presents coefficients from logistic regression models that predicted the likelihood of physical disability (difficulty walking or climbing stairs) by nativity (models 1–3) and immigrant arrival cohort (models 4–6). As shown in Model 1, foreign-born Arab Americans had a higher odds of physical disability (OR = 1.55, 95% CI = 1.42, 1.58), net of controls for age, sex, and marital status. Adjustments for socioeconomic status (education and poverty) resulted in a lower but still

statistically significant elevated odds for physical disability (OR = 1.10, 95% CI = 1.00, 1.21). Model 3 examines whether birthplace is partially driving differences in disability among the foreign-born. The results in Model 3 show that compared to immigrants born in Lebanon, immigrants from all other birthplaces had significantly worse health, except for those from Syria and Palestine who did not differ statistically from those from Lebanon. Immigrants born in Iraq were particularly disadvantaged (OR = 1.82, 95% CI = 1.54, 2.14). Also noteworthy in Model 3 was the negative health consequences associated with low English language proficiency (OR = 1.69, 95% CI = 1.49, 1.92).

When we disaggregated foreign-born Arabs into immigrant arrival cohorts (Models 4–6), we found that the later cohort (2001 +) reported the highest odds of physical disability (OR = 2.04, 95% CI = 1.79, 2.31) relative to native-born Arab Americans (Model 4). The pre-1991 and 1991–2000 cohorts also had significantly higher odds of physical disability, but the size of the gap was smaller than the gap for the later cohort. Adjustments for socioeconomic status resulted in declines in the odds of a physical disability for both the first and middle cohort. Although both cohorts became statistically insignificant, the p-value for the earlier cohort is 0.06, suggesting that socioeconomic characteristics are only able to attenuate the higher odds of disability among this cohort. In contrast, the elevated odds of physical disability for the post-2001 cohort remained statistically significant even after adjustment for socioeconomic characteristics.

Since Model 6 aims to test the effect of duration and country of birth, the odds ratios for arrival cohort are difficult to interpret as the

Table 3

Odds ratios of self-care disability by nativity and immigrant arrival cohort among Arab Americans aged 40+ (n = 49,867).

