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Abstract

Stress is associated with sleep problems and poor sleep is linked to mental health and depression symptoms. The stress associated with immigrant status and immigration policy can directly affect mental health. While previous studies have documented the significant relationship between immigration policy and the physical and mental health of immigrants, we know little about the effects of immigration policy on immigrants' sleep patterns. Exploiting the approval of the Deferred Action for Childhood Arrivals (DACA) program in 2012, we study how immigrants' sleep behavior responds to a change in immigration policy. Consistent with the findings of previous research documenting the positive effects of DACA on mental health, we find evidence of a significant improvement in immigrants' sleep in response to this policy change. However, the estimated effects of the policy disappear rapidly after 2016. While temporary authorization programs such as DACA may have beneficial impacts on immigrants' sleep in the short term, the effects of such temporary programs can be rapidly undermined by uncertainty about their future. Thus, permanent legalization programs may be more effective at achieving long-term effects, thereby eliminating uncertainty around the legal status of undocumented immigrants.

JEL Codes: J15, I10 **Keywords:** Immigration, Sleep, Mental health, DACA.

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1 Introduction

The debate on unauthorized immigrants, deportation, and legal status has hardly been as lively as in recent years. Estimates suggest that there are 11 million undocumented immigrants in the United States. Immigrants' legal status has been linked to socioeconomic disparities and inequality (Menjívar, 2006). Undocumented immigrants report high levels of stress as well as psychological and physical loss (Garcini et al., 2019). The threat of deportation as well as the lack of work authorization, access to credit, and access to welfare programs affect the daily lives of undocumented immigrants across the United States. Further, unauthorized immigrants are at risk of poor health, particularly of reporting symptoms of depression, anxiety disorders, and other mental health problems (Passel et al., 2016). Despite the paucity of studies analyzing the effects of immigration policy on health, recent work suggests that the stress associated with immigrant status and immigration policy can have direct impacts on mental well-being (Kaushal et al., 2018; Wang and Kaushal, 2019; Venkataramani et al., 2017; Giuntella and Lonsky, 2020; Hainmueller et al., 2017). Yet, we know relatively little about the mechanisms through which policy may affect immigrant health.

In this study, we examine the role of sleep deprivation, one of the first consequences of stress. If stress is an important determinant of sleep deprivation, and sleep deprivation has detrimental effects on health, this may be one of the channels through which immigration policy affects mental health.[1] Given the evidence of significant racial and ethnic disparities in short sleep duration (Hale and Do, 2007; Jackson et al., 2013) and the close links among stress, mental health, and sleep disorders, we examine the effects of immigration reform on immigrants' sleep behavior. While previous studies have documented a significant relationship between immigrant status and the mental health of immigrants, we know little about the possible impacts of an immigration policy change on immigrants' sleep patterns.

Insufficient sleep has been associated with detrimental effects on health outcomes (Cappuccio et al., 2010), including a higher risk of weight gain and obesity, type 2 diabetes, cardiovascular diseases, and premature mortality (Giuntella and Mazzonna, 2019) . There is evidence of significant disparities in sleep duration across ethnic groups. The stress associated with supporting

[1] Stress causes hyperarousal, which in turn can upset the balance between sleep and wakefulness and induce short sleep duration and other sleep problems (Hall et al., 2000).

family members in their country of origin, racial discrimination (Bhattacharya and Schoppelrey, 2004), and concerns about legal status represent important stress factors that could help explain disparities in sleep duration (Liang and Fassinger, 2008; Slopen and Williams, 2014).

To the best of our knowledge, no work has thus far analyzed the effects of immigrant legalization on immigrants' sleep patterns. Sleep may be one of the primary channels through which stress related to immigration policy changes affects health. We focus on the effects of the Deferred Action for Childhood Arrivals (DACA) program. DACA is an executive memorandum issued by President Obama on June 15, 2012. This large-scale immigration policy change provides temporary work authorization and deferral from deportation for undocumented, high school-educated young people. However, DACA status is only a temporary authorization, and although it enables undocumented young people to remain in the United States legally, it does not provide them with a path to citizenship or permanent residency. The status can be renewed every two years conditional on still meeting the eligibility criteria.

Exploiting the introduction of DACA, we study how immigrants' sleep behavior responds to a change in immigrant status. Consistent with the findings of previous research documenting the positive effects of DACA on mental health, we find evidence that this policy significantly improves the duration and quality of immigrants' sleep but only in the short run. To estimate the effects of DACA, we employ a difference-in-differences strategy, which relies on discontinuities in the DACA eligibility criteria. We find that DACA-eligible individuals are 10.2 percentage points less likely to sleep less than seven hours and 13.8 percentage points less likely to sleep less than eight hours. The effects are concentrated among men, who are also significantly more likely to report satisfaction with their sleep. Interestingly, we also find that DACA-eligible immigrants—after the introduction of the reform—are less likely to report episodes of sleeplessness. Specifically, DACA-eligible immigrants are 2 percentage points less likely to report sleeplessness. Reassuringly, the estimated effects are driven by states with a large number of DACA applications. Furthermore, they are larger in states with a high number of deportations and become non-significant in states with a relatively low number of deportations. In 2016, the uncertainty around DACA increased and the program was eventually terminated by President Trump in 2017. Unsurprisingly, we show that the beneficial effects of DACA on sleep behavior tend to dissipate from 2016. This finding is consistent with the idea that the uncertainty around

this temporary program may have undermined its positive impact on health and well-being, and, in turn, on sleep (Mallet and Garcia Bedolla, 2019).

Our study adds to the literature analyzing the effects of immigration policies on the mental health of immigrants. Using data from the National Health Interview Survey and California Health Interview Survey, Venkataramani et al. (2017) and Giuntella and Lonsky (2020) demonstrate that economic opportunities and protection from deportation can have large positive effects on the mental health of undocumented immigrants. Their findings confirm the associations obtained by Patler and Pirtle (2017). Moreover, Hainmueller et al. (2017), using Medicaid claims data from Oregon, show that children of DACA-eligible mothers had 50% fewer diagnoses of adjustment and anxiety disorders relative to children of ineligible mothers. However, to the best of our knowledge, this is the first study to examine the effects of DACA on immigrants' sleep patterns. Our findings are also in line with recent evidence on the health and mental health consequences of local immigration enforcement (Wang and Kaushal, 2019).

The remainder of this paper is organized as follows. Section 2 discusses the background and data. In Section 3, we present the identification strategy. We discuss the results in Section 4. Section 5 concludes.

2 Background and Data

2.1 DACA Program

DACA, announced by President Obama on June 15, 2012, was the largest immigration reform since the passage of the Immigration Reform and Control Act by the US Congress in 1986. Approximately 1.7 million unauthorized immigrants (Passel and Lopez, 2012) are targeted by this policy, which provides eligible applicants with a two-year renewable status that shields them from deportation and enables them to stay and work in the United States legally. However, the program does not provide a path to citizenship or permanent residency. The US Department of Homeland Security's Citizenship and Immigration Services started accepting applications for DACA status on August 15, 2012. The first applications were approved in October 2012. Figure 1 provides a timeline of the institutional setting.

The eligibility criteria for the program are defined as follows: (1) no lawful status as of June 15,

2012; (2) under the age of 31 as of June 15, 2012; (3) entered the United States before reaching their 16th birthday; (4) continuously residing in the United States since June 15, 2007; (5) physically present in the United States on June 15, 2012 and at the time of applying for DACA; (6) currently in school, with a high school diploma (or GED), or an honorably discharged veteran of the Coast Guard or Armed Forces of the United States; and (7) not convicted of a felony, significant misdemeanor, or three or more other misdemeanors. In addition, DACA applicants have to be at least 15 years, they are required to pay a processing fee of 495 dollars, and they have to provide evidence that they were living in the United States at the prescribed times, proof of education, and confirmation of their identity.[2] They also have to pass a background check, fingerprinting, and other checks that consider their biological identifying features. Applicants do not need legal representation. Officials can revoke DACA protection if individuals pose a threat to public safety or national security. For instance, about 1,500 people have had their deferral canceled because of a crime or gang-related activity or an admission of such activities. This amount represents fewer than 0.2% of the people accepted into the program (source: Immigration and Customs Enforcement).

