



The Painful and Chilling Effects of Legal Violence: Immigration Enforcement and Racialized Legal Status Inequities in Worker Well-Being

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Abstract

A wave of restrictive immigration policies implemented over the past several decades dramatically increased immigrant detentions and deportations in the United States (U.S.), with important consequences for a host of immigrant outcomes. Still, questions remain as to how temporal and geographic variation in immigration enforcement within and across the U.S. shaped racialized legal status inequities in health and well-being, particularly among those employed in precarious occupations. To fill this gap, we interrogated the links between changes in county-level immigration enforcement and racialized legal status inequalities in musculoskeletal pain and social welfare benefits utilization among U.S. agricultural workers over nearly two decades (2002–2018). We merged data from three sources [(1) restricted-access, geocoded data from the National Agricultural Workers Survey (NAWS) ($n=37,619$); (2) county-level immigration enforcement data from the Transactional Records Access Clearinghouse (TRAC); and (3) population data from the Census and American Community Survey (ACS)] and estimated linear probability models with year, month, and state fixed effects. We show that, in counties with high enforcement rates, workers—especially undocumented workers—were at increased risk of musculoskeletal pain, including pain that was severe. Heightened enforcement was also associated with declines in needs-based benefits utilization, especially among documented and U.S.-citizen non-White workers and undocumented White and non-White workers. Together, these findings highlight how changes in sociopolitical and legal contexts can shift and maintain racialized legal status hierarchies, with especially important consequences for the well-being of vulnerable workers.

Keywords Immigration enforcement · Health disparities · Race · Legal status

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Introduction

A wave of restrictive federal immigration policies over the past several decades drastically expanded immigration enforcement in the United States (U.S.), resulting in massive increases in immigrant detentions and deportations (Coleman, 2012; Meissner et al., 2013; Moinester, 2018). These policies not only changed the intensity of enforcement, but the geography of enforcement—shifting efforts into the U.S. interior and making the communities where immigrants live and work sites of surveillance and control (Coleman, 2007; Moinester, 2018). These changes had important consequences for immigrant well-being. Heightened levels of enforcement have been associated with a number of adverse outcomes for immigrants, including increased health and disability risks (Lopez et al., 2017; Novak et al., 2017; Pedroza & Chung, 2021; Stanhope et al., 2021; Wang & Kaushal, 2018), worse labor market outcomes (Gentsch & Massey, 2011; Lim & Paik, 2023), and reductions in institutional engagement and social welfare program participation (Alsan & Yang, 2022; Bellows, 2021; Friedman & Venkataramani, 2021; Schut & Boen, 2022; Watson, 2014). These damaging aspects of immigration laws—including those that govern enforcement—have been referred to as *legal violence* (Menjívar & Abrego, 2012). Importantly, because Mexican and Central American individuals and communities have experienced the greatest increases in and highest levels of immigration surveillance and removals in recent decades (Coleman & Kocher, 2019; Donato & Rodríguez, 2014; Golash-Boza & Hondagneu-Sotelo, 2013; Menjívar & Abrego, 2012), the harmful consequences of legal violence, broadly, and enforcement, specifically, have been especially concentrated among Latinx people in the U.S.

Despite increased attention to the deleterious impacts of immigration enforcement for immigrant well-being and the impacts of *legal violence* on the lives of immigrants, three gaps warrant attention. First, because of data limitations, studies have been constrained in comprehensively assessing how immigration enforcement differentially shapes inequities in health and well-being jointly by race, nativity, and legal status. While social surveys generally collect data about race, and many have information about nativity, few include data on legal status. Still, immigration enforcement may be most damaging to undocumented immigrant groups, who are typically the primary targets of these efforts. The harmful consequences of enforcement may also be concentrated among non-White groups—both foreign and U.S. born—who are more likely than White individuals to be *racialized* as undocumented (Flores & Schachter, 2018; Jiménez et al., 2021; Martínez, 2022). Because of data limitations, however, studies are often unable to directly capture legal status and empirically assess differential impacts of enforcement at the intersection of race, nativity, and legal status. Second, research on the consequences of immigration enforcement generally uses data on single states or assesses the impacts of single immigration raids (Lopez et al., 2017; Philbin et al., 2018). As a result, concerns about generalizability remain. Further consideration of how every day, chronic levels of immigrant surveillance and enforcement may pattern well-being—above and beyond the effects of

any particular raid—is warranted. Finally, though immigration enforcement is a highly localized phenomenon—contextualized within particular social, political, and racial contexts (Moinester, 2018; Pedroza, 2013)—most studies in this area focus on immigration enforcement at the state level. This focus risks masking high levels of sub-state heterogeneity in enforcement and potentially underestimating the consequences of living and/or working in an especially highly surveilled local context.

In the present study, we link restricted, geocoded data from the survey data from the National Agricultural Workers Survey (NAWS) to county-level immigration enforcement from the Transactional Records Access Clearinghouse (TRAC) and population data from the Decennial Census and American Community Survey (ACS) to examine the links between county-level immigration enforcement and indicators of worker well-being over a nearly two-decade period. We use a battery of linear probability models with time- and place-based fixed effects to assess how changes in local levels of immigration enforcement pattern two measures of worker well-being: reports of musculoskeletal pain and social welfare (i.e., “needs-based”) benefits utilization. Our estimation strategy allows us to consider the dynamic links between changing enforcement contexts and worker well-being over time and space. Importantly, the NAWS is one of the few social surveys that includes detailed information about race, nativity, and legal status, which allows us to assess the role of immigration enforcement in shaping well-being within and across these axes of social stratification (Asad & Clair, 2018; Schut & Boen, 2022).

Our investigation highlights how changes in the immigration enforcement landscape have impacted workers in the lower tiers of the occupational hierarchy, including those working precarious jobs. We focus specifically on U.S. agricultural workers, an important and vulnerable, but largely understudied group of U.S. workers. There are roughly 11 million undocumented immigrants in the U.S., around a quarter of whom work in agriculture (Passel & Cohn, 2018). Much of agricultural work is “precarious” (Kalleberg, 2009); agricultural workers face high occupational risks, much uncertainty, and few protections. Notably, agricultural workers are at significant risk of experiencing environmental and occupational hazards that directly harm their health (Caxaj & Cohen, 2019) and are subjected to greater risk of labor exploitation and limited access to resources and benefits that promote well-being (Paret, 2014). Given their positioning within broader occupational and legal status hierarchies (Culp & Umbarger, 2004; Holmes, 2011; Schut & Boen, 2022), changes to the immigration policy landscape—including changes in local levels of immigration enforcement—may have particularly deleterious impacts on the physical and material well-being of agricultural workers, especially those who are foreign born and/or undocumented.

Our findings provide evidence of what we call the “painful” and “chilling” effects of *legal violence* (Menjívar & Abrego, 2012). Results show that in counties with high rates of immigration enforcement, undocumented agricultural workers—and to some degree, documented/U.S.-citizen agricultural workers of color—report more musculoskeletal pain, especially pain that is severe. We also find heightened levels of county enforcement reduce or “chill” utilization of needs-based social welfare benefits (e.g., SNAP, TANF, and Medicaid) among both White and non-White

undocumented workers and documented and U.S. citizen non-White workers. Taken together, we show that while the consequences of immigration enforcement for worker well-being are especially salient for those with undocumented legal status, even documented, and U.S.-citizen workers of color experience the harms of increasingly aggressive and hostile enforcement contexts, despite holding U.S. legal status. Ultimately, our findings help reveal the less visible effects of state violence, showing how changes in immigration law, policy, and practice can shift and/or reify racialized legal status hierarchies, with particularly important consequences for the health and well-being of precarious workers in the U.S.