	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)	Model 4 OR (95% CI)	Model 5 OR (95% CI)	Model 6 OR (95% CI)
Nativity (Native-born) ^a						
Foreign-born Arab	2.12 (1.87, 2.39)***	1.49 (1.30, 1.70)***	1.02 (0.73, 1.42)			
Arrival cohort (Native-born)						
Foreign-born, < 1991				1.90 (1.67, 2.17)***	1.49 (1.29, 1.72)***	1.05 (0.60, 1.82)
Foreign-born, 1991–2000				2.19 (1.83, 2.62)***	1.34 (1.10, 1.63)**	0.87 (0.55, 1.38)
Foreign-born, 2001+				2.89 (2.41, 3.45)***	1.63 (1.34, 1.99)***	1.01 (0.72, 1.42)
Education (< HS)						
High school graduate		0.63 (0.54, 0.74)***	0.74 (0.63, 0.87)***		0.63 (0.54, 0.73)***	0.74 (0.63, 0.87)***
Some college		0.54 (0.45, 0.64)***	0.66 (0.55, 0.79)***		0.54 (0.45, 0.64)***	0.66 (0.55, 0.79)***
College degree or more		0.35 (0.30, 0.41)***	0.44 (0.37, 0.53)***		0.35 (0.30, 0.41)***	0.44 (0.37, 0.53)***
Poverty (401% or more)						
139–400%		1.78 (1.53, 2.07)***	1.75 (1.50, 2.04)***		1.77 (1.52, 2.07)***	1.75 (1.50, 2.04)***
138% or below		3.13 (2.67, 3.67)***	2.87 (2.43, 3.38)***		3.11 (2.65, 3.65)***	2.88 (2.44, 3.40)***
Birthplace (Lebanon)						
Egypt			1.12 (0.87, 1.43)			1.12 (0.88, 1.44)
Iraq			1.75 (1.40, 2.18)***			1.76 (1.42, 2.20)***
Jordan			1.17 (0.85, 1.61)			1.17 (0.85, 1.61)
Syria			0.81 (0.60, 1.10)			0.82 (0.60, 1.11)
Palestine			0.88 (0.60, 1.30)			0.89 (0.60, 1.31)
Low English proficiency			1.94 (1.64, 2.30)***			1.95 (1.64, 2.31)***
Not a U.S. citizen			0.81 (0.67, 0.99)*			0.81 (0.67, 0.99)*
Duration in U.S. (< 10 yrs)						
11–20 years			0.90 (0.70, 1.15)			1.00 (0.70, 1.44)
21+ years			1.19 (0.94, 1.52)			1.17 (0.70, 1.95)
Female	1.24 (1.10, 1.39)***	1.07 (0.95, 1.20)	1.01 (0.90, 1.14)	1.21 (1.08, 1.36)**	1.06 (0.95, 1.20)	1.01 (0.90, 1.14)
Age	0.98 (0.94, 1.02)	1.00 (0.96, 1.04)	0.97 (0.94, 1.01)	0.99 (0.95, 1.02)	0.99 (0.96, 1.03)	0.97 (0.94, 1.01)
Age squared	1.00 (1.00, 1.00)***	1.00 (1.00, 1.00)***	1.00 (1.00, 1.00)***	1.00 (1.00, 1.00)***	1.00 (1.00, 1.00)***	1.00 (1.00, 1.00)***
Marital status (married)						
Separated/divorced	1.81 (1.53, 2.14)***	1.60 (1.34, 1.90)***	1.66 (1.40, 1.98)***	1.86 (1.57, 2.20)***	1.61 (1.35, 1.91)***	1.66 (1.39, 1.98)***
Widowed	1.87 (1.61, 2.18)***	1.56 (1.34, 1.83)***	1.50 (1.28, 1.76)***	1.84 (1.58, 2.14)***	1.56 (1.33, 1.83)***	1.50 (1.28, 1.76)***
Never married/single	2.29 (1.87, 2.81)***	2.01 (1.63, 2.48)***	2.00 (1.62, 2.47)***	2.32 (1.89, 2.84)***	2.01 (1.63, 2.48)***	2.00 (1.62, 2.47)***
Survey year	1.01 (0.99, 1.03)	1.01 (0.99, 1.03)	1.01 (0.98, 1.03)	1.00 (0.98, 1.02)	1.01 (0.99, 1.03)	1.01 (0.98, 1.03)
Constant	0.00 (0.00, 0.01)***	0.00 (0.00, 0.02)***	0.01 (0.00, 0.03)***	0.00 (0.00, 0.01)***	0.00 (0.00, 0.02)***	0.01 (0.00, 0.03)***
BIC	1,852,915	1,756,160	1,730,652	1,848,126	1,755,456	1,730,270

Data: ACS 2008–2016.

Note: Estimates are weighted. OR = odds ratio; CI = confidence interval.

^a The reference category for the arrival cohort variables is different in Model 6 because of changes in model specification and the inclusion of duration of residence and country of birth. Native-born Arabs are the reference category for the arrival cohorts in Models 4 and 5. In Model 6, Lebanese immigrants who have resided in the U.S. for < 10 years are the reference category. To ease interpretation, we graph predicted probabilities in Fig. 3.