As of August 2018, approximately 823,000 individuals had been granted DACA status . Of these, roughly 699,000 individuals were actively enrolled in the program on August 31, 2018, whereas about 40,000 had adjusted to lawful permanent resident status and the rest either had not renewed their status or had had their renewal request denied. Overall, there have been 1,264,000 renewal cases, with only 13,400 of renewal requests (1%) denied. Most current DACA recipients come from Latin America. In particular, Mexico is the major source country (558,100), followed by El Salvador (26,500) and Guatemala (18,100). Approximately, 75% of DACA recipients live in 20 US metropolitan areas. Los Angeles-Long Beach-Anaheim has the largest concentration of DACA enrollees (88,400 DACA recipients) followed by New York-Newark-Jersey City (46,500) and Dallas-Fort Worth-Arlington (37,800). One-third of DACA recipients live in California (29%), while 16% of enrollees reside in Texas. Approximately, 63% of current status-holders are 25 or younger, 53% are women, and 80% are single (USCIS and PEW Research Center). The main

[2]Documents showing that individuals arrived in the United States before their 16th birthday include a passport with an admission stamp, Form I-94, and school records from US schools attended. USCIS provides a complete list of accepted documents for each of the eligibility criteria: `https://www.uscis.gov/archive/consideration-deferred-action-childhood-arrivals-daca`.

benefits of DACA for unauthorized immigrants are being reprieved from deportation and obtaining a work permit. DACA recipients receive a social security number, which enables them to open a bank account, build a credit history, and access Earned Income Tax Credit. Furthermore, most states (the only exceptions being Arizona and Nebraska) allow DACA recipients to obtain a driver's license. At the same time, DACA does not provide access to federal welfare programs, federal student aid, or any provisions of the 2010 Patient Protection and Affordable Care Act.

Ahead of the 2016 presidential election, the uncertainty around the future of the program increased significantly. DACA was challenged several times in court and encountered firm opposition from many members of the Republican Party. Furthermore, at the beginning of the 2016 primary election campaign, (the future) President Trump remarked his intention to end the program. During a campaign rally in Arizona in August 2016, Trump reaffirmed his intention to rescind DACA if elected president.[3] Immigration quickly became one of the leading topics of the campaigns, with several candidates casting doubt on the future of DACA.

The DACA program was initially rescinded by President Trump's administration in September 2017, although this repeal was later blocked by three preliminary injunctions issued by federal district court judges in California, New York, and D.C. On May 1, 2018, Texas and six other states filed a lawsuit in the US District Court for the Southern District of Texas challenging the 2012 program itself. The plaintiffs asked for a preliminary injunction that would stop USCIS from accepting DACA renewal requests while the lawsuit was pending. However, this request was denied by the judge on August 8, 2018. Finally, on June 18, 2020, the Supreme Court announced its decision to block the DACA repeal, arguing that the administration failed to provide adequate justification for ending the program. Thus, the US Department of Homeland Security now only accepts requests for the renewal of the existing status but no new applications (source: National Immigration Law Center).

2.2 Previous Literature

We contribute to the recent literature exploring the impact of legalization programs on human capital, labor market outcomes, and health. Previous studies show that illegal immigrants tend

[3]Trump's key announcements about the DACA program are summarized in `https://time.com/4941733/trump-daca-deal-enshrine/`.

to earn substantially lower hourly wage rates and family income than their legal immigrant or native-born counterparts (Rivera-Batiz, 1999; Borjas, 2017). Further, legalization programs can have positive impacts on labor market integration, leading to higher labor force participation and lower likelihood of unemployment among legalized immigrants (Kossoudji and Cobb-Clark, 2002; Devillanova et al., 2018). In addition, legalization leads to a significant increase in immigrants' wages (Rivera-Batiz, 1999), thereby contributing to the growth in private sector GDP (Edwards and Ortega, 2017). On the contrary , previous studies have found that programs requiring employers to check workers' eligibility to work legally in the United States have reduced average hourly earnings among likely unauthorized Mexican immigrants (Orrenius and Zavodny, 2015). Our study closely relates to the growing number of studies analyzing the impact of immigration policy on health and, more specifically, to studies investigating the effects of DACA on labor market outcomes, human capital, and health. DACA has been shown to improve the labor market opportunities of undocumented immigrants (Pope, 2016), reduce the likelihood of life in poverty (Amuedo-Dorantes and Antman, 2016), and increase GDP (Ortega et al., 2019). There is, instead, mixed evidence on the effects of DACA on human capital. While DACA may have incentivized work over educational investment (Amuedo-Dorantes and Antman, 2017; Hsin and Ortega, 2018), Kuka et al. (2020), using administrative data from California, find evidence that DACA increases high school graduation rates and college attendance. There is also growing evidence of the effects of DACA on health. Using data from the National Health Interview Survey, Venkataramani et al. (2017), Patler and Pirtle (2017), and Giuntella and Lonsky (2020) show that economic opportunities and protection from deportation can have large positive effects on the mental health of undocumented immigrants. Hainmueller et al. (2017) use Medicaid claims data from Oregon to document that children of DACA-eligible mothers have 50% fewer diagnoses of adjustment and anxiety disorders than children of ineligible mothers. More recently, Patler et al. (2019) show that the DACA health benefit in California appears to worsen in 2016 and 2017, a result consistent with our finding on sleep at the national level using a longer observation window. Finally, Wang and Kaushal (2019) report the significant effects of local immigration enforcement policy on immigrants' health.

Second, we relate to the growing number of studies analyzing the determinants and consequences of sleep deprivation using quasi-natural experiments and time-use data. In particular,

there is increasing evidence of the causal effects of sleep deprivation on chronic diseases, health, cognitive skills, decision making, human capital, and productivity (Luyster et al., 2012; Giuntella and Mazzonna, 2019; Giuntella et al., 2017; Jin and Ziebarth, 2020; McKenna et al., 2007; Hafner et al., 2017; Heissel and Norris, 2018; Gibson and Shrader, 2018).

Finally, we contribute to the literature analyzing disparities in sleep (Guglielmo et al., 2018; Jackson et al., 2013; Williams et al., 2015). Prior studies have shown marked differences in sleep duration by race and ethnicity (Lauderdale et al., 2006; Hale and Do, 2007; Jackson et al., 2013). A handful analyze acculturation and sleep using small cross-sectional studies and comparing first-generation immigrants with later-generation immigrant descendants. For example, Hale and Rivero-Fuentes (2011), using data from the National Health Interview Survey, suggest that United States-born Mexican Americans are more likely to be short sleepers than Mexican immigrants. Similarly, Hale et al. (2014) employ data from the Study of Women's Health Across the Nation and find that United States-born Hispanics as well as Chinese and Japanese immigrant descendants are more likely to report sleep complaints than their first-generation ethnic counterparts. However, while previous studies have investigated how immigration policy may affect immigrants' health, we know little about the effects of immigration reforms on sleep.

2.3 Data

Our data are drawn from the American Time Use Survey (ATUS), a nationally representative, repeated cross-sectional survey of the time use of Americans conducted since 2003 (Bureau of Labor Statistics, 2018). The monthly Current Population Survey provides the sampling frame for this survey; households that complete the eighth and final interview become eligible for selection into the ATUS sample. Specifically, respondents aged 15 years and above are asked to complete a detailed diary of their previous day, with 50% of the sample reporting about weekdays and 50% reporting about Saturday and Sunday. This diary provides information on all performed activities recorded during the entire 24 hours. In addition, respondents are requested to answer questions about their sociodemographic characteristics.

In our analysis, we focus on the period between 2009 and 2019.[4] Following Pope (2016) and in

[4]Although ATUS data are available since 2003, we use data from 2009 to avoid the confounding effect of the Great Recession. Moreover, given the eligibility criteria of being under 31 in 2012, we avoid having a pre-policy group

accordance with the eligibility criteria (see also Section 2.1), we restrict attention to individuals between 18 and 35 years with at least a high school degree at the time of the survey. Furthermore, we drop individuals reporting more than 16 or less than 2 hours of sleep and consider only night sleeping by excluding naps (i.e., sleep that starts and finishes between 7 am and 7 pm).[5] After these restrictions, our final estimation sample comprises 25,720 observations. While only non-citizens are defined as DACA-eligible, the control group in our baseline specifications includes citizens and natives (see also Pope, 2016). Following the previous literature on the economic and health effects of DACA (Pope, 2016; Venkataramani et al., 2017), we test the sensitivity of our results by restricting the sample to foreign-born adults or foreign-born adults who reported Hispanic ethnicity (i.e., roughly 90% of DACA beneficiaries). As we narrow the sample selection criteria and include only foreign-born Hispanics in the control group, we increase the comparability between the treatment and control groups, but the sample size decreases substantially.