Background

Precarity and U.S. Agricultural Work

Precarious work subjects individuals to uncertain, unstable, and insecure employment; workers employed precariously bear the risks of work, have little voice in determining how to minimize such risk, and receive few social benefits and limited protections to mitigate potential harms (Kalleberg & Vallas, 2018). Precarious workers often lack alternative options for employment and are more likely to suffer from substandard earnings, unsafe working conditions, and an inability to advocate for their rights alongside other workers (for example, via unionization) (Kalleberg, 2009).

In this study, we focus on agricultural workers. Agricultural work is precarious in several ways. For one, farmworkers are often faced with job instability and financial vulnerability; seasonal farmworkers often travel great distances across the U.S. (or across international borders, such as between Mexico and the U.S.) to search for work planting, harvesting, and packing agricultural products. Extensive travel puts workers, many of whom are immigrants, at increased risk of separation from family and other social supports, and exploitation and human trafficking (Norwood, 2020).

Financially, farmworkers are poorly compensated, with average earnings far less than other low wage occupations (Costa, 2021). Farmworkers are often paid based on a “piece-rate system” that is most financially remunerative to workers who exhibit high levels of productivity (i.e., those who can plant, harvest, or pack the greatest quantity). Consequently, farmworkers are subjected to demanding and often adverse working conditions that are extremely physically taxing (Holmes, 2013; Horton, 2016). The repetitive nature of many agricultural tasks means workers are often unable to take breaks, leading to increased risk of physical injury and pain (Hamilton et al., 2019). Farmworkers also face dangerous working conditions, characterized by poor sanitation, exposure to carcinogenic pesticides, and sometimes dangerously high temperatures and conditions (Handal et al., 2020; Holmes, 2013).

Another important source of precarity faced by agricultural workers stems from immigration policies and enforcement activities that target those without legal status in the U.S. (Holmes, 2013; Horton, 2016). Recent statistics cite that 86% of U.S. agricultural workers are foreign born, and 45% are undocumented (Rosenbloom, 2022). Most of these workers migrated from Latin America, namely Mexico and

Central American countries. As a result, changes to the immigration policy and enforcement landscape over the past three decades may hold particular salience for the health and well-being of agricultural workers.

Immigration Enforcement in the U.S.: Uneven Across Time, Space, and Race

In the past thirty years, several policies have worked to increase immigrant surveillance and detention, exacerbating the precarity of those who are undocumented. The 287(g) and Secure Communities programs played especially prominent roles in facilitating the massive expansion of immigration enforcement in the U.S. since the early 1990s. As part of 287(g), state, county, and local law enforcement enter into formal agreements with the federal government to enforce immigration laws, enabling them to investigate immigration cases, arrest and detain noncitizens, and assist in putting together immigration cases for prosecution. Through Secure Communities, local jails submit fingerprints of individuals arrested and detained to federal immigration databases, and this biometric information could then be used to identify noncitizens for potential removal. Together, these federal programs dramatically increased immigrant surveillance and policing, in large part by extending authority to state and local law enforcement agencies in identifying and detaining potentially unauthorized immigrants (Armenta, 2017; Provine et al., 2016). In addition to increasing immigration surveillance and enforcement, these programs (and the policies that created them) also radically restructured the consequences for noncitizens convicted or charged with crimes (Coleman, 2007). In particular, these programs drastically increased risks of detention and deportation, even among individuals with long-standing ties in the U.S. (Kanstroom, 2012). Following the implementation of 287(g) and Secure Communities, immigrant detentions and removals skyrocketed. In the twenty-year period between 1994 and 2014, immigrant removals and returns increased nearly ninefold, rising from roughly 45,700 in 1994 to more than 405,000 in 2014 (U.S. Department of Homeland Security, 2019).

Alongside increasing levels of enforcement, these programs also facilitated an inward migration of enforcement, shifting surveillance and detention efforts more heavily into the interior of the U.S. (Coleman, 2012). In effect, this made everyday spaces, like residential neighborhoods and workplaces, sites of surveillance and control (Armenta, 2017; Coleman, 2012; Provine et al., 2016). Still, this movement of enforcement into the U.S. interior did not occur evenly, and there is tremendous sub-national, sub-state variation in enforcement levels. Though 287(g) and Secure Communities are federal programs, there is hyperlocal discretion and variability in program participation, implementation, and enforcement at the state, county, and municipal levels (Coleman, 2012; Pedroza, 2013). Consequently, increases in immigration enforcement in recent decades have occurred unevenly across both time and geographic space.

Though policies and programs governing enforcement have the stated aim of identifying unauthorized immigrants—especially those who have committed crimes—for removal from the U.S., a sizable number of individuals deported in recent years had no criminal history. In 2011, for example, more than a quarter of

those deported through the Secure Communities program had no criminal conviction (U.S. Immigration & Customs Enforcement, 2011).

Instead, enforcement efforts have focused largely on identifying *potentially* unauthorized immigrants. This has especially salient consequences for Latinx individuals in the U.S., who are more likely than other groups to be *racialized* as undocumented (Armenta, 2017; Asad & Clair, 2018; Flores & Schachter, 2018; Jiménez et al., 2021; Menjívar, 2021). Latinx individuals and groups—especially immigrants from Mexico and Central America—can share “noncriminal social characteristics” (Menjívar & Abrego, 2012, p. 1388) including appearance or language with undocumented groups in ways that make them subject to being profiled in the context of traffic stops or workplace raids (Coleman & Kocher, 2019; Donato & Rodríguez, 2014). In this sense, the U.S. immigration enforcement apparatus serves to socially construct *racialized legal status* hierarchies in ways that spread the risks and harms of enforcement to immigrants and Latinx individuals, regardless of legal status (Armenta, 2017; Asad & Clair, 2018; Golash-Boza & Hondagneu-Sotelo, 2013; Menjívar & Abrego, 2012; Menjívar, 2021).

Consequences of Enforcement for the Health and Well-Being of Agricultural Workers

Menjívar and Abrego (2012) used the term “legal violence” to describe the harmful effects of restrictive immigration policy and enforcement, which can obstruct and derail pathways of immigrant incorporation and undermine the well-being of immigrant groups. Studies across disciplines link heightened enforcement to a range of adverse outcomes, including poor mental health (Wang and Kaushal), reduced school engagement (Bellows, 2021), and increased risks of poverty (Amuedo-Dorantes et al., 2018) and unemployment (Lim & Paik, 2023). Whereas most studies focus on the effects of enforcement for immigrants (e.g., Dondero & Altman, 2020; Pedroza & Chung, 2021; Tome et al., 2021; Wang & Kaushal, 2018), a growing body of work also finds that enforcement can affect Latinx individuals more generally, who may be racialized as potentially unauthorized and/or experience stigmatization, criminalization, and vicarious stress related to enforcement, regardless of legal status (Asad & Clair, 2018; Friedman & Venkataramani, 2021; Novak et al., 2017; Rhodes et al., 2015; Ro et al., 2020).

In this study, we consider the links between local immigration enforcement and two key markers of worker well-being: musculoskeletal pain and social welfare (i.e., “needs-based”) benefits utilization. As we describe in more detail later, we include these outcomes because they may be especially relevant indicators of the physical and material well-being of agricultural workers. Whereas our measures of musculoskeletal pain are important markers of acute physical well-being for this group of workers, the indicator of social welfare benefits use captures farmworkers’ material well-being and access to health-promoting socioeconomic resources, which has longer-term implications for health and longevity. While we do not directly test these mechanisms in our investigation, we theorize that enforcement may affect these markers of worker well-being through a variety of direct and indirect channels.

First, enforcement may affect workers' physical well-being—in this study, captured through the measures of bodily pain—directly through stress-related pathways. High levels of immigration enforcement can increase levels of fear, stress, and worry for undocumented immigrants and their families and community members, including those who may be racialized as undocumented and consequently subject to increased surveillance and threat (Lopez et al., 2017; Nichols et al., 2018; Novak et al., 2017; Rhodes et al., 2015; Torche & Sirois, 2019). Even those with legal status may fear or worry about the apprehension, detention, or deportation of family members, friends, or other network members in ways that affect well-being (Asad, 2020; Cervantes & Menjívar, 2020; Rodriguez et al., 2017). These psychosocial consequences of enforcement can affect physical health—including experiences with and reports of pain—through several mechanisms.

