Do You Hear the People Sing?

The Impact of Strikes on Workers' Mental Health

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Abstract

This study investigates the mental health impact of strikes through a dual-effect framework. We theorize that strikes can improve workers' mental well-being by providing a collective voice and fostering solidarity. Meanwhile, strikes present significant risks to mental health, driven by financial hardship, uncertainty, potential antagonism, and weak legal protection. We further propose that female workers are more susceptible to the adverse consequences of strikes, due to violation of social expectations, gender differences in coping strategies, and sex segregation in the workplace. Evidence from the Panel Study of Income Dynamics supports our arguments. On average, male workers do not show significant changes in mental health in the year following a strike, while female workers experience poorer mental health. Additional analyses suggest that the mental health impact of strikes is heterogeneous, particularly for male workers. We also find that part of the heterogeneity is related to the economic outcomes of strikes, such that wage increases are associated with improved mental health for male strikers but not for female strikers.

Introduction

Strikes are pivotal industrial relations events, influencing both workplace dynamics and social orders. Despite decades of decline, labor activism in the United States has surged since the global pandemic, leading to a notable rise in strike activity (Kochan et al., 2023). This resurgence has captured public attention and sparked renewed interest in understanding the various consequences of strikes. While frequently analyzed through an economic lens, strikes are also deeply personal experiences that involve complex psychological processes (Nicholson & Kelly, 1980). During strikes, workers join together in pursuit of their aspirations and wishes while navigating changes in daily routines, social roles, and interpersonal relationships. These unusual lived experiences may not only affect workers' immediate emotions and feelings but also have lasting implications for their subjective well-being. Motivated by this perspective, the present study seeks to uniquely theorize and empirically examine the mental health impact of strikes.

While scholars have investigated the topic, significant limitations and gaps remain in the research. From a theoretical perspective, many studies have narrowly treated strikes only as stressful events (Barling & Milligan, 1987; MacBride et al., 1981; Scales et al., 2014; Wickens, 2007). Certainly, strikes often involve disrupted work routines, strained employment relationships, and increased public scrutiny—all of which can generate considerable anxiety. Yet, strikes are also moments of solidarity and agency, providing workers with a unique opportunity to collectively shape their futures (Godard, 1992; Morgan & Pulignano, 2020). By uniting for a common cause, workers can effectively voice their concerns and advocate for fair treatment, potentially resulting in improved mental health outcomes. Relatedly, as this dual effect has largely been overlooked, little is known about whether the mental health impact of strikes varies systematically across different groups of workers, as well as the conditions under which strikes may benefit or harm

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mental health (with Fowler et al., 2009 as an exception). Moreover, from a methodological perspective, prior studies commonly face challenges in establishing a causal relationship between strikes and mental health, due to various endogeneity concerns such as selection bias and reverse causality. Additionally, much of the existing research has limited external validity, as it tends to focus on a single strike event instead of using more representative samples.

The present study aims to fill several of these gaps. We begin by developing a broader theoretical framework, viewing strikes both as a collective voice that enables workers to address workplace problems and as a multifaceted stressor that poses a significant risk to mental well-being. We also highlight the importance of gender, recognizing that the mental health impact of strikes may be different for male and female workers. We then analyze a nationally representative sample from the Panel Study of Income Dynamics. Given the nature of the data, our analysis focuses on the relatively long-run impact of strikes (i.e., within a year following the strike activity). Two empirical strategies are used to mitigate endogeneity concerns: an individual fixed effects model that controls for unobserved time-invariant worker characteristics and an event study design that provides further information on pre- and post-strike dynamics. In addition to gender, we also test if the mental health impact of strikes differs by various socio-economic factors. Finally, we explore more generally to what extent the mental health impact of strikes is heterogeneous and whether the heterogeneity is related to the economic outcomes of strikes. On the basis of these results, we offer practical recommendations for managing workplace mental health during and after labor disputes.

Overall, our study makes three key contributions to the literature. First, we introduce a more comprehensive theoretical framework to understand the relationship between strikes and mental health, emphasizing that strikes have the potential to both improve and impair mental health.