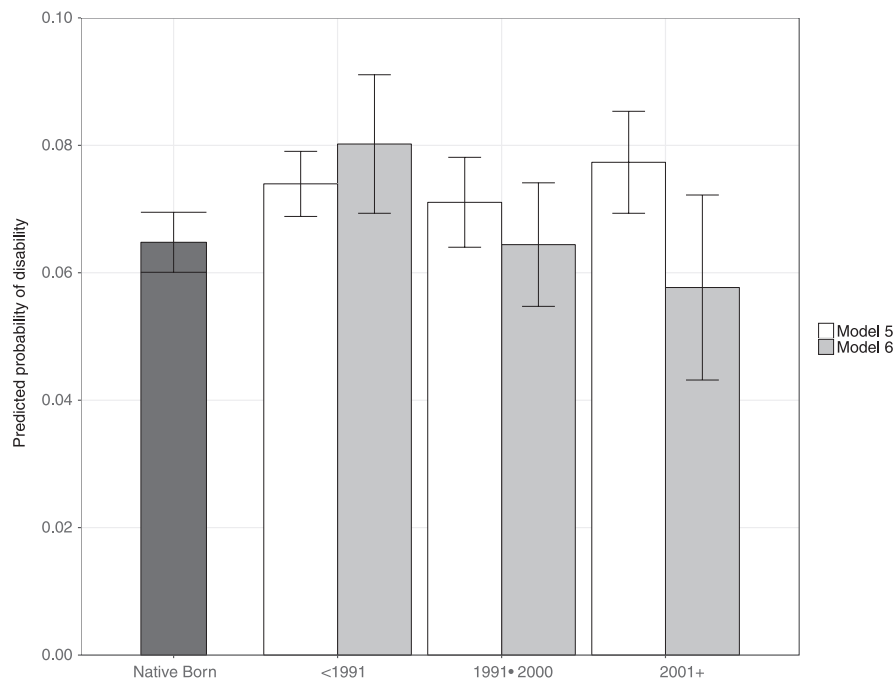


Fig. 2. Predicted Probability of Physical Disability by Nativity and Immigrant Arrival Cohort. Note. Predicted probabilities derived from odds ratios in Table 2. Legend: White: Model 5, Grey: Model 6.

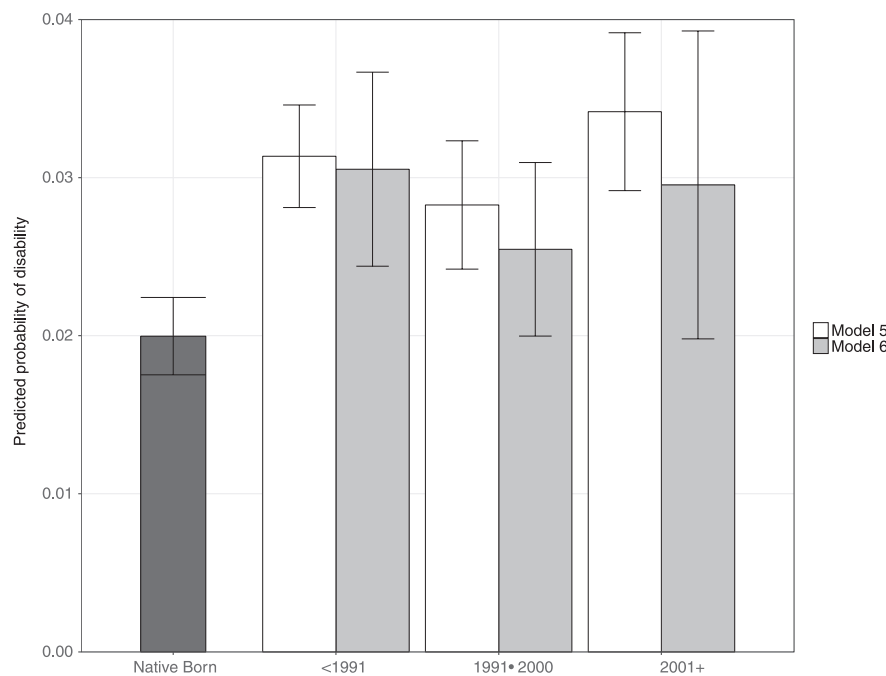


Fig. 3. Predicted Probability of Self-Care Disability by Nativity and Immigrant Arrival Cohort. Note. Predicted probabilities derived from odds ratios in Table 3. Legend: White: Model 5, Grey: Model 6.

reference categories for these variables change from native-born Arabs to Lebanese immigrants who have lived in the U.S. for 0–10 years. Fig. 2 eases interpretation by presenting predicted probabilities of physical disability from Models 5 and 6 before and after the inclusion of duration and country of birth (see Appendix A for margins and confidence intervals). As evidenced in Fig. 2, the inclusion of these variables—particularly country of birth—altered predicted probabilities of physical disability among Arab immigrant arrival cohorts.² The predicted probability of physical disability for the 1991–2000 cohort was reduced from 7.1% percent to 6.4% percent for the 1991–2000 cohort and from 7.7% to 5.8% for the 2001+ cohort once we accounted for country of birth. Immigrants born in Iraq—and to a lesser extent Egypt and Jordan—had significantly higher odds of physical disability compared to immigrants born in Lebanon, while those born in Syria and Palestine did not differ from them. It is also important to note that immigrants arriving in the most recent cohort had the lowest levels of English language proficiency (Table 1), which in turn was associated with a significantly higher odds of physical disability (OR = 1.71, 95% CI = 1.50, 1.94).