A large body of research documents how repeated activation of the body's "fight or flight" stress responses can dysregulate functioning across a range of bodily systems (McEwen, 1998, 2007). Chronic stress exposure has been linked to the onset and exacerbation of bodily pain, in particular (Chapman et al., 2008; Hauke et al., 2011; Jennings et al., 2014; Jones et al., 2009; Ortego et al., 2016). In response to stress, individuals can experience muscle tension and reduced blood supply; over time, this increases the risk of musculoskeletal disorders and chronic musculoskeletal pain (Hauke et al., 2011). This stress-induced onset and exacerbation of pain may be particularly consequential for agricultural workers, whose work is physically taxing (Hamilton et al., 2019). Agricultural workers are at especially high risk for musculoskeletal disorders and related pain because of the repetitive motions involved with their work (Davis & Kotowski, 2007). In this study, we speculate that the stress of living and working in a highly surveilled context might shape workers' physical well-being in part by accelerating the onset and exacerbating the severity of pain.

Second, it is possible that heightened levels of enforcement could shape workers' well-being by increasing employment violations and eroding worker protections. While protections under labor laws like the National Labor Relations Act and the Fair Labor Standards Act have been applied to unauthorized immigrants, immigrant workers in highly surveilled areas may fear retaliation, detention, or deportation if they complain about or report substandard wages, hazardous working conditions, and/or a lack of employer-provided benefits (Smith et al., 2009). In this sense, heightened enforcement may put workers at increased physical and material risks while simultaneously protecting and economically benefiting employers who can exploit workers. Consistent with this idea, research by Grittner and Johnson (2022) found that the onset of Secure Communities substantially reduced worker complaints to government safety regulators while simultaneously increasing worker injuries at predominately Latinx workplaces. Fear related to enforcement may also undermine collective bargaining efforts in ways that erode worker protections and increase occupational risks and hazards (Smith et al., 2009). Altogether, it is possible that heightened enforcement may increase farmworker exposure to exploitative and dangerous working conditions in ways that increase pain risks, in particular.

Finally, we hypothesize that enforcement might affect both physical and material well-being by "chilling" social welfare benefits utilization. In highly surveilled local contexts, individuals may fear that accessing services or utilizing benefits

can result in themselves, their family members, or other network members being identified as unauthorized and be subject to detention or deportation. These so-called “chilling effects” can shape physical and material well-being by discouraging individuals from using social welfare benefits programs including SNAP, Medicaid, and TANF—even if they are eligible—in ways that can undermine health and well-being. Indeed, studies link increases in enforcement to reductions in Medicaid participation (Watson, 2014), social welfare benefits usage (Alsan & Yang, 2022), and health care utilization (Friedman & Venkataramani, 2021; Rhodes et al., 2015; Schut & Boen, 2022). In this study, we consider whether local levels of enforcement shape inequities in worker well-being through these “chilling effects” by assessing the links between local levels of enforcement and social welfare program benefits utilization, broadly defined.

Aims of the Current Study

Using a legal violence lens (Menjívar & Abrego, 2012), this study interrogates the links between county-level immigration enforcement and makers of worker well-being. We have two overarching aims:

- (1) Assess the patterning of musculoskeletal pain and needs-based social welfare benefits (e.g., Medicaid, Supplemental Nutrition Assistance Program, etc.) utilization among U.S. agricultural workers at the intersection of race, nativity, and legal status.
- (2) Examine whether and how changes in enforcement are associated with musculoskeletal pain and benefits utilization among U.S. agricultural workers, allowing for differential associations at the intersection of race, nativity, and legal status.

In addressing these aims, this work provides new evidence of inequities in worker well-being at the intersection of race, nativity and legal status and highlights the critical role of immigration policies in shaping the well-being of a particularly vulnerable group of U.S. workers. Taken together, findings from this study have broad implications for understanding how immigration enforcement shapes the well-being of individuals across race, nativity, and legal status.

Data and Methods

Data and Samples

Data for this project come from three sources. First, individual-level measures come from the NAWS, a survey administered by the U.S. Department of Labor. This is an annual, repeated cross-sectional survey that includes information on U.S.-native and immigrant agricultural workers working in the U.S. The NAWS draws on a national multistage probability sample stratified by region, crop cycle, farming clusters, counties, and employers. The survey excludes farm workers with H-2A temporary

work visas but includes other types of temporary workers. At each wave, NAWS interviews between 1500 and 3600 agricultural workers (Schut & Boen, 2022). The NAWS is well suited for this study because it includes detailed information on respondent sociodemographic characteristics—including race-ethnicity, nativity, and legal status—and health and social welfare benefits utilization. We obtained restricted-access geocoded NAWS data to enable us to merge the individual-level survey data to county-level immigration enforcement and other contextual data. This study uses NAWS data spanning from 2002 to 2018.

Second, we use data from the TRAC, who compiled data on ICE detainees (2002–2019) and ICE removals under the Secure Communities Program (2008–2017) from case-by-case records obtained after successful court litigation. As we describe in more detail below, we use this data to create longitudinal measures of county-level immigration enforcement.

Third, we use county-level data on population size from the 2000 Decennial Census and American Community Survey 5-year estimates (2010–2017). We use these data to create yearly measures of total county population, which serve as the denominators of our immigration enforcement variables. Because county-level data were not available in the ACS until 2009, we use the 2000 Decennial Census and interpolate data (linear interpolation) between 2000 and 2009.

Our total analytic sample includes a total of 37,619 agricultural workers across the 2002–2018 NAWS survey waves. Missing data were minimal (<5%) across the covariates. We dropped NAWS respondents with missing data on the covariates or whose race ethnicity was Latinx Asian or non-Latinx Asian, given extremely small samples for these groups.

Measures

Our study includes two sets of outcomes. First, we include two dichotomous variables indicating self-reported *musculoskeletal pain*: (1) whether respondents experienced *musculoskeletal pain* over the last 12 months (1 = yes), and among a subset of respondents who reported pain in the last week, (2) whether those respondents experienced *severe musculoskeletal pain*. The measure indicating any musculoskeletal pain is available in the 2002–2004, 2008–2010, and 2014–2015 waves of the NAWS, whereas the measure indicating severe pain is only available in the 2014 and 2015 waves. The pain measures reflect reported pain or discomfort across a range of areas, including in the back, shoulder/neck, elbow/arm, hand/wrist/finger, legs/feet/toes, and other areas.

Musculoskeletal pain is an important indicator of farmworker health for three main reasons. First, unlike reports of disease diagnosis, self-reports of pain are not contingent upon having access to health care or a provider, which can risk misclassification error (Aneshensel et al., 1991). Given our hypothesis that immigration enforcement may “chill” service utilization, we avoid using diagnosis-based outcomes as these measures may bias our estimates. Using reports of pain as outcomes helps to avoid this potential bias. Second, as described, agricultural work is physically demanding (Hamilton et al., 2019), making reports of musculoskeletal pain

an especially pertinent indicator of physical well-being among this group of workers. Finally, pain is an important measure of health and well-being to consider for agricultural workers, particularly those who are foreign born. Strong selection forces shape one's ability to migrate to the U.S. for agricultural work, given the physical nature of the work. Because our sample of agricultural workers may have been positively selected for health, other commonly measured health outcomes (including those for chronic diseases or self-rated health) may be less suitable for evaluating health and well-being in this population. By contrast, considering experiences of pain among agricultural workers is an important indicator of future physical well-being, as experiences of chronic pain may shape risks of musculoskeletal problems, injury, and accelerated aging (Blanchflower & Bryson, 2021; Turner et al., 2000).