Table 1 displays the descriptive statistics for these three samples. Specifically, we report the mean and standard deviation for the main sample (all individuals aged 18–35 with at least a high school degree), foreign-born respondents, and foreign-born Hispanics. Individuals report sleeping on average about nine hours per day and immigrants tend to sleep more than natives (compare the main sample with the foreign-born and Hispanic samples). Further, self-reported sleep tends to overestimate objective measures of sleep duration (Lauderdale et al., 2008). Moreover, Basner et al. (2007) note that the values for sleep time may overestimate actual sleep because the ATUS Activity Lexicon includes transition states (e.g., falling asleep). We also use non-linear measures of sleep such as sleeping less than seven or eight hours, which have often been used in the medical literature analyzing sleep deprivation (Cappuccio et al., 2010), as well as other subjective measures related to sleep quality such as reporting being well rested and episodes of sleeplessness.

Regarding the other individual characteristics, the proportion of people whose highest educational qualification is a college degree is lower in the Hispanic subsample and foreign-born individuals are typically more likely to be married. Finally, in the main sample, approximately 2% of respondents are eligible for the DACA program (roughly 60 individuals per year). The

systematically younger than the post-policy group.

[5]The results are not sensitive to these restrictions.

proportion is markedly larger when we focus on Hispanics (18%). Overall, this table illustrates the trade-off between comparability and power as we move toward the group mostly affected by the immigration policy. Table A.1 in the Appendix reports the estimates of a balancing test obtained by regressing each of our outcomes and covariates (not used to determine eligibility status) on the DACA-eligible dummy, focusing on the period before the introduction of DACA in 2012. Reassuringly, most of the coefficients are low and not significantly different from zero. However, we do find a higher share of married individuals among DACA-eligible individuals.

3 Identification Strategy

To identify the effect of DACA, we adopt the difference-in-differences approach proposed by Pope (2016) and Amuedo-Dorantes and Antman (2016). Specifically, we exploit discontinuities in the eligibility criteria of the DACA program and compare DACA-eligible (treatment group) with DACA-ineligible individuals (control group) before and after the implementation of the program. As mentioned in Section 2.1, DACA-eligible individuals are defined as those who (1) were under 31 as of June 15, 2012; (2) have lived in the United States since June 15, 2007; (3) entered the United States before reaching their 16th birthday; (4) have at least a high school degree (or equivalent); (5) are not US citizens; and (6) are unauthorized immigrants. Since the survey asked respondents about their age, year of migration, education, and citizenship status, we can identify individuals who meet the first five qualification criteria. However, as is typical in publicly available US databases, we cannot determine the immigrant's legal status. Previous estimates using survey data suggest that among self-reported non-citizens, approximately 60% are expected to be undocumented (Baker and Rytina, 2014; Pope, 2016).

Specifically, we estimate different versions of the following equation for individual i residing in state s in the year of interview t:

$$Y_{ist} = \alpha + \beta_1 \text{Eligible}_{ist} + \beta_2 \text{Post}_t * \text{Eligible}_{ist} + \gamma X_{ist} + I_t + \eta_s + \epsilon_{ist} \quad (1)$$

where Y_{ist} represents a set of sleep outcomes, defined as follows: 1) sleep hours; 2) an indicator

variable for whether the individual sleeps less than seven hours; 3) a binary variable for whether the individual sleeps less than eight hours; 4) a measure of sleep satisfaction proxied by a dummy equal to one if the individual reported to have rested very well the previous day; and 5) episodes of sleeplessness. $Eligible_{ist}$ is a dummy equal to one if individual i is DACA-eligible when the survey is administered. To capture the effect of the policy, $Eligible_{ist}$ is interacted with $Post_t$, a binary variable taking one for all the years after DACA was implemented in the United States (i.e., 2013 or later).[6] Model (1) also contains a full set of state fixed effects (η_s), which aim to capture unobservable time-invariant differences across states that may affect our outcomes. I_t collects a set of fixed effects for the interview characteristics (i.e., survey year, month, and day fixed effects), which account for possible trends in sleep behavior. X_{ist} is a vector of the control variables including sex , age dummies, indicators for marital status, education, dummies for race (i.e., whites, Hispanics, and blacks), and age at arrival fixed effects (the omitted category is given by comparable natives). Finally, ϵ_{ist} represents an idiosyncratic error term.

While the coefficient β_1 measures the average difference in sleep behavior between the treatment and control groups , the key parameter is β_2, which indicates the change in the sleep behavior of treated individuals after the reform relative to the control group. Therefore, β_2 measures the effect of the policy on DACA-eligible individuals.[7] As already mentioned, since nearly 40% of the non-citizens in the data are estimated to be authorized immigrants, our estimated effect of the policy (β_2) will be smaller than the intent-to-treat effect of DACA. Furthermore, not all DACA-eligible individuals applied and received DACA status. The Migration Policy Institute estimates that there were 1,326,000 DACA-eligible individuals in 2017. However, as of January 2018, only 682,750 individuals obtained DACA status.[8] Based on these estimates, the program participation rate is 52%, suggesting that the treatment on the treated effects could be twice as large as the intent-to-treat effects.

Differently from the previous literature on the effect of DACA, we also evaluate whether the increasing uncertainty about the future of the program (from as early as 2016) affected the sleep behavior of eligible individuals. For this reason, we present our results for the impact of the

[6]Most applications were approved in 2013. However, in our alternative specifications (see Tables A.7 and A.8 in the Appendix), we use the year of announcement (2012).

[7]The *Post* dummy is excluded from the model because we include year fixed effects.

[8]See `https://www.migrationpolicy.org/programs/data-hub/deferred-action-childhood-arrivals-daca-profiles`.

program separated for two periods (2013–2015 and 2016–2019). In other words, the *Post* variable in equation (1) is split into two subperiods.

We also replicate our main analysis using an event study design (or multi-period difference-in-differences) in which we interact the eligible dummy (Eligible_{ist}) with the year fixed effects using 2012 as the reference period to test for pre-trends and visually inspect the estimated effect over time. In particular, this allows us to verify whether the impact of the policy clearly dissipates after 2015 (or is just the result of an outlier in a specific year).

Since the question about sleep satisfaction is asked only up to 2013, we cannot identify for this outcome the effect of the policy in the second period. We estimate our model using ordinary least squares (OLS) and standard errors are clustered at the state level. All our analyses use the ATUS respondent weights ($WT06$). These weights aim to recover nationally representative estimates, taking into account the over- and under-representation of a demographic group due to sampling differentials.[9] One concern is that DACA may have altered the survey response behavior among the eligible population, potentially biasing the estimates. Pope (2016) suggests this is not the case when examining data from the American Community Survey. Consistent with his findings, we detect no evidence of a change in the share of DACA-eligible respondents throughout our sample period (p-value=0.28), thereby suggesting that response behavior was not altered by the policy.

4 Results

Before presenting the results, we visualize the effect of the policy by comparing DACA-eligible individuals with DACA ineligible ones before and after the policy implementation using the event study design previously described. Figure 2 reports this comparison by sex to highlight the large differences, while we presents the pooled evidence and non-parametric unconditional figures in the Appendix (see Figure A.1 and Figure A.2, respectively). Specifically, Figure 2 reports the parametric differences between the two groups in the share of individuals reporting less than seven (top panels) and less than eight hours of sleep (bottom panels). The dotted vertical line at 2012 is taken as the reference point because the policy was implemented in June 2012 and

[9] More information is provided at `https://www.bls.gov/tus/atususersguide.pdf`.

this shows most of its effects since 2013. All the estimates include age dummies, indicators for marital status, education, race dummies, and age at arrival fixed effects.

Focusing on men (see the left panels of Figure 2), the figure shows that DACA-eligible immigrants become significantly less likely to report insufficient sleep after the implementation of the policy, while there are no significant differences in the pre-trends between eligible and ineligible individuals (between 2009 and 2011). Indeed, when testing the joint hypothesis that the pre-trend coefficients for the years preceding DACA adoption are not significantly different from zero, we cannot reject the null hypothesis for all the sleep duration outcomes (see columns 1, 3 and 5 of Table A.2 in the Appendix).

However, the beneficial effects of DACA attenuate over time, particularly after 2016. There are two possible explanations of this convergence. First, DACA is subject to renewal every two years, thereby leading to some uncertainty among individuals who are due to renew. However, the effect of concerns about renewal should have materialized in 2015, as most applications were approved in 2013. Second, with the approaching 2016 presidential primaries and elections and change in the political climate, the uncertainty about the future of the program increased substantially . During the 2016 campaign, Donald Trump (as many other Republican candidates) publicly declared his intention to rescind the program.

For women, by contrast, there is no evidence of an effect of the policy, except some noisy effects in 2017–2019 that lack any systematic pattern (see the right panels of Figure 2).