This approach highlights the need to investigate the heterogeneous impact of strikes—in addition to an average effect—and examine the conditions under which different outcomes may arise. Second, we present more credible causal evidence for the mental health impact of strikes by employing rigorous empirical strategies. Our conclusions are also more generalizable due to the use of nationally representative data. Third and more broadly, by examining the mental health impact of strikes, we reaffirm the importance of considering the subjective benefits and costs associated with strikes. Recognizing these hidden consequences is crucial in an era of declining union power. In particular, if unions can strategically cultivate rewarding collective experience while minimizing the psychological tolls during strikes, they may have a greater chance to attract potential members and reinvigorate labor activism. Likewise, we suggest that managers can proactively implement interventions to create supportive organizational climates following labor disputes, as poorer mental health is linked to various workplace outcomes, such as lower productivity and higher turnover (Kelloway et al., 2023).

Strikes and Mental Health

Strike as Collective Voice

The World Health Organization defines mental health as a state of well-being that enables individuals to cope with life stresses, establish meaningful relationships, engage in learning and productive work, and contribute positively to their community (WHO, 2022). Mental health conditions include mental disorders, psychosocial disabilities, and other mental states characterized by distress, functional impairment, or an increased risk of self-harm. According to the 2023 *Mental Health at Work Report*, 61% of U.S. workers reported experiencing at least one symptom of mental health conditions, with 31% attributing the causes to unsatisfactory workplace

factors. These alarming facts highlight the urgent need to investigate workplace mechanisms that impact employees' mental well-being.

In this study, we investigate one such mechanism by examining the impact of strikes on workers' mental health. To theorize this relationship, we build on a widely recognized premise in industrial relations: strikes serve as a form of collective voice, providing workers with a platform to express their discontent and address problematic working conditions (Brooks & Wilkinson, 2022; Freeman and Medoff, 1984; Hirschman, 1970; Godard, 1992). Strikes can thus have the potential to improve subjective well-being by targeting workplace causes of mental health conditions, such as low pay, unsafe environments, and abusive managerial practices. Importantly, compared to alternative forms of worker voice, strikes offer several distinct advantages in improving management accountability and driving meaningful changes. For instance, while individual complaints are often ignored or dismissed as isolated grievances, strikes represent purposeful collective action, signaling that workers' concerns are shared, validated, and non-trivial (Morrison et al., 2011; Prouska et al., 2023). Moreover, by stopping work, strikes impose substantial costs on employers, forcing management to be more responsive to workers' needs (Schmalz et al., 2018). In addition, strikes can raise public attention to workplace issues. With management behavior subjected to third-party scrutiny, employers face heightened pressure and are more likely to respond promptly (Chun, 2009).

Strikes are also a more effective voice mechanism because they help address the public good problem inherent in individual expressions of voice (Olson, 1965; Freeman and Medoff, 1984). In many cases, worker voice is underprovided as all employees share the benefits of improved conditions, while only those who speak up bear the costs, such as potential retaliation from management (Burris, 2012). However, strikes often require intensive mobilization efforts,

including one-on-one conversations and public rallying. This process can encourage workers to carefully assess their circumstances and provide valuable input. The social pressure cultivated during the strike process can also mitigate free-rider behavior by increasing the psychological costs of benefiting from collective gains without contributing (Akkerman et al., 2013). Furthermore, unlike individual voice, strikes distribute the costs of voice collectively. Employers may find it more challenging to single out individuals within a unified group, thereby lowering the personal risk. When the threat of management retaliation diminishes, workers are more likely to experience psychological safety, enabling them to express opinions authentically and drive meaningful workplace changes to improve mental health (Della Torre, 2019; Liang et al., 2012).

In addition to the problem-solving function, strikes can also enhance mental health by fostering a sense of worker solidarity and offering additional psychological benefits. First, participation in picket line duties, administrative tasks, and other mobilization efforts during strikes creates opportunities for social contact with coworkers. These interactions create shared identities, build trust, and increase perceived social support and connectedness—all of which are important determinants of mental health (Fowler et al., 2009; Guinot et al., 2014; López-Andreu, 2020; Khan et al., 2016; Wickramaratne et al., 2022). Second, strikes can serve as a protective mechanism for alleviating negative emotions and feelings, particularly in response to long-standing grievances that culminate in a strike. Workers may use strikes as a retaliation against employers who have shown consistent disrespect and contempt for their voice (Cloutier et al., 2013). In such cases, strikes serve as a cathartic outlet, allowing workers to release pent-up negative emotions, restore their sense of self-esteem and self-worth, and ultimately improve their mental health.