Second, we include a dichotomous measure of whether the respondent *utilized needs-based programs* (e.g., Medicaid, SNAP) over the past two years (1=yes). Survey questions about program utilization were asked in all waves of the NAWS (2002–2018 in this study). As described, we include this measure to capture the potential “chilling effects” of enforcement on utilization of benefits that can enhance both health and material well-being.

Our key exposure measures include two indicators of county-level immigration enforcement. We use data from the TRAC to create longitudinal county-level measures of ICE detainer and removal rates. First, our measure of detainer rates come from individual records on all detainer or notice request prepared by ICE over the period 2002–2017. ICE issues detainers to local law enforcement on individuals who are not U.S. citizens and who were arrested on criminal charges for whom ICE possesses probable cause to believe that they can be deported. Detainers are written requests from ICE to law enforcement agencies or jails, requesting that they hold individuals for an additional 48 h after their set release date so that ICE can investigate whether they can be taken into federal custody for removal. Previous studies (e.g., Friedman & Venkataramani, 2021; Ro et al., 2020) have used measures of detainer rates to capture local levels of immigration surveillance and enforcement. Our measure of *county-level detainer rates* indicates the number of detainers in the county per 100,000 population.

Our measure of *county-level ICE Secure Communities removal rates* indicates the number of removals of noncitizens that ICE sought to deport through the Secure Communities program per 100,000 county population. The Secure Communities program aimed to identify immigrants in U.S. jails who were deportable under federal immigration law. As part of Secure Communities, local jails submit arrested individuals' fingerprints to immigration databases; this would then allow ICE to identify potentially unauthorized immigrants. The data used in this project come from case-by-case records from ICE and include information about the county where the fingerprint record was originally submitted. This allows us to link removals to the county where the individual was originally apprehended. Data on removals cover the period 2008–2017. While this program is commonly referred to as Secure Communities, our data on removals also covers the period (2014–2017) when the program was replaced by the Priority Enforcement Program (PEP), as the fingerprint matching program used to identify individuals was unchanged across the programs and periods.

While the TRAC data on detainers and removals is available monthly, we include these measures as time-varying measures reflecting the average rate over a 12-month period. In sensitivity analyses, we tested various operationalizations of these measures (e.g., using counts of detainers/removals, changing the denominator of the rates from the total county population to the total foreign-born population in a county, and using state-level measures of detainer and removal rates). Our results were robust to these alternative measures. In Tables A1.1, A1.2, and A1.3 of Online Appendix 1, we show results of supplementary analyses using the foreign-born population as the denominator in the measures of detainer and removal rates. Tables A2.1, A2.2, and A2.3 in Online Appendix 2 show results of supplementary analyses using state-level measures of detainer and removal rates.

In the musculoskeletal pain models, we lag the enforcement measures by one year (so that average enforcement rates at year t predict musculoskeletal pain at year $t+1$). In the social welfare program utilization models, we lag the enforcement rate measures by two years (so that enforcement rates at year t predict program utilization at year $t+2$) to account for the fact that the survey questions about social welfare program utilization reflect a two-year period. To ease interpretation, in our multivariable models, we include the two indicators of immigration enforcement as standardized measures (mean = 0, standard deviation = 1).

To assess intersectional inequities in the links between the enforcement measures and the markers of pain and benefits utilization, we combine information on race and legal status to generate a four-category measure that includes: documented/U.S.-citizen White, documented/U.S.-citizen non-White, undocumented White, and undocumented non-White. Because of sample size constraints, we could not include more detailed information about race beyond White vs. non-White, nor could we also stratify by Latinx ethnicity [though most NAWS respondents—77% in 2017–2018—were Hispanic or Latinx (Ornelas et al., 2021)]. Following Schut and Boen (2022), we dichotomize race into two categories: non-White and White. As we highlight in the discussion, we acknowledge this limitation of our data for capturing processes of racialization. Supplemental analyses restricting our sample to only Latinx individuals produced substantively similar results to the final results presented in this study. We were also unable to separate documented respondents from U.S. citizen respondents, as fewer than 2% of respondents were foreign born with documented status, raising concerns about sample size.

We include several other covariates that are potentially related to the outcomes and/or exposures and could confound our results, including age (continuous), gender (dichotomous measure where 1 = female), education (continuous years of education), family poverty status (dichotomous measure where 1 = below federal poverty line), health insurance status (dichotomous measure where 1 = insured), whether the respondent lives in a mixed status family (dichotomous measure where 1 = yes), U.S. region of residence, and whether the respondent is a “follow the crop” migrant (dichotomous measure where 1 = yes).

Methods

We begin with weighted descriptive statistics, paying particular attention to race-legal status inequities in our outcomes and temporal and geographic variation in the immigration enforcement measures. Next, we run a series of stepwise linear probability models for each outcome separately. All models include state, year, and month fixed effects. State fixed effects account for potential sources of time-invariant state-level heterogeneity and the clustering of counties within states. Year fixed effects account for secular time trends (e.g., federal immigration policy changes) that could confound our results. Month fixed effects account for seasonal variation in our outcomes.

Each outcome includes the following series of model iterations. Model 1 examines the patterning of our outcomes at the intersection of race and legal status. To do this, we regress each of the outcomes on our measures of race-legal status, controlling for age only, while also including year, state, and month fixed effects. Model 2 builds on Model 1 by including the full set of individual- and household-level covariates. Then, in Models 3 and 4, we build on Model 2 by including the county-level enforcement measures. Model 3 includes the lagged measure of detainer rates, and Model 4 includes the lagged measure of removal rates. In Models 3 and 4, we also include interaction terms for our enforcement measures by race-legal status to test for heterogeneous associations with the outcomes. All models are weighted to correct for survey design effects.

The basic form of these models for outcome Y is below, where i denotes the individual, j denotes the county, R/L is the combined race-legal status measure, and X is a vector of covariates; we include state (γ), year (π), and month (α) fixed effects:

$$Y_{ij} = \beta_1 + \beta_2 \text{enforcementrate}_j + \beta_3 \text{enforcementrate}_j * R/L_i \\ + \beta_4 R/L_i + \beta_5 X_i + \gamma + \pi + \alpha + \epsilon_{ij}$$

Here, our parameters of particular interest are β_2 and β_3 , which indicate how immigration enforcement rates are related to the outcomes (β_2) differentially by race-legal status (β_3).

Importantly, temporal variation in survey dates yields differential exposure to immigration enforcement, improving our ability to make inferences. Further, by including documented/U.S.-citizen White workers—who, theoretically, are less likely to be affected by immigration enforcement—in our study, we are better able to account for secular changes that might affect immigration enforcement activity and worker well-being, thereby reducing concerns about unmeasured confounding.

Results

Descriptive Analyses

Table 1 presents weighted descriptive statistics of the sociodemographic and immigration covariates. The mean age of agricultural workers over the period is 37 years.

Table 1 Weighted respondent sociodemographic and economic characteristics

Mean age	37.0
Women (%)	26.5
Legal status and race (%)	
Undocumented White	11.5
Undocumented non-White	33.7
Documented/U.S.-citizen White	26.9
Documented/U.S.-citizen non-White	27.8
Mean educational attainment	8.1
Mixed legal status family (%)	17.0
Family below poverty level (%)	32.6
Has health insurance (%)	36.2
U.S. region of residence (%)	
Northeast	13.8
Southeast	12.1
Midwest	16.6
Southwest	7.5
Pacific	49.9
“Follow the crop” migrant (%)	5.8
<i>N</i>	37,619

Source: Data are drawn from the restricted-access 2002–2018 National Agricultural Workers Survey

Twenty-seven percent of agricultural workers are women, and U.S. agricultural workers are diverse in terms of race and legal status. Nearly half (45%) are undocumented, the majority of whom are non-White. Over half of agricultural workers are documented/U.S. citizens (55%); 27% of all workers are documented/U.S.-citizen and White and 28% are documented/U.S.-citizen and non-White. Mean educational attainment is relatively low, at 8.1 years. Seventeen percent of workers live in a mixed status family, and a third live below the federal poverty line. Thirty-six percent of workers have health insurance. In terms of regional distribution across the U.S., most agricultural workers live and work in the Pacific (50%), followed by the Midwest (17%). Workers are least likely to reside in the U.S. Southwest (8%). A minority are “follow the crop” workers (6%) who travel across the country seasonally to plant and harvest various crops.