Table 2 presents the results of the simple OLS estimation of model (1), using pooled data from the 2009–2019 period for individuals aged 18 to 35 years and distinguishing between the short- (2013–2015) and long-run effects (2016–2019) of the policy. For the short-run effects, we find that DACA-eligible individuals sleep on average 30 minutes longer than ineligible individuals. We also find a significant reduction in the likelihood of reporting less than seven and less than eight hours of sleep. In particular, eligible immigrants are 10.2 percentage points less likely to sleep less than seven hours and 13.8 percentage points less likely to sleep less than eight hours.[10]

Consistent with Figure 2, the effects are larger and more precisely estimated for men (see Panel

[10]The coefficient of sleep less than six hours is -0.021 (0.041). While the point estimate is sizeable compared with the share of individuals sleeping less than six hours (6.9%), the standard errors are large and the coefficient is imprecisely estimated. Because time-use surveys tend to significantly overestimate sleep (Lauderdale et al., 2006; Avery et al., 2019), unsurprisingly, the share of individuals sleeping less than six hours is relatively low.

B), while they are much smaller and no longer significant among women (see Panel C). This result is consistent with other evidence suggesting little or no impacts of DACA on women (Kuka et al., 2020). Among men, we also find a significant increase in sleep satisfaction, which is markedly larger among DACA-eligible immigrants than ineligible ones (see column 4 of Panel B).

While we do not have a perfect measure of sleep quality, we can identify the time individuals report sleeplessness. Interestingly, DACA-eligible immigrants are less likely to report sleeplessness episodes after the introduction of DACA. Specifically, Table 2 documents that DACA-eligible individuals are 2 percentage points less likely to report such episodes (see column 5 of Panel A). The effects are significantly larger among men than women (see column 5 of Panels B and C, respectively).

As shown in Figure 2, in the long run, the effects of DACA become not statistically different from zero. Indeed, if anything, they change sign (see the coefficients of the interaction term DACA-Eligible* 2016–2019 in Table 2). Again, this result is driven by men. For women, our estimate suggests the opposite effect on sleeping less than eight hours. However, the event study in Figure 2 shows no clear pattern for women, suggesting an increase in noisy data in the latter years of the sample.

We also show the presence of substantial spatial heterogeneity. In Table 3, we follow Amuedo-Dorantes and Antman (2017) who focus on the nine US states with the most DACA applicants. Reassuringly, our results are larger in these states (see Panel A), while they are smaller and mostly non-significant in all the other states with a low number of applications (see Panel B). Similarly, as displayed in Table 4, the estimated coefficients of interest are larger when examining states with a high (above the median) number of deportations as opposed to those with a low number (see Panels A and B, respectively).[11] While the threat of deportation in the period under study is fairly low, recent estimates suggest that 50% of Latinos in the United States fear deportation (Asad, 2020). Our findings suggest that the lower threat of deportation may have lengthened sleep duration among DACA-eligible immigrants.

In what follows, we perform several sensitivity analyses to check the robustness of our results. First, we replicate our analyses using different samples, notably different control groups. In particular, we narrow our sample to include only foreign-born individuals and, as in Venkataramani

[11] Instead, we find no clear relationship when comparing states with a Democratic or a Republican governor.

et al. (2017), foreign-born Hispanics (see Panels A and B of Table 5, respectively). Reassuringly, the point estimates are almost identical, although the standard errors increase markedly because the sample size shrinks considerably, especially in the Hispanic subsample. Table A.3 in the Appendix also shows that the point estimates are substantially unchanged when restricting the sample to non-citizens, although the coefficients are less precisely estimated because of the smaller sample. However, our sample selection criteria are more restrictive than those applied by Venkataramani et al. (2017), who focus on non-citizen adults with Hispanic ethnicity aged 18 to 50, while we maintain the DACA requirement of 18–35 years. Next, we show that our results remain substantially unchanged when restricting the analysis to immigrants who arrived after 1980 (see Table A.4 in the Appendix and Borjas and Slusky, 2017).

Table A.5 in the Appendix shows that our results are also robust to the use of a larger sample of both citizens and non-citizens aged 18–50 years. In Table A.6 in the Appendix, we repeat our analyses taking into account the discrete nature of most of our outcome variables using probit models. The results are similar to our baseline findings (see Table 2). Finally, Table A.7 (A.8) in the Appendix replicates the main estimates using the year (month) of the policy announcement to define our treatment variable. While the estimates become somehow noisier, the coefficients are not statistically different from those reported in our main specification. Overall, these sensitivity analyses confirm our baseline results.

5 Conclusion

There has been heated political debate on the effectiveness of the DACA program. Previous work has provided evidence of the positive effects of DACA on labor force participation and other labor market outcomes. There is also evidence of positive effects on health insurance, access to health care, and mental health outcomes as well as mixed evidence on the effects on academic outcomes. However, we know little about the mechanisms underlying such effects. This study explores the role of sleep, which is known to be an important health factor and is directly affected by stress. Exploiting the discontinuities in the DACA eligibility criteria, we provide evidence that DACA-eligible immigrants after 2012 significantly improved their sleep duration. The effects are larger among men. These results are consistent with those of recent studies suggesting that DACA has

beneficial effects on immigrants' mental health and well-being (Kaushal et al., 2018; Wang and Kaushal, 2019; Venkataramani et al., 2017; Giuntella and Lonsky, 2020).

While we do not have precise measures of sleep quality, we do find evidence that DACA-eligible immigrants—after the introduction of DACA—were significantly less likely to report episodes of sleeplessness. Although the threat of deportation in the period under study is fairly low, recent estimates suggest that 50% of Latinos in the United States fear deportation. Hence, the lower threat of deportation may be one of the important factors behind our results. The increased economic opportunities associated with the temporary authorization to work are also likely to affect stress and sleep patterns. At the same time, the beneficial effects of the policy seem to dissipate after a few years, becoming non-significantly different from zero after 2016. Therefore, we cannot exclude the implication that DACA provides only short-term benefits and that the increased uncertainty around its future attenuates the positive effects observed in previous studies.

This study has some limitations. First, we use self-reported data from a time-use survey. As pointed out by Lauderdale et al. (2008), the lack of more objective information on sleep may result in substantial measurement error. Second, our results are based on a relatively small sample. While other data (e.g., the National Health Interview Survey) would provide a larger sample, they do not contain precise information on the year of immigration to the United States, which is crucial to identify DACA-eligible individuals. Third, we are unable to precisely identify authorized and unauthorized immigrants and thus the exact DACA-eligible population. Fourth, we estimate an intent-to-treat effect of DACA. Our estimates suggest that the treatment on the treated effects could be twice as large as the intent-to-treat effects.

Despite these limitations, our study contributes to the extant literature. This is the first analysis of the impact of immigration policy on immigrants' sleep patterns. Furthermore, while previous studies have suggested that concerns about immigrant status may affect immigrants' stress and sleep, we are the first to employ a difference-in-differences approach to quantify the impacts of an immigration policy change on immigrants' sleep.

Overall, our results reveal that the stress associated with immigration status, particularly the threat of deportation and lack of work authorization, may significantly affect immigrants' sleep habits. We also show that legalization or temporary authorization programs such as DACA may have non-negligible impacts on immigrants' sleep. At the same time, the effects of tempo-

rary programs can be quickly undermined by uncertainty about their future. Thus, while there may be positive effects in the short term, the uncertainty around the program may increase the vulnerability of targeted individuals over time.

Given growing evidence of the detrimental effects of sleep deprivation on health, cognitive skills, and productivity (Gibson and Shrader, 2018; Giuntella and Mazzonna, 2019; Giuntella et al., 2017), policymakers should not discount the impact of immigration policies on health disparities and the economic integration of immigrants. Sleep deprivation may help explain the unhealthy assimilation of immigrants with time spent in the United States (Antecol and Bedard, 2006). Yet, permanent legalization programs may be more effective at achieving long-term effects by eliminating uncertainty related to the legal status of undocumented immigrants. While this goes beyond the scope of our study, future research could shed light on the role of sleep in explaining immigrants' health trajectories.