Table 3 replicates the logistic regression modelling in Table 2 using self-care disability as the primary outcome (i.e., difficulty bathing or dressing). While the overall patterns are generally similar to those found for physical disability, there are some noteworthy findings in the models for nativity (Models 1–3) and immigrant arrival cohort (Models 4–6). First, the size of the foreign-born disadvantage was even larger for self-care disability than for physical disability, net of controls for age, gender, and marital status. This was true for each immigrant arrival cohort, with the most recent cohort (2001+) being the most disadvantaged relative to the native-born (OR = 2.89, 95% CI = 2.41, 3.45). As was the case for physical disability, adjustments for socioeconomic status attenuated the size of the gap but did not fully explain the elevated odds of self-care disability for any of the three cohorts (Model 5). To interpret the findings in Model 6, Fig. 3 graphs the predicted probabilities of self-care disability before and after the inclusion

of duration and country of birth (see Appendix A for margins and confidence intervals). The predicted probability of disability for the 1991–2000 cohort declined from 2.8% to 2.5% and declined from 3.4% to 2.9% for the 2001+ cohort. Changes in these predicted probabilities were related to one of the more striking findings in Table 3, which was the significantly elevated odds of self-care disability for immigrants born in Iraq (OR = 1.76, 95% CI = 1.42, 2.20) but not for immigrants born in any other country relative to those born in Lebanon.

5. Discussion

This study used nationally-representative data to examine differences in physical and self-care disability among Arab Americans by nativity status and immigrant arrival cohort. We built on an emerging literature regarding the significance of arrival cohort and extended the traditional focus on racial/ethnic minorities to distinguish Arab Americans from their legal and historical classification as white (Ajrouch & Antonucci, 2017). Results from the analyses were both similar to and different from prior research and have implications for future studies on Arab Americans, specifically, and on immigration and health, more generally. First, foreign-born Arab Americans did not exhibit an immigrant health advantage, which stood in contrast to studies that find such a pattern among Hispanics (Hamilton et al., 2015), blacks (Elo et al., 2011), and Asians (Mehta, Elo, Engelman, Lauderdale, & Kestenbaum, 2016). This finding contributes to a growing literature that challenges the applicability of the “epidemiologic paradox” to functional health outcomes (Hummer & Hayward, 2015; Mehta & Elo, 2012). Further, it suggests that theoretical frameworks on immigrant health may not apply equally to immigrants from diverse world regions (Reynolds et al., 2016). Our results also mirrored prior studies that document poorer health among foreign-born Arab Americans relative to the native-born, but have not considered potential variation among arrival cohorts (Dallo et al., 2009, 2015; Dallo & Kindratt, 2016).

To that end, we identified three critical periods of migration in the post-1965 era that shaped the composition of Arab immigrants and tested whether and how timing of arrival in the U.S. and country of birth contributed to the foreign-born disadvantage in disability. The analysis revealed a gradient in health among the cohorts that tracked

² In ancillary analysis, we entered country of birth and duration of U.S. residence separately in the model and found that country of birth is driving the change.

with historical circumstances in the sending and receiving regions. The earliest arrival cohort (pre-1991) reported an elevated odds of both types of disabilities relative to the native born; adjustment for socioeconomic status largely explained this gap for physical, but not self-care, disability. Immigrants arriving during this period constituted the first significant numbers of immigrants to arrive following a forty-year moratorium on immigrants from the Arab world (Abdelhady, 2014). As such, the pre-1991 cohort built the ethnic communities from which later arrival cohorts could benefit. In other words, the earliest arrival cohort faced unique barriers to integrating and adapting to the host country, which may have limited their ability to achieve success (Haboush & Barakat, 2014). The middle cohort (1991–2000) fared slightly worse than the first cohort in the initial model, but no longer differed on physical disability from the native-born after adjustments for covariates. A sizable portion of this group was arriving in the U.S. with disrupted education and employment histories that may have impeded functioning, yet they arrived to established Arab American communities, which may serve as a key resource to set them on a healthier path (Abraido-Lanza, Echeverria, & Florez, 2016).