Table 2 presents descriptive information on our outcomes. Nearly one in four agricultural workers reported musculoskeletal pain in the 12 months prior to survey response. Among those who reported experiencing pain in the week prior to survey response, 42% experienced pain they perceived as severe. Nearly 40% accessed needs-based programs two years prior to survey response.

Figure 1 shows temporal and geographic trends in ICE immigration enforcement during the study period (2002–2018). Panel A in Fig. 1 presents a heat map of aggregate state-level detainer rates across the 48 contiguous states and the District of Columbia for which TRAC data were available between 2002 and 2018. Panel B shows state-level removal rates. For the purpose of description and to simplify

Table 2 Weighted respondent-reported public services and physical health characteristics

Experienced musculoskeletal (MSK) pain in the 12 months prior to survey (%)	23.1
Experienced severe pain in the week prior to survey (%)	42.2
Accessed needs-based programs in the past two years (%)	39.7

Source: Data are drawn from the restricted-access 2009 and 2010 National Agricultural Workers Survey

Measures of whether respondent accessed needs-based or contributions-based programs are asked among 37,619 respondents between 2002 and 2018. Measures of whether respondent experienced musculoskeletal pain in the last 12 months asked among 22,984 respondents. Measure of whether last experience of pain was severe asked among 3011 respondents. Both measures of musculoskeletal pain asked among respondents between 2002–2004, 2008–2010, and 2014–2015 NAWS

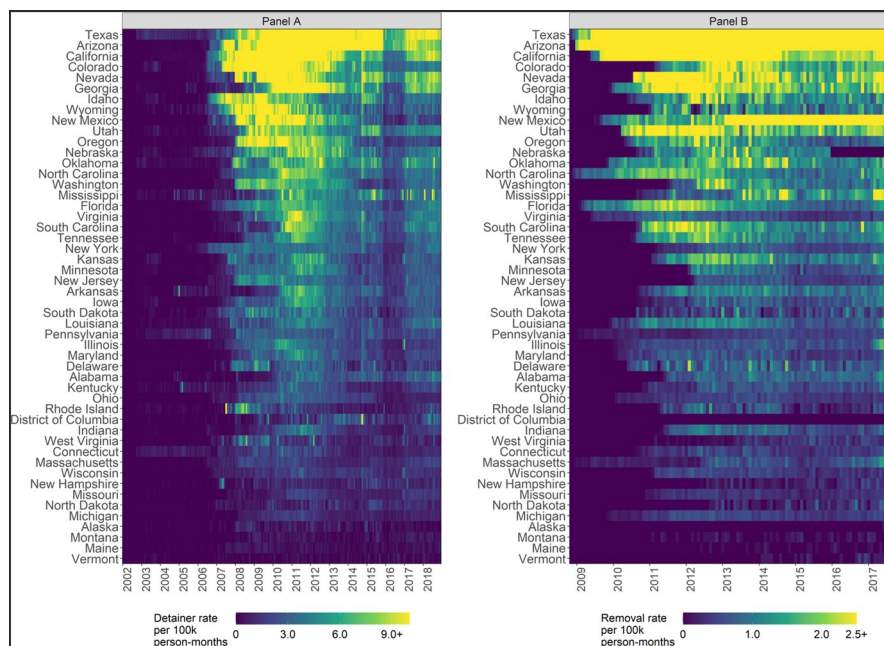


Fig. 1 Immigration Enforcement by State over Time (TRAC, 2002–2018). Graphs present detainer (Panel A) and removal (Panel B) rates calculated per 100 k person-months. Rate scale is capped at the 95th percentile to avoid outliers pulling the color scales. The denominator for both rates is the total county population. All years 2002–2018 are included for Panel A, whereas years 2008–2017 are included in Panel B. States are ordered from top-to-bottom by average detainer rate over the period (states with highest rates at top). Source: Transactional Records Access Clearinghouse

the visualization of time trends over space, we have collapsed county-level data into states. In both Panels A and B, states are rank ordered, with those with the highest detainer/removal rates at the top and those with the lowest detainer/removal rates at the bottom.

Panel A of Fig. 1 shows significant variation in detainer rates across years and states. Many states experienced higher detainer rates between 2007 and 2015 than in more recent years (e.g., Florida, Georgia, Nebraska, Nevada, New Mexico, Oregon, and Washington). Several states experienced spikes in detainer rates in particular years, including Rhode Island (2008), North and South Carolina (in 2010), and West Virginia (in 2008 and 2012). In general, detainer rates decreased across most states between 2015 and 2018, apart from Arizona, California, Colorado, Georgia, Nevada, Mississippi, Oklahoma, and Texas, which remained as the states with the highest detainer rates across the entire period.

Panel B in Fig. 1 is a heat map of aggregate state-level ICE removal rates over time, where county-level data has been collapsed for the purposes of description. Data on removal rates are only available from 2008 onwards. For most states, removal rates were > 2 per 100,000 between 2008 and 2012. Many states saw reductions in removal rates after 2012, though some states (including Georgia, Illinois, New Mexico, Massachusetts, Mississippi, Louisiana, South Carolina, and Tennessee) saw increases in removal rates in these more recent years. Other states, including Idaho and Kansas, experienced initially higher rates of removal that have decreased substantially and continuously over time. Removal rates in Arizona, California, and Texas remained consistently high throughout the period 2008–2012.

Figure 2 shows county-level rates of detainers (Panel A) and removals (Panel B) in 2011, the year when both detainers and removals peaked during our period of observation. While Fig. 1 demonstrates substantial variation in detainer and removal rates over time, Panel B reveals tremendous sub-national and sub-state heterogeneity in enforcement at the county-level. Both Panels A and B of Fig. 2 highlight the highly localized nature of enforcement in the U.S.

Linear Probability Models

Table 3 presents results of linear probability models regressing reports of musculoskeletal pain on respondents' legal status/race-ethnicity, county-level enforcement measures, and the interaction of the two. Results from Table 3 show that generally, undocumented White, undocumented non-White, and documented/U.S.-citizen non-White agricultural workers are less likely than documented/U.S.-citizen White workers to report having experienced musculoskeletal pain in the 12 months prior to survey; this holds in both age-adjusted (Model 1) and fully adjusted (Model 2) models. In Models 3 and 4 we include the county-level measures of detainer and removal rates, respectively. In Model 3, we find that increases in detainer rates are associated with increased probability of reporting pain for all groups except undocumented White agricultural workers; results indicate that, for documented/U.S.-citizen White, undocumented non-White, and documented/U.S.-citizen non-White workers, an increase of 1 detainer per 100,000 county population is associated with a 2 percentage point increase in musculoskeletal pain risk (coeff = 0.020, $p < 0.01$). In Model 4, results show that increases in ICE removal rates are associated with increased risks of reporting pain, but only among undocumented non-White agricultural workers (coeff = 0.078, $p < 0.001$).