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Figures

Figure 1: Timeline

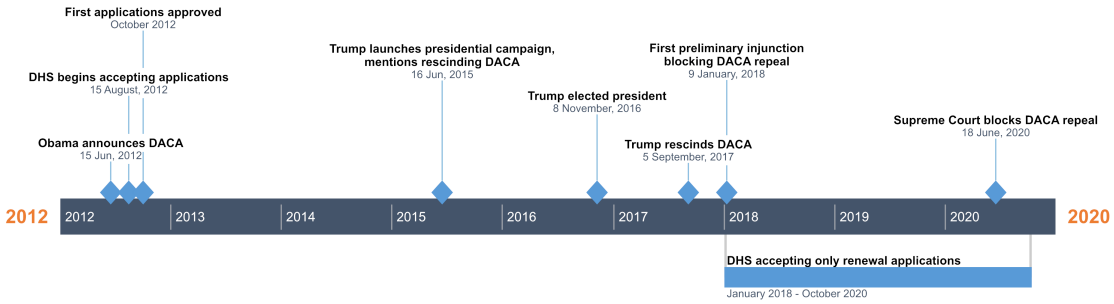
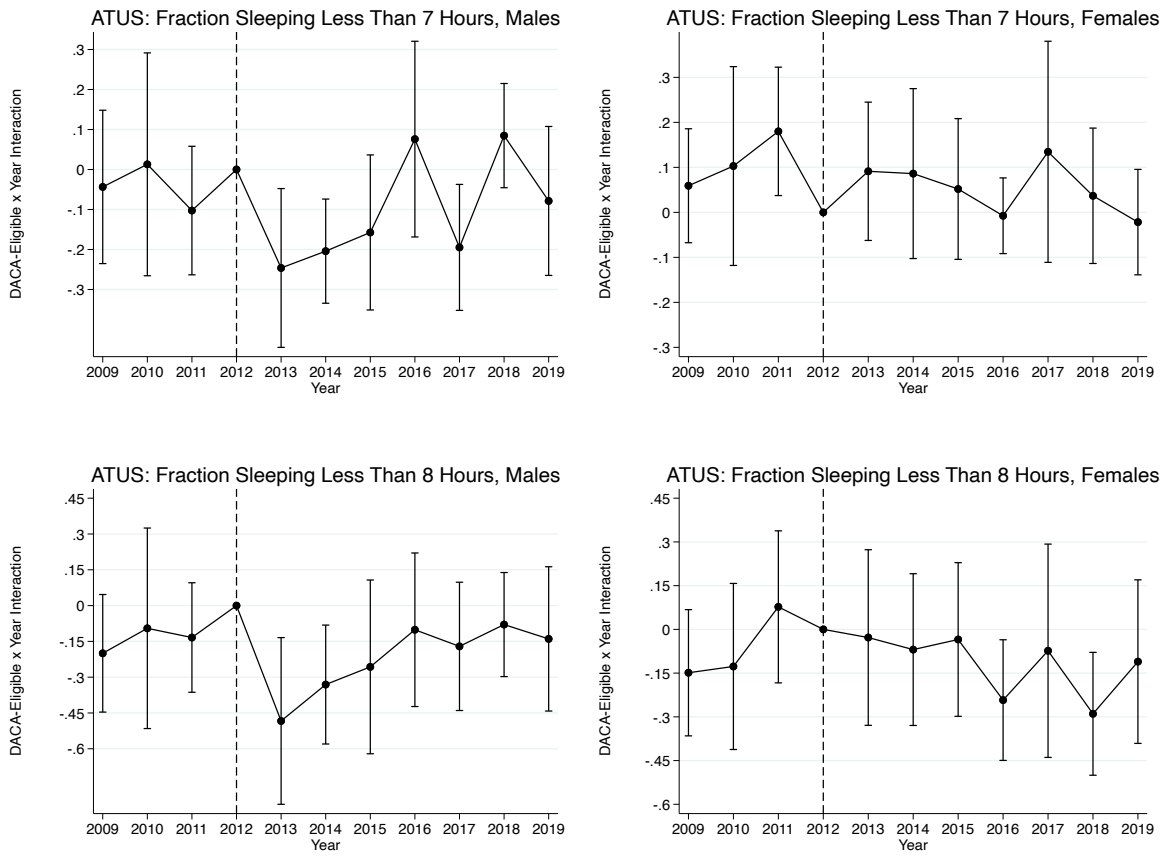


Figure 2: DACA Eligibility and Insufficient Sleep, by Sex



Notes - Data are drawn from the ATUS (survey years: 2009–2019). The sample is restricted to individuals aged 18–35 with at least a high school degree. The figure shows the point estimates and 95% confidence intervals of the interaction terms between the treatment group and year dummies taking 2012 as the reference and using the model reported in equation (1).

Tables

Table 1: Descriptive Statistics

	Full Sample		Foreign-born Sample		Hispanic Sample	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Hours of sleep	9.16	2.31	9.41	2.35	9.53	2.42
Sleep less than 7	0.15	0.35	0.13	0.34	0.13	0.34
Sleep less than 8	0.29	0.45	0.26	0.44	0.25	0.43
Sleep satisfaction	0.35	0.48	0.41	0.49	0.47	0.50
Espisodes of sleeplessness	0.05	0.21	0.03	0.16	0.02	0.15
Female	0.57	0.50	0.56	0.50	0.55	0.50
Age	28.47	4.70	29.25	4.45	28.56	4.61
Married	0.44	0.50	0.56	0.50	0.54	0.50
High school degree	0.26	0.44	0.29	0.45	0.49	0.50
Some college	0.36	0.48	0.27	0.45	0.30	0.46
College degree	0.38	0.49	0.44	0.50	0.21	0.41
Black	0.13	0.34	0.13	0.33	0.04	0.19
Hispanic	0.17	0.37	0.42	0.49	1.00	0.00
White	0.78	0.41	0.57	0.50	0.92	0.28
DACA-eligible immigrants	0.02	0.12	0.10	0.30	0.18	0.38
Immigrants	0.14	0.35	1		1	
Age at arrival	17.56	9.29	17.63	9.23	15.90	8.74
Observations	25,720		3,728		1,553	

Notes - Data are drawn from the ATUS for individuals aged 18-35 with at least a high school degree (survey years: 2009-2019). All the samples contain individuals for whom information on all observables and the respective outcome variable are not missing. The sample size for sleep satisfaction reduces to 7,335 observations for the full sample, 997 observations for the foreign-born sample, and 423 observations for the Hispanic sample.

Table 2: Effects of DACA on Sleep - Individuals aged 18-35

Dep. var.:	(1) Sleep hours	(2) Sleep hours<7	(3) Sleep hours<8	(4) Sleep satisfaction	(5) Sleeplessness
Panel A: Full Sample					
DACA-Eligible * 2013-2015	0.498	-0.102***	-0.138***	0.098	-0.020*
	(0.365)	(0.037)	(0.050)	(0.131)	(0.012)
DACA-Eligible * 2016-2019	0.100	0.015	-0.048	NA	-0.008
	(0.382)	(0.038)	(0.062)	NA	(0.016)
Mean of dep. var.	9.162	0.148	0.289	0.346	0.0464
Std. dev. of dep. var.	2.310	0.355	0.453	0.476	0.210
Observations	25,720	25,720	25,720	7,335	25,720
Panel B: Males					
DACA-Eligible * 2013-2015	0.900	-0.177***	-0.219**	0.291*	-0.042**
	(0.578)	(0.053)	(0.090)	(0.161)	(0.021)
DACA-Eligible * 2016-2019	-0.075	0.021	-0.005	NA	-0.016
	(0.425)	(0.045)	(0.067)	NA	(0.028)
Mean of dep. var.	9.004	0.171	0.319	0.386	0.0444
Std. dev. of dep. var.	2.363	0.377	0.466	0.487	0.206
Observations	11,111	11,111	11,111	3,178	11,111
Panel C: Females					
DACA-Eligible * 2013-2015	0.091	-0.022	-0.034	-0.174	-0.007
	(0.388)	(0.054)	(0.069)	(0.122)	(0.009)
DACA-Eligible * 2016-2019	0.778*	-0.069	-0.179**	NA	-0.004
	(0.429)	(0.042)	(0.075)	NA	(0.023)
Mean of dep. var.	9.283	0.130	0.266	0.316	0.0480
Std. dev. of dep. var.	2.262	0.336	0.442	0.465	0.214
Observations	14,609	14,609	14,609	4,157	14,609

Notes - Standard errors are reported in parentheses and are clustered at the state level. All models are estimated using data from 2009-2019 ATUS. Panel A includes both genders, while Panel B includes only men, and Panel C includes only women. Control variables: gender (only Panel A), age dummies, indicators for the ethnic group, marital status and education, as well as state, survey year, month, day and age at arrival fixed effects. NA=not applicable.

* Significant at 10%; ** significant at 5%; *** significant at 1%.