The third and most recent cohort (post-2001) reported the highest odds of disability, which diminished but remained significantly higher than native-born Arabs after adjustments for sociodemographic covariates. A larger proportion of immigrants in this group were coming as political refugees from Iraq (Camarota, 2002; Foad, 2013; Mossaad, 2016). Important to functional health is that the region experienced prolonged instability, that likely further influenced whether and what type of work was available, access to clean water, nutrition and medical care, and elevated exposure to toxins and environmental hazards (Levy & Sidel, 2013). These situations increased the likelihood of physical injuries that would compromise mobility. It also resulted in limited English language proficiency as a by-product of disrupted schooling. Lacking language proficiency can hinder participation in the host country, discourage activities that would strengthen social ties, and block access to the health care system (DuBard & Gizlice, 2008; Read & Smith, 2017).

Some potential limitations regarding this study should be noted. First, one member of the household typically responds to the ACS questionnaire on behalf of all other household members, which may result in inaccurate reporting for others. However, there is little reason to believe that inaccurate reporting would systematically vary by nativity or arrival cohort. Therefore, any potential bias that this might introduce should be distributed randomly across groups and not influence the main findings. Moreover, we benefit from the ACS in that it is one of the only nationally-representative datasets that allow us to disaggregate Arab Americans from their classification as white. Second, the perception of disability may be shaped by race, ethnicity, or culture, which, in turn, might influence how disability is reported in the ACS. This limitation is particularly problematic when attempting to compare different racial/ethnic immigrant groups to one another (e.g., Chinese and Mexican immigrants) (Read & Smith, 2017), but may be less so in analysis that focuses on a particular group, such as Arab Americans. Third, although the analysis included covariates that are related to health status, data limitations prevented us from including other variables that might serve as mediators, such as refugee status, geographic locale, or health behaviors. While variation in these characteristics might have helped explain differences in disability outcomes relative to native-born Arabs, it would have done little to alter the fact that there was considerable variability among foreign-born Arabs in the first place. The strengths of this study, however, include the use of nationally representative data, which allow us to overcome bias associated with data based on Arab surnames (Bergmans et al., 2014; Housey et al., 2015). Further, we capitalize on the ability to disaggregate the foreign-born into immigrant arrival cohorts. These elements help balance the limitations and offer new insight into factors related to immigrant health.

6. Conclusions

This study demonstrated how immigration shapes the health of a population classified as white—an aggregate category that is typically used as a reference group for gauging U.S. racial/ethnic health disparities. We found that classifying Arabs as white masks heterogeneity in health and obscures complex migratory experiences that result in diversity among Arab Americans. Importantly, we found that the well-documented healthy immigrant effect (i.e., foreign-born health advantage over the native-born) was less evident for immigrants who migrated during periods of strife and conflict. The most recent arrival cohort was heavily comprised of immigrants from Iraq, who experienced different sending and receiving contexts than earlier arrival cohorts. Ongoing instability throughout many parts of the Middle East will likely impact the composition and health of Arab immigrants arriving in the U.S. for many years to come. As more data become available, future research will need to continue examining the characteristics of immigrant arrivals cohorts to better specify the conditions that impact health.

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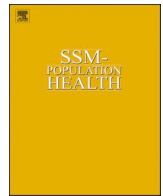
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Update

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Erratum

Erratum regarding missing Declaration of Competing Interest statements in previously published articles

Erratum regarding missing Declaration of Competing Interest statements in previously published articles.

Declaration of Competing Interest statements were not included in the published version of the following articles that appeared in previous issues of SSM - Population Health.

The appropriate Declaration/Competing Interest statements, provided by the Authors, are included below.

1. Were there long-term economic effects of exposure to polio vaccination? An analysis of migrants to Sweden 1946–2003 (SSM - Population Health, 2020; 11C), <https://doi.org/10.1016/j.ssmph.2020.100589>. The authors were contacted after publication to request a Declaration of Interest statement.
2. Communicating the benefits of population health interventions: The health effects can be on par with those of medication (SSM - Population Health, 2018; 6C: 54–62), <https://doi.org/10.1016/j.ssmph.2018.06.002>. The authors were contacted after publication to request a Declaration of Interest statement.
3. A cohort longitudinal study of individual level social capital and depressive symptoms in the Wisconsin Longitudinal Study (SSM - Population Health, 2020; 10C), <https://doi.org/10.1016/j.ssmph.2020.100544>. The authors were contacted after publication to request a Declaration of Interest statement.
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