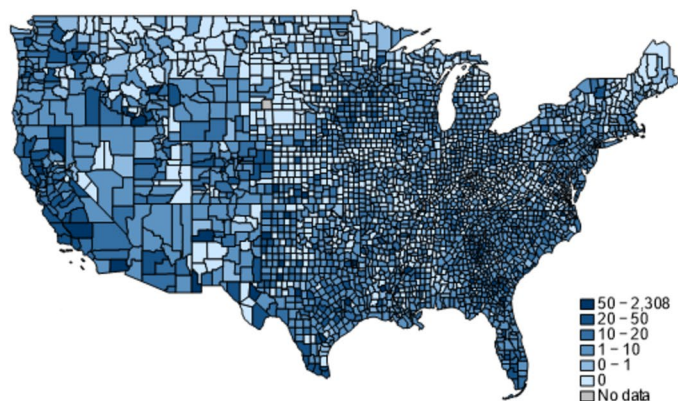
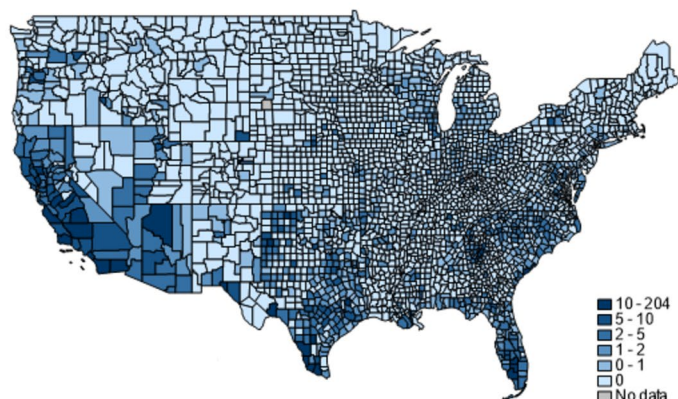
Panel A. County-Level Detainers**Panel B. County-Level Removals**

Fig. 2 County-Level Enforcement (TRAC, 2011). Maps present 2011 county-level detainer (Panel A) and removal (Panel B) rates calculated per 100 k person-months. Source: Transactional Records Access Clearinghouse

Table 4 assesses risks of severe pain among workers who reported pain in the last week. In Models 1 and 2, undocumented White workers are less likely to report severe pain than documented/U.S.-born White workers. However, Model 3 indicates that, as detainer rates in a county increase, undocumented White workers were more likely to report severe pain (coeff = 0.059, $p < 0.05$). Moreover, in Model 4, we find that increases in removal rates increase risks of severe pain for undocumented non-White workers as well as documented/U.S.-citizen non-White workers. An increase of 1 removal per 100,000 county population increased severe pain risks by 21.8 percentage points for undocumented non-White workers ($p < 0.01$) and 12.6 percentage points for documented/U.S.-citizen non-White workers ($p < 0.05$). In this sense, non-White agricultural workers, regardless of

Table 3 OLS regression models estimating respondent report of experiencing musculoskeletal pain in the past 12 months with state, month, and year fixed effects

Characteristics	Model 1: Legal status and race		Model 2: Legal status and race		Model 3: Legal status and race * Detainer rates		Model 4: Legal status and race * Removal rates	
	Coefficients	SE	Coefficients	SE	Coefficients	SE	Coefficients	SE
Legal status/race (ref = documented/U.S.-citizen White)								
Undocumented White	− 0.200	*(0.011)	− 0.032	** (0.011)	− 0.033	** (0.011)	− 0.034	** (0.012)
Undocumented non-White	− 0.032	*** (0.008)	− 0.043	*** (0.009)	− 0.043	*** (0.009)	− 0.035	*** (0.010)
Documented/U.S.-citizen non-White	− 0.019	** (0.008)	− 0.019	* (0.008)	− 0.021	* (0.008)	− 0.018	* (0.009)
Detainer rates					0.020	** (0.007)		
Removal rates							− 0.004	(0.013)
Legal status/race (ref = documented/U.S.-citizen White) * detainer rates								
Undocumented White * detainer rates					− 0.020	* (0.010)		
Undocumented non-White * detainer rates					0.006	(0.009)		
Documented/U.S.-citizen non-White * detainer rates					− 0.014	(0.008)		
Legal status/race (ref = documented/U.S.-citizen White) * removal rates								
Undocumented White * removal rates							− 0.029	(0.028)
Undocumented non-White * removal rates							0.078	*** (0.023)
Documented/U.S.-citizen non-White * removal rates							− 0.001	(0.016)
N							22,984	

Source: National Agricultural Workers Survey, 2002–2018; Transactional Records Access Clearinghouse

Model 1 adjusts for age. Models 2, 3, and 4 adjust for age, gender, years of education, whether the respondent is in a mixed legal status family, whether the family lives in poverty, and whether the respondent “follows the crop.” All models include state, year, and month fixed effects

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, † $p < 0.1$

Table 4 OLS regression models estimating respondent report of experiencing severe musculoskeletal pain in the past week with state, month, and year fixed effects

Characteristics	Model 1: Legal status and race		Model 2: Legal status and race		Model 3: Legal status and race * Detainer rates		Model 4: Legal status and race * Removal rates	
	Coefficients	SE	Coefficients	SE	Coefficients	SE	Coefficients	SE
Legal status/race (ref = documented/U.S.-citizen White)								
Undocumented White	− 0.086	** (0.031)	− 0.110	*** (0.033)	− 0.104	(0.034)	− 0.086	** (0.012)
Undocumented non-White	0.030	(0.026)	0.007	(0.029)	0.009	(0.030)	− 0.035	*** (0.010)
Documented/U.S.-citizen non-White	0.033	(0.024)	0.031	(0.025)	0.033	(0.025)	− 0.018	* (0.009)
Detainer rates					− 0.022	(0.017)		
Removal rates							− 0.087	(0.055)
Legal status/race (ref = documented/U.S.-citizen White) * detainer rates					0.059	*		
Undocumented White * detainer rates					0.012	(0.021)		
Undocumented non-White * detainer rates					0.018	(0.022)		
Documented/U.S.-citizen non-White * detainer rates								
Legal status/race (ref = documented/U.S.-citizen White) * removal rates								
Undocumented White * removal rates							0.147	(0.123)
Undocumented non-White * removal rates							0.218	** (0.081)
Documented/U.S.-citizen non-White * removal rates							0.126	* (0.064)
<i>N</i>				3011				

Source: National Agricultural Workers Survey, 2002–2018; Transactional Records Access Clearinghouse

Model 1 adjusts for age, Models 2, 3, and 4 adjust for age, gender, years of education, whether the respondent is in a mixed legal status family, whether the family lives in poverty, and whether the respondent “follows the crop.” All models include state, year, and month fixed effects

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, † $p < 0.1$

legal status, were more likely to report severe pain when county-level removals increased.

Table 5 presents the findings from the needs-based benefits utilization models. In Model 1 (the basic adjusted model) undocumented white and non-white and documented/U.S.-citizen non-White workers were more likely to use needs-based benefits than documented/U.S.-citizen White workers. After controlling for the full set of individual-level covariates in Model 2, findings show that only undocumented agricultural workers were less likely to use needs-based benefits than documented/U.S.-citizen White workers (coeff=-0.225, $p<0.001$ for undocumented White; coeff=-0.218, $p<0.001$ for undocumented non-White workers), while documented/U.S.-citizen non-White workers were more likely to use needs-based benefits (coeff=0.099, $p<0.001$).

Results from Model 3, however, show that, as ICE detainer rates in a county increase undocumented White workers (coeff=-0.033, $p<0.001$), undocumented non-White (coeff=-0.028, $p<0.001$), and documented/U.S.-citizen non-White (coeff=-0.024, $p<0.001$) workers experienced chilled use of needs-based benefits. Similarly, in Model 4, these same groups of agricultural workers experienced chilled use of needs-based benefits in contexts with higher ICE removal rates; an increase of 1 removal per 100,000 county population decreased the probability of using needs-based benefits by 13.1 percentage points for undocumented White workers ($p<0.001$), 1.5 percentage points for undocumented non-White workers ($p<0.05$), and 1.8 percentage points for documented/U.S.-citizen non-White workers ($p<0.001$).