Table 3: Effects of DACA on Sleep - Individuals aged 18-35 - States with High vs. Low Applications

Dep. var.:	(1) Sleep hours	(2) Sleep hours<7	(3) Sleep hours<8	(4) Sleep satisfaction	(5) Sleeplessness
Panel A: States with high number of applications (CA, TX, NY, IL, FL, NC, AZ, GA and NJ)					
DACA-Eligible * 2013-2015	0.649	-0.114**	-0.158**	0.325**	-0.014
	(0.487)	(0.039)	(0.061)	(0.121)	(0.014)
DACA-Eligible * 2016-2019	-0.162	0.060	-0.001	NA	-0.003
	(0.489)	(0.037)	(0.078)	NA	(0.019)
Mean of dep. var.	9.238	0.145	0.277	0.362	0.0399
Std. dev. of dep. var.	2.331	0.352	0.447	0.481	0.196
Observations	10,764	10,764	10,764	3,125	10,764
Panel B: States with low number of applications					
DACA-Eligible * 2013-2015	-0.252	-0.024	-0.049	-0.544***	-0.036
	(0.509)	(0.080)	(0.090)	(0.131)	(0.025)
DACA-Eligible * 2016-2019	0.132	-0.017	-0.076	NA	-0.025
	(0.357)	(0.068)	(0.081)	NA	(0.034)
Mean of dep. var.	9.108	0.150	0.297	0.334	0.0511
Std. dev. of dep. var.	2.294	0.357	0.457	0.472	0.220
Observations	14,956	14,956	14,956	4,210	14,956

Notes - Standard errors are reported in parentheses and are clustered at the state level. All models are estimated using data from 2009-2019 ATUS. Panel A includes states with a high number of applications (the top 9 states listed above), while Panel B includes all the other states with a low number of applications. Control variables: gender, age dummies, indicators for the ethnic group, marital status and education, as well as state, survey year, month, day and age at arrival fixed effects. NA=not applicable.
* Significant at 10%; ** significant at 5%; *** significant at 1%.

Table 4: Effects of DACA on Sleep - Individuals aged 18-35 - High vs. Low Deporting States

Dep. var.:	(1) Sleep hours	(2) Sleep hours<7	(3) Sleep hours<8	(4) Sleep satisfaction	(5) Sleeplessness
Panel A: High-deporting states (above the median)					
DACA-Eligible * 2013-2015	0.580	-0.110**	-0.161***	0.191	-0.020
	(0.410)	(0.042)	(0.055)	(0.131)	(0.015)
DACA-Eligible * 2016-2019	0.045	0.016	-0.047	NA	0.000
	(0.438)	(0.043)	(0.077)	NA	(0.016)
Mean of dep. var.	9.191	0.148	0.284	0.354	0.0434
Std. dev. of dep. var.	2.316	0.355	0.451	0.478	0.204
Observations	17,302	17,302	17,302	4,934	17,302
Panel B: Low-deporting states (below the median)					
DACA-Eligible * 2013-2015	-0.345	-0.056	0.000	-0.748***	0.006
	(0.541)	(0.081)	(0.079)	(0.193)	(0.028)
DACA-Eligible * 2016-2019	-0.005	0.024	0.011	NA	-0.018
	(0.554)	(0.079)	(0.101)	NA	(0.042)
Mean of dep. var.	9.104	0.147	0.297	0.331	0.0526
Std. dev. of dep. var.	2.297	0.354	0.457	0.471	0.223
Observations	8,418	8,418	8,418	2,401	8,418

Notes - Standard errors are reported in parentheses and are clustered at the state level. All models are estimated using data from 2009-2019 ATUS. Panel A includes states with a high number of deportations (above the median), while Panel B includes states with a low number of deportations (below the median). Control variables: gender, age dummies, indicators for the ethnic group, marital status and education, as well as state, survey year, month, day and age at arrival fixed effects. NA=not applicable.

* Significant at 10%; ** significant at 5%; *** significant at 1%.

Table 5: Effects of DACA on Sleep - Foreign-born and Hispanic Sample - Individuals aged 18-35

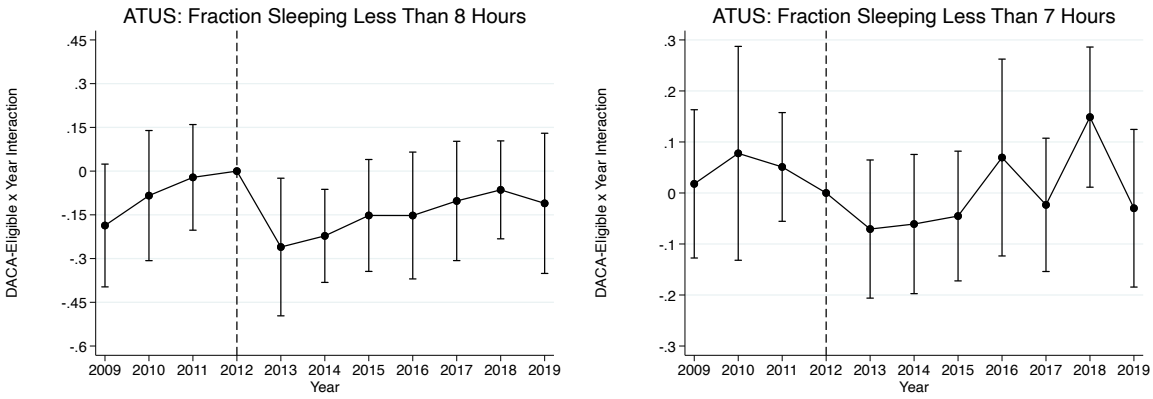
Dep. var.:	(1) Sleep hours	(2) Sleep hours<7	(3) Sleep hours<8	(4) Sleep satisfaction	(5) Sleeplessness
Panel A: Foreign-born Sample					
DACA-Eligible * 2013-2015	0.470	-0.096**	-0.133**	0.095	-0.022
	(0.430)	(0.037)	(0.060)	(0.129)	(0.015)
DACA-Eligible * 2016-2019	0.185	-0.004	-0.056	NA	0.005
	(0.469)	(0.042)	(0.073)	NA	(0.021)
Mean of dep. var.	9.408	0.132	0.257	0.414	0.0268
Std. dev. of dep. var.	2.349	0.339	0.437	0.493	0.162
Observations	3,728	3,728	3,728	997	3,728
Panel B: Hispanics Sample					
DACA-Eligible * 2013-2015	0.161	-0.082	-0.084	0.094	-0.008
	(0.529)	(0.059)	(0.095)	(0.130)	(0.016)
DACA-Eligible * 2016-2019	0.044	0.036	0.004	NA	0.016
	(0.588)	(0.056)	(0.107)	NA	(0.025)
Mean of dep. var.	9.528	0.131	0.251	0.473	0.0245
Std. dev. of dep. var.	2.419	0.338	0.434	0.500	0.155
Observations	1,553	1,553	1,553	423	1,553

Notes - Standard errors are reported in parentheses and are clustered at the state level. All models are estimated using data from 2009-2017 ATUS. Panel A includes only foreign-born individuals, while Panel B includes only Hispanics. Control variables: gender, age dummies, indicators for the ethnic group (only Panel A), marital status and education, as well as state, survey year, month, day and age at arrival fixed effects. NA=not applicable.

* Significant at 10%; ** significant at 5%; *** significant at 1%.

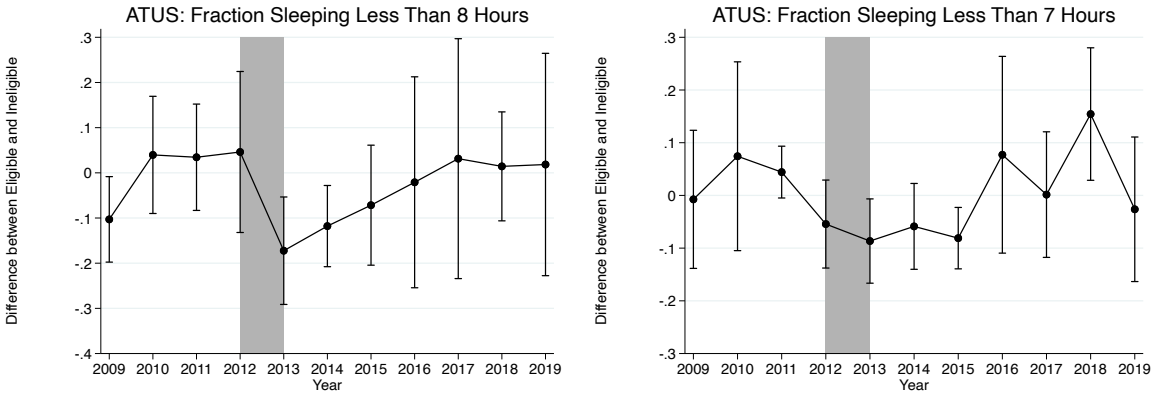
Appendix: Supplemental Figures and Tables

Figure A.1: DACA Eligibility and Insufficient Sleep



Notes - Data are drawn from the ATUS (survey years: 2009–2019). The sample is restricted to individuals aged 18–35 with at least a high school degree. The figure shows the point estimates and 95% confidence intervals of the interaction terms between the treatment group and year dummies taking 2012 as the reference and using the model reported in equation (1).