Discussion

The massive expansion of the immigration surveillance and deportation apparatus over the past several decades drastically changed the social and political environments where immigrants in the U.S. live and work. In this study, we drew on the concept of *legal violence* (Menjívar & Abrego, 2012) to interrogate whether and how these changes to the sociopolitical landscape shaped the well-being of agricultural workers—a large and diverse but especially vulnerable group of U.S. workers. We hypothesized that the consequences of heightened surveillance and enforcement would disproportionately borne by undocumented workers, who are often the primary targets of enforcement efforts. We also hypothesized that non-White workers, regardless of legal status, would be affected by these changes because of the highly racialized nature of enforcement in the U.S. We merged nearly two decades of restricted access, geocoded survey data on agricultural workers from the NAWS to county-level data on immigration enforcement and used a battery of fixed effects models to: (1) document patterns of racialized legal status inequities across three markers of worker well-being, and (2) interrogate the roles of county-level immigration detainer and removal rates in patterning inequities in worker well-being. Our findings support two broad conclusions.

First, there are striking inequities in both experiences of musculoskeletal pain and needs-based benefits utilization among U.S. agricultural workers at the intersection

Table 5 OLS regression models estimating needs-based benefits utilization with state, month, and year fixed effects

Characteristics	Model 1: Legal status and race		Model 2: Legal status and race		Model 3: Legal status and race * Detainer rates		Model 4: Legal status and race * Removal rates	
	Coefficients	SE	Coefficients	SE	Coefficients	SE	Coefficients	SE
Legal status/race (ref = documented/U.S.-citizen White)								
Undocumented White	0.033	(0.009)	***	(0.008)	***	(0.008)	***	(0.008)
Undocumented non-White	0.036	(0.007)	***	(0.007)	***	(0.007)	***	(0.007)
Documented/U.S.-citizen non-White	0.111	(0.007)	***	(0.006)	***	(0.006)	***	(0.006)
Detainer rates					0.017	(0.005)		
Removal rates							0.013	(0.004)
Legal status/race (ref = documented/U.S.-citizen White) * detainer rates					***	(0.008)		
Undocumented White * detainer rates					***	(0.006)		
Undocumented non-White * detainer rates					***	(0.006)		
Documented/U.S.-citizen non-White * detainer rates								
Legal status/race (ref = documented/U.S.-citizen White) * removal rates								
Undocumented White * removal rates							***	(0.028)
Undocumented non-White * removal rates							*	(0.023)
Documented/U.S.-citizen non-White * removal rates							***	(0.016)
<i>N</i>							37,619	

Source: National Agricultural Workers Survey, 2002–2018; Transactional Records Access Clearinghouse

Model 1 adjusts for age. Models 2, 3, and 4 adjust for age, gender, years of education, whether the respondent is in a mixed legal status family, whether the family lives in poverty, and whether the respondent “follows the crop.” All models include state, year, and month fixed effects

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, † $p < 0.1$

of race, nativity, and legal status. Consistent with previous research (Hamilton et al., 2019), our descriptive results (Table 1) showed relatively high levels of pain among U.S. agricultural workers, with nearly 1 in 4 experiencing musculoskeletal pain in the past year. Moreover, among those who reported pain in the last week, nearly half had experienced severe pain. Our multivariable analyses in Tables 3 and 4 further revealed racialized legal status inequalities in pain. Generally, undocumented workers and documented/U.S.-citizen non-White workers were less likely to report musculoskeletal pain compared to documented/U.S.-citizen White workers; among workers reporting pain in the past week, undocumented White workers were less likely to report severe pain compared to documented/U.S.-citizen White workers. These racialized legal status patterns in pain reporting may reflect a “healthy immigrant effect,” whereby individuals who are relatively new to, and less incorporated within, the U.S. (i.e., undocumented immigrants) report better health than those who have been in the U.S. for longer periods of time, or who were born and raised in the U.S. (i.e., documented immigrants/U.S. citizens), in large part because of strong selection forces (Riosmena et al., 2017). Findings showing that undocumented workers experience comparatively low levels of pain perhaps also reflect selection mechanisms that jointly shape not only who can successfully migrate to the U.S., but also who is in the physical condition to endure the taxing and manual nature of agricultural labor. It is also possible that these patterns reflect differences in the likelihood of *reporting* pain in social surveys.

Our results further showed racialized legal status inequalities in benefits utilization. Descriptive results indicated that nearly 40% of agricultural workers reported accessing some form of needs-based benefits in a two-year reporting period. After controlling for a host of individual and household characteristics, undocumented workers—both White and non-White—were significantly less likely than documented/U.S.-citizen White workers to use needs-based benefits. These findings may reflect group differences in health and/or policy restrictions that purposively bar undocumented workers from accessing benefits. By contrast, documented/U.S.-citizen non-White workers were more likely to use needs-based benefits, potentially reflecting the higher health and/or financial risks of this group compared to documented/U.S.-citizen White workers, in particular.

Taken together, this first set of findings highlights the importance of intersectional frameworks for understanding inequalities (Brown, 2018; Dill & Zambrana, 2009), including those in worker physical health and material well-being. Whereas a large body of research documents racial/ethnic and nativity status inequities in health and well-being, few studies are able to simultaneously consider how systems of racialized, nativity, and legal status inequality jointly pattern well-being. By focusing our analyses on understanding inequities in well-being among a large, diverse, and important group of precarious workers (i.e., those employed in agriculture), we show how structures of racial domination, immigrant exclusion, and legal status inequality jointly shape the well-being of a socially and economically vulnerable group of U.S. workers.

Second, our findings provide new evidence of the critical role of immigration enforcement in shaping racialized legal status inequities in the physical and material well-being of agricultural workers. We present some of the first estimates revealing a

link between local enforcement and musculoskeletal pain. Findings in Table 3 show a strong association between increases in local detainer rates and risks of musculoskeletal pain across most groups of workers. We also showed a link between removal rates and increases in reports of musculoskeletal pain among undocumented non-White workers, specifically. In Table 4, we found that increases in detainers heightened risks of severe pain among undocumented White workers, and local removal rates increased severe pain risks for non-White workers, both undocumented and documented/U.S.-citizen.

We take these findings to reflect how the nature of agricultural work taxes and strains the body, and how living and working in contexts with higher rates of enforcement activities further exacerbates those harms. Research from across disciplines highlights how the stress of social environments can shape the onset and exacerbation of pain through a variety of neurocognitive, biophysiological, and behavioral mechanisms (Chapman et al., 2008; Hauke et al., 2011; Jennings et al., 2014; Jones et al., 2009; Ortego et al., 2016). It is, therefore, possible that the stress of living in a highly surveilled contacts may directly impact worker experiences with pain. Another potential explanation for these findings is that heightened enforcement could alter working conditions in ways that increase occupational risks and harm workers' physical health. Workers might fear complaining about working conditions, and employers may violate worker rights, in places where enforcement levels are high (Grittner & Johnson, 2022; Smith et al., 2009). Though we are unable to formally test these mechanisms, our results provide clear evidence of a link between local enforcement and worker pain.

Results also provide evidence of the "chilling effects" of enforcement, which are especially pronounced for undocumented workers and documented/U.S.-citizen non-White workers. Results in Table 5 show that, in counties with higher rates of enforcement, documented/U.S.-citizen White workers experienced increased utilization of needs-based benefits; by contrast, undocumented White, undocumented non-White, and documented/U.S.-citizen non-White workers reported reductions in needs-based benefits utilization. Drawing on work highlighting the role of "icy" policy environments in patterning institutional engagement and benefits utilization (Alsan & Yang, 2022; Friedman & Venkataramani, 2021; Rhodes et al., 2015; Schut & Boen, 2022; Watson, 2014), we speculate that the fear of detention and deportation may prevent undocumented workers, in particular, from accessing health-promoting material resources and services in the case of increased ICE enforcement activity. Still, we also found evidence of "chilled" benefits utilization among non-White—but not White—workers with legal status, indicating that these activities may also generate contexts in which even those "protected" by legal status fear and reduce access to benefits that may ultimately promote well-being.

Altogether, our results suggest that enforcement has spillover consequences even for documented agricultural workers, albeit in highly racialized ways. Even though they possess legalized status, documented and U.S.-born workers can still experience the collateral threat, fear, stigmatization, and stress associated with heightened enforcement. They may worry for their undocumented family members, friends, and communities (Asad, 2020; Asad & Clair, 2018) in ways that reduce their social participation and benefits utilization. Still, the collateral damages of enforcement are

concentrated among non-White workers in ways that highlight the role of racialized legal status in patterning population well-being (Asad & Clair, 2018). High levels of local enforcement, which are typically targeted at Latinx individuals and communities, serve to racialize, subordinate, and threaten Latinx people and other groups of color who may be “lumped in” with undocumented groups, regardless of legal status, in ways that harm well-being (Schut & Boen, 2022).

Our findings indicate that the most structurally vulnerable groups included in our analyses—including undocumented workers and documented/U.S.-citizen non-White workers—were most likely to experience increased risks of pain and reduced access to needs-based benefits in more restrictive ICE enforcement contexts. As such, our findings have concerning implications for the long-term well-being of these groups. Persistent pain resulting from chronic musculoskeletal strain may contribute to weathering, premature aging, and heightened disability risks later on in the life course. Similarly, reduced utilization of social benefits can impede access to nutritional resources, prenatal care, preventative screenings, and other material resources, which can have long-term detrimental consequences for health and financial well-being. Thus, our findings have salient consequences for understanding widening U.S. population health and financial inequalities, including those at the intersection of race, nativity, and legal status.

Critically, our results point to the central role of state violence—in this case, in the form of immigration and enforcement laws, policies, and practices—in shaping the health and material well-being of structurally vulnerable groups. By using markers of musculoskeletal pain and benefits utilization in our analyses, our study expands understanding of the less visible and “untallied” damages resulting from legal violence. Most research using the legal violence frame has interrogated forms of legal violence that are “not directly physically harmful” (Menjívar & Abrego, 2012, p. 1383) but that harm the social and economic well-being of immigrants. By using measures of bodily pain, in particular, our results show that legal violence can manifest physically and likely operates through a variety of direct (e.g., stress related) and indirect (e.g., through “chilling” benefits use or increasing worker exploitation) channels to produce health-related harms. Altogether, this study highlights the utility of the legal violence framework for shedding light on the less visible effects of state violence, broadly, and immigration enforcement, specifically, in shaping population well-being. While previous research documents a “healthy immigrant effect,” our results highlights the precarity of this advantage. Racialized forms of state violence—like immigration enforcement—can erode health and material resources in ways that have concerning implications for the health and well-being of immigrant groups in the U.S., especially those that are racially minoritized (Bacong & Menjívar, 2021).

Despite the numerous strengths of our data and analyses, there are several limitations to this study that warrant attention. First, we rely on pooled cross-sectional data from the NAWS and were, therefore, unable to examine intra-individual changes in pain and benefits utilization. These data are justified by the fact that we can use them to capture legal status, which is otherwise unavailable in many longitudinal surveys. To address this limitation of the NAWS, future data collection efforts should aim to collect longitudinal data that include measures of legal status. These types of data

would allow future research to build on our findings by examining trajectories of well-being as they unfold across varying enforcement contexts.

Second, reporting errors and recall biases may affect our estimates. The NAWS asked workers about experiences with musculoskeletal pain in the year prior to the survey and about benefits utilization in the two years prior to the survey. These are relatively long time spans, and respondents may have had difficulty remembering whether they experienced pain or used benefits over these periods. Third, whereas overall response rates in the NAWS are high among workers, the NAWS does not survey all employers that are contacted to participate. For example, in 2009, 92% of workers responded to the survey, but only 59% of eligible employers ultimately responded that year. Response rates were similar in other years of data collection. Selection biases shaping which employers respond (or not) to the survey could affect our findings. Fourth, unmeasured confounding and selection at the county level are difficult to rule out with observational data. Finally, small samples imposed other limitations. Whereas our analyses considered intersectional inequities by race, nativity, and legal status, concerns about sample sizes prevented us from considering other dimensions of inequality like gender, age, and country of origin, among others. Our measure of race was crude, due again to sample size restrictions. These limitations highlight the need for future data collection and empirical investigations on the well-being of diverse samples of U.S.- and foreign-born individuals (Hamilton & Hummer, 2011), including farmworkers.

Conclusion and Implications

This study highlights the critical role that immigration enforcement plays in shaping racialized legal status inequities in worker well-being. Our findings show that efforts to surveil, detain, and deport unauthorized immigrants not only harm the well-being of unauthorized workers, but serve to reify racist and nativist hierarchies, with far reaching consequences for workers of color, regardless of legal status. In focusing our analyses on agricultural workers specifically, we demonstrated how precarity operates in a multifaceted way to not only shape risks and hazards across occupations, but also among workers employed *within* the same occupation. Agricultural work is, itself, precarious; it is physically taxing, risky, unstable, and underpaid. Furthermore, given that farmworkers are disproportionately Latinx and overwhelmingly immigrants, with many lacking legal status, policies and institutional practices governing immigration enforcement may further erode the well-being of this already vulnerable group. Still, the effects of such policies are not shared among all workers in these precarious occupations, but are instead concentrated among those in marginalized positions within broader racialized legal status hierarchies.

Our work has several important policy implications. First, we show that hostile, unwelcoming, and restrictive immigration policies and enforcement activities harm the well-being of socially marginalized groups, with important implications for population well-being. Rolling back such aggressive immigration policies and enforcement programs is a critical first step for reducing inequities in physical and material well-being.

In addition to rolling back enforcement, research highlights the protective role that inclusive, welcoming, or otherwise accommodating policies can play in protecting and promoting well-being (Friedman & Venkataramani, 2021; Schut & Boen, 2022).

Precarious work is linked to numerous risks for the physical and material well-being of workers (Gunn et al., 2022). Increased protections for precarious workers across industries including agriculture, construction, and food processing, can also work to mitigate the patterns documented in the present study. Efforts to improve the conditions of these workers must occur at various levels. Increased worker organizing and collective bargaining is needed to protect and advance the rights of those employed in precarious jobs. Activist groups and social institutions can also perform outreach to vulnerable workers to inform them of their rights, and to facilitate and encourage their use of benefits for which they are eligible. Moreover, community and migrant health centers (CHCs and MHCs) are institutions that provide access to health care and other benefits, regardless of an individual's legal status or ability to pay (Parker, 2021). Ensuring continued funding for these health centers is critical.

Finally, increased legislation is needed to pass regulations that increase workers' rights and protections against abuse and exploitation at the hands of employers (International Labor Organization, 2011). Organizing and advocacy is increasingly necessary as the sociopolitical climate of the U.S. continues to become more restrictive and hostile towards immigrant workers, in particular. Political efforts to shift the sociopolitical and legal context toward one that is more welcoming to immigrants will have important consequences for the well-being of vulnerable workers, generally, and the U.S. population, more broadly.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s11113-024-09862-x>.

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Data availability Data from the National Agricultural Workers Survey are restricted-use. For access, please contact Daniel Carroll, Office of Policy Development and Research, Employment and Training Administration, U.S. Department of Labor, 200 Constitution Ave NW, Room N-5641, Washington, DC 20210; email: Carroll.Daniel.J@dol.gov; phone: 202-693-2795. Data from the Transactional Records Action Clearinghouse are restricted to use by TRAC Fellows. For more information about how to apply, visit <https://trac.syr.edu/fellows/>. All Stata and R code pertaining to data preparation and analyses informing the results of this article are available upon request.

Declarations

Conflicts of interest The authors declare that they have no conflict of interests or competing interests.

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