Figure A.2: DACA Eligibility and Insufficient Sleep (Unconditional Comparison)



Notes - Data are drawn from the ATUS (survey years: 2009–2019). The sample is restricted to individuals aged 18–35 with at least a high school degree.

Table A.1: Balancing Test - Full Sample (Before 2012)

Indep. var.:	DACA-Eligible	
	Coefficient	*P*-value
Hours of sleep	-0.484	0.181
Sleep less than 7	0.092	0.118
Sleep less than 8	0.071	0.243
Sleep satisfaction	-0.080	0.532
Espisodes of sleeplessness	0.002	0.887
Female	0.039	0.520
Married	0.113**	0.019
Black	-0.025	0.539
Weekend	-0.000**	0.011
First quarter	0.000**	0.015
Second quarter	0.000***	0.005
Third quarter	0.000	0.356
Fourth quarter	-0.000***	0.009
Earnings	-5.654	0.895
Working full-time	0.008	0.881
Observations	8,376	

Notes - Data are drawn from the ATUS for individuals aged 18-35 with at least a high school degree (survey years: 2009-2011). The table reports the coefficient on the DACA-eligible dummy derived by regressing each of the outcomes and covariates listed in each row on the DACA-eligible dummy. All models control for dummies for age and education, as well as state, year, month, day and age at arrival fixed effects. Standard errors are clustered at the state level. The sample size for sleep satisfaction and earnings reduces to 2,773 and 5,966 observations, respectively.

Table A.2: Testing Parallel Pre-Trends Assumption, by Gender

	(1)	(2)	(3)	(4)	(5)	(6)
	Males	Females	Males	Females	Males	Females
Dep. var.:	Sleep hours	Sleep hours	Sleep hours<7	Sleep hours<7	Sleep hours<8	Sleep hours<8
DACA-Eligible * 2009	0.316	-0.109	-0.050	0.079	-0.077	-0.026
	(0.500)	(0.498)	(0.089)	(0.057)	(0.088)	(0.077)
DACA-Eligible * 2010	0.318	-0.011	-0.005	0.130	0.013	0.025
	(0.872)	(0.608)	(0.124)	(0.112)	(0.166)	(0.144)
DACA-Eligible * 2011	-0.461	-1.057**	-0.052	0.221***	-0.108*	0.232*
	(0.376)	(0.475)	(0.100)	(0.078)	(0.063)	(0.120)
Joint F statistics (2011=2010=2009=0)	0.836	1.741	0.237	7.069	1.202	1.959
Observations	11,111	14,609	11,111	14,609	11,111	14,609

Notes - Standard errors are reported in parentheses and are clustered at the state level. All models are estimated using data from 2009-2019 ATUS. All estimate include an indicator for DACA-eligiblity status, year dummies, and the interaction of DACA-eligibility status with year dummies, month and day fixed effects, age dummies, indicators for the ethnic group, marital status and education, as well as age at arrival fixed effects.

* Significant at 10%; ** significant at 5%; *** significant at 1%.

Table A.3: Effects of DACA on Sleep - Individuals aged 18-35 - Sample of Non-citizens

Dep. var.:	(1) Sleep hours	(2) Sleep hours<7	(3) Sleep hours<8	(4) Sleep satisfaction	(5) Sleeplessness
Panel A: Full Sample					
DACA-Eligible * 2013-2015	0.513	-0.084*	-0.124	0.193	-0.007
	(0.531)	(0.048)	(0.081)	(0.158)	(0.013)
DACA-Eligible * 2016-2019	0.181	-0.019	-0.082	NA	0.030
	(0.486)	(0.047)	(0.079)	NA	(0.021)
Mean of dep. var.	9.488	0.118	0.243	0.452	0.0217
Std. dev. of dep. var.	2.352	0.323	0.429	0.498	0.146
Observations	2,396	2,396	2,396	646	2,396
Panel B: Males					
DACA-Eligible * 2013-2015	0.562	-0.089	-0.123	0.682***	-0.029
	(0.798)	(0.078)	(0.110)	(0.200)	(0.021)
DACA-Eligible * 2016-2019	-0.345	0.018	0.002	NA	0.030
	(0.445)	(0.053)	(0.073)	NA	(0.029)
Mean of dep. var.	9.331	0.141	0.270	0.472	0.0221
Std. dev. of dep. var.	2.457	0.348	0.444	0.500	0.147
Observations	1,084	1,084	1,084	305	1,084
Panel C: Females					
DACA-Eligible * 2013-2015	0.432	-0.089	-0.093	-0.262	0.008
	(0.512)	(0.060)	(0.110)	(0.212)	(0.015)
DACA-Eligible * 2016-2019	0.997	-0.115*	-0.213*	NA	0.034
	(0.604)	(0.066)	(0.123)	NA	(0.028)
Mean of dep. var.	9.619	0.0991	0.221	0.434	0.0213
Std. dev. of dep. var.	2.254	0.299	0.415	0.496	0.145
Observations	1,312	1,312	1,312	341	1,312

Notes - Standard errors are reported in parentheses and are clustered at the state level. All models are estimated using data from 2009-2019 ATUS. Panel A includes both genders, while Panel B includes only men, and Panel C includes only women. Control variables: gender (only Panel A), age dummies, indicators for the ethnic group, marital status and education, as well as state, survey year, month, day and age at arrival fixed effects. NA=not applicable.

* Significant at 10%; ** significant at 5%; *** significant at 1%.

Table A.4: Effects of DACA on Sleep - Individuals aged 18-35 - Restricting to Immigrants Arrived After 1980

Dep. var.:	(1) Sleep hours	(2) Sleep hours<7	(3) Sleep hours<8	(4) Sleep satisfaction	(5) Sleeplessness
Panel A: Full Sample					
DACA-Eligible * 2013-2015	0.503	-0.103***	-0.139***	0.100	-0.020*
	(0.363)	(0.038)	(0.049)	(0.131)	(0.012)
DACA-Eligible * 2016-2019	0.091	0.017	-0.047	NA	-0.008
	(0.381)	(0.038)	(0.062)	NA	(0.017)
Mean of dep. var.	9.163	0.148	0.289	0.347	0.0463
Std. dev. of dep. var.	2.310	0.355	0.453	0.476	0.210
Observations	25,675	25,675	25,675	7,317	25,675
Panel B: Males					
DACA-Eligible * 2013-2015	0.902	-0.178***	-0.220**	0.294*	-0.042**
	(0.574)	(0.052)	(0.089)	(0.161)	(0.021)
DACA-Eligible * 2016-2019	-0.082	0.022	-0.005	NA	-0.017
	(0.430)	(0.046)	(0.068)	NA	(0.029)
Mean of dep. var.	9.004	0.171	0.319	0.387	0.0444
Std. dev. of dep. var.	2.363	0.377	0.466	0.487	0.206
Observations	11,094	11,094	11,094	3,174	11,094
Panel C: Females					
DACA-Eligible * 2013-2015	0.092	-0.023	-0.034	-0.177	-0.007
	(0.388)	(0.055)	(0.070)	(0.121)	(0.009)
DACA-Eligible * 2016-2019	0.766*	-0.065	-0.177**	NA	-0.005
	(0.420)	(0.040)	(0.073)	NA	(0.023)
Mean of dep. var.	9.283	0.130	0.265	0.316	0.0478
Std. dev. of dep. var.	2.261	0.336	0.442	0.465	0.213
Observations	14,581	14,581	14,581	4,143	14,581

Notes - Standard errors are reported in parentheses and are clustered at the state level. All models are estimated using data from 2009-2019 ATUS. Panel A includes both genders, while Panel B includes only men, and Panel C includes only women. Control variables: gender (only Panel A), age dummies, indicators for the ethnic group, marital status and education, as well as state, survey year, month, day and age at arrival fixed effects. NA=not applicable.

* Significant at 10%; ** significant at 5%; *** significant at 1%.

Table A.5: Effects of DACA on Sleep - Individuals aged 18-50

Dep. var.:	(1) Sleep hours	(2) Sleep hours<7	(3) Sleep hours<8	(4) Sleep satisfaction	(5) Sleeplessness
Panel A: Full Sample					
DACA-Eligible * 2013-2015	0.420	-0.089**	-0.124**	0.103	-0.015
	(0.355)	(0.035)	(0.053)	(0.142)	(0.010)
DACA-Eligible * 2016-2019	0.126	0.020	-0.039	NA	-0.003
	(0.368)	(0.039)	(0.061)	NA	(0.016)
Mean of dep. var.	8.922	0.165	0.331	0.348	0.0458
Std. dev. of dep. var.	2.245	0.371	0.471	0.476	0.209
Observations	57,579	57,579	57,579	16,502	57,579
Panel B: Males					
DACA-Eligible * 2013-2015	0.782	-0.162***	-0.205**	0.361**	-0.033*
	(0.566)	(0.045)	(0.082)	(0.137)	(0.019)
DACA-Eligible * 2016-2019	-0.107	0.020	-0.002	NA	-0.011
	(0.408)	(0.050)	(0.075)	NA	(0.026)
Mean of dep. var.	8.768	0.187	0.361	0.376	0.0433
Std. dev. of dep. var.	2.276	0.390	0.480	0.484	0.204
Observations	25,850	25,850	25,850	7,395	25,850
Panel C: Females					
DACA-Eligible * 2013-2015	0.033	-0.012	-0.018	-0.227*	-0.005
	(0.361)	(0.052)	(0.073)	(0.133)	(0.009)
DACA-Eligible * 2016-2019	0.639	-0.028	-0.131**	NA	0.000
	(0.410)	(0.049)	(0.064)	NA	(0.017)
Mean of dep. var.	9.047	0.147	0.306	0.326	0.0478
Std. dev. of dep. var.	2.212	0.354	0.461	0.469	0.213
Observations	31,729	31,729	31,729	9,107	31,729

Notes - Standard errors are reported in parentheses and are clustered at the state level. All models are estimated using data from 2009-2019 ATUS. Panel A includes both genders, while Panel B includes only men, and Panel C includes only women. Control variables: gender (only Panel A), age dummies, indicators for the ethnic group, marital status and education, as well as state, survey year, month, day and age at arrival fixed effects. NA=not applicable.

* Significant at 10%; ** significant at 5%; *** significant at 1%.

Table A.6: Effects of DACA on Sleep - Individuals aged 18-35 - Probit Analysis

Dep. var.:	(1) Sleep hours<7	(2) Sleep hours<8	(3) Sleep satisfaction
Panel A: Full Sample			
DACA-Eligible * 2013-2015	-0.121**	-0.149***	0.103
	(0.048)	(0.056)	(0.138)
DACA-Eligible * 2016-2019	0.007	-0.051	NA
	(0.034)	(0.064)	NA
Mean of dep. var.	0.148	0.289	0.346
Std. dev. of dep. var.	0.355	0.453	0.476
Observations	25,674	25,720	7,335
Panel B: Males			
DACA-Eligible * 2013-2015	-0.197***	-0.248**	0.442**
	(0.068)	(0.102)	(0.219)
DACA-Eligible * 2016-2019	0.004	-0.006	NA
	(0.039)	(0.068)	NA
Mean of dep. var.	0.172	0.320	0.387
Std. dev. of dep. var.	0.377	0.466	0.487
Observations	11,074	11,091	3,173
Panel C: Females			
DACA-Eligible * 2013-2015	-0.039	-0.038	-0.201
	(0.065)	(0.079)	(0.147)
DACA-Eligible * 2016-2019	-0.106*	-0.219**	NA
	(0.055)	(0.094)	NA
Mean of dep. var.	0.130	0.266	0.316
Std. dev. of dep. var.	0.336	0.442	0.465
Observations	14,566	14,609	4,157

Notes - Probit estimations; average marginal effects reported. Standard errors are reported in parentheses and are clustered at the state level. All models are estimated using data from 2009-2019 ATUS. Panel A includes both genders, while Panel B includes only men, and Panel C includes only women. Control variables: gender (only Panel A), age dummies, indicators for the ethnic group, marital status and education, as well as state, survey year, month, day and age at arrival fixed effects. NA=not applicable.
* Significant at 10%; ** significant at 5%; *** significant at 1%.

Table A.7: Effects of DACA on Sleep - Individuals aged 18-35 - Treatment in 2012

Dep. var.:	(1) Sleep hours	(2) Sleep hours<7	(3) Sleep hours<8	(4) Sleep satisfaction	(5) Sleeplessness
Panel A: Full Sample					
DACA-Eligible * 2012-2015	0.352	-0.122***	-0.065	0.117	-0.017
	(0.327)	(0.032)	(0.046)	(0.170)	(0.014)
DACA-Eligible * 2016-2019	0.090	-0.015	-0.025	NA	-0.009
	(0.402)	(0.037)	(0.070)	NA	(0.019)
Mean of dep. var.	9.162	0.148	0.289	0.346	0.0464
Std. dev. of dep. var.	2.310	0.355	0.453	0.476	0.210
Observations	25,720	25,720	25,720	7,335	25,720
Panel B: Males					
DACA-Eligible * 2012-2015	0.693*	-0.156***	-0.122**	0.313	-0.041
	(0.412)	(0.057)	(0.058)	(0.224)	(0.024)
DACA-Eligible * 2016-2019	-0.100	0.013	0.032	NA	-0.021
	(0.401)	(0.050)	(0.085)	NA	(0.031)
Mean of dep. var.	9.004	0.171	0.319	0.386	0.0444
Std. dev. of dep. var.	2.363	0.377	0.466	0.487	0.206
Observations	11,111	11,111	11,111	3,178	11,111
Panel C: Females					
DACA-Eligible * 2012-2015	0.208	-0.107**	-0.025	-0.081	0.003
	(0.285)	(0.045)	(0.051)	(0.175)	(0.010)
DACA-Eligible * 2016-2019	0.870*	-0.127***	-0.180**	NA	0.001
	(0.484)	(0.036)	(0.080)	NA	(0.024)
Mean of dep. var.	9.283	0.130	0.266	0.316	0.0480
Std. dev. of dep. var.	2.262	0.336	0.442	0.465	0.214
Observations	14,609	14,609	14,609	4,157	14,609

Notes - Standard errors are reported in parentheses and are clustered at the state level. All models are estimated using data from 2009-2019 ATUS. Panel A includes both genders, while Panel B includes only men, and Panel C includes only women. Control variables: gender (only Panel A), age dummies, indicators for the ethnic group, marital status and education, as well as state, survey year, month, day and age at arrival fixed effects. NA=not applicable.

* Significant at 10%; ** significant at 5%; *** significant at 1%.

Table A.8: Effects of DACA on Sleep - Individuals aged 18-35 - Treatment in June 2012

Dep. var.:	(1) Sleep hours	(2) Sleep hours<7	(3) Sleep hours<8	(4) Sleep satisfaction	(5) Sleeplessness
Panel A: Full Sample					
DACA-Eligible * 2012-2015	0.196	-0.091***	-0.034	0.135	-0.016
	(0.399)	(0.030)	(0.045)	(0.140)	(0.013)
DACA-Eligible * 2016-2019	-0.027	0.014	-0.003	NA	-0.007
	(0.425)	(0.034)	(0.068)	NA	(0.018)
Mean of dep. var.	9.162	0.148	0.289	0.346	0.0464
Std. dev. of dep. var.	2.310	0.355	0.453	0.476	0.210
Observations	25,720	25,720	25,720	7,335	25,720
Panel B: Males					
DACA-Eligible * 2012-2015	0.573	-0.184***	-0.141**	0.268	-0.039*
	(0.526)	(0.060)	(0.069)	(0.162)	(0.023)
DACA-Eligible * 2016-2019	-0.216	0.007	0.029	NA	-0.017
	(0.464)	(0.049)	(0.084)	NA	(0.030)
Mean of dep. var.	9.004	0.171	0.319	0.386	0.0444
Std. dev. of dep. var.	2.363	0.377	0.466	0.487	0.206
Observations	11,111	11,111	11,111	3,178	11,111
Panel C: Females					
DACA-Eligible * 2012-2015	-0.109	-0.007	0.077	-0.057	-0.007
	(0.382)	(0.042)	(0.059)	(0.114)	(0.010)
DACA-Eligible * 2016-2019	0.688	-0.062*	-0.130*	NA	-0.004
	(0.455)	(0.035)	(0.068)	NA	(0.024)
Mean of dep. var.	9.283	0.130	0.266	0.316	0.0480
Std. dev. of dep. var.	2.262	0.336	0.442	0.465	0.214
Observations	14,609	14,609	14,609	4,157	14,609

Notes - Standard errors are reported in parentheses and are clustered at the state level. All models are estimated using data from 2009-2019 ATUS. Panel A includes both genders, while Panel B includes only men, and Panel C includes only women. Control variables: gender (only Panel A), age dummies, indicators for the ethnic group, marital status and education, as well as state, survey year, month, day and age at arrival fixed effects. NA=not applicable.

* Significant at 10%; ** significant at 5%; *** significant at 1%.

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