Strikes as a Stressor

While strikes provide a channel for collective voice, we recognize that strikes are a complex phenomenon that can also become a stressor, i.e., "circumstances and experiences to which it is difficult to adjust and, therefore, that can impose deleterious effects on emotions, cognitions, behavior, physiological functioning, and wellbeing" (Pearlin et al., 2012, pp. 325). In the context of the United States, the stressful nature of strikes can be illustrated through at least four key aspects. First, financial hardship during strikes poses significant threats to workers' subjective well-being. Striking workers often lose their regular income and may receive only a fraction of their wages at replacement rates. These financial strains can disrupt workers' daily lives, potentially affecting their ability to meet basic needs such as food and housing (Maslow, 1943; Schwartz, 1992). Moreover, limited financial resources may constrain social interactions and leisure activities, further impacting their overall quality of life and mental health.

Second, strikes introduce a multifaceted sense of uncertainty into workers' lives. During strikes, workers' daily routines are disrupted as they shift from regular work sites to picket lines. Additionally, the duration of a strike is highly unpredictable—it may last a single day or extend for an extended period. Even more concerning is the uncertainty surrounding the outcomes of strikes. Although workers often strike for equitable economic rewards and improved working conditions, success is never guaranteed. This unpredictability amplifies the psychological burden on workers, as they must endure not only immediate hardships but also the potential disappointment of unmet goals despite their collective efforts (Brosschot, Verkuil, & Thayer, 2016; Monat, Averill, & Lazarus, 1972; Zakowski, 1995).

Third, strikes can trigger antagonism from multiple parties, generating additional mental health burdens on strikers. Most notably, employers often hold negative attitudes toward strikes,

blaming workers on strike for the disruption. In addition, during work stoppages, non-striking coworkers may face increased responsibilities to meet the demands of employers and customers. This division between strikers and non-strikers can lead to tension and conflict among workers, further intensifying stress levels (Thommes et al., 2014). Moreover, the impact of strikes can extend to family members of strikers, who may experience difficulties due to disruptions in daily routines and a reduction in household income (Gennard, 1982). The general public may also perceive strikes as undesirable events, potentially blaming strikers for the inconvenience caused to their daily lives (for examples of the negative externality of strikes, see Baker, 2013; Bauernschuster et al., 2017; Gruber & Kleiner, 2012; Jaume & Willén, 2019, 2021; Krueger & Mas, 2004).

Fourth and finally, the relatively weak legal protections for strikers in the United States may further amplify the anxiety experienced by workers. While the National Labor Relations Act of 1935 shields private-sector workers from being disciplined or discharged for participating in economic strikes and unfair labor practice strikes, legal protections are far more limited for other types of strikes (McCammon, 1990). For example, sympathy strikes, which support other workers on strike, and political strikes, which protest government policies, receive significantly less protection under the law, leaving participants vulnerable to employer retaliation. Furthermore, even in economic strikes over wages and benefits, workers face the risk of being permanently replaced by employers under the famous 1938 Mackay doctrine. Additionally, in the public sector, strikes are often perceived as lacking legitimacy and hence enjoy even more limited protection. For instance, the Civil Service Reform Act of 1978 prohibits federal employees from striking, while state-level regulations often impose strict restrictions on strikes by employees of local governments (Budd, 2020).

Gender Differences

So far, we have highlighted that strikes can function both as a collective voice that enhances subjective well-being and as a stressor that imposes significant psychological challenges. In what follows, we argue that gender plays a critical role in determining which of these two channels predominates the mental health impact of strikes. We focus on gender because of the significant demographic changes in the labor force over the past few decades, with an increasing presence of women in the workplace and, particularly, within the labor movement (Goldin, 2006; Milkman, 2013). Moreover, psychiatric research has highlighted gender as an important factor influencing the incidence and expression of mental health conditions, such as depression (Kuehner, 2017).

How might gender affect the mental health impact of strikes? In this study, we argue that female workers are more likely to face worse mental health outcomes following a strike compared to their male counterparts. Specifically, social role theory links gender stereotypes to societal roles, with men often portrayed as agentic—assertive and competitive—and women as communal—nurturing and emotionally expressive (Bakan, 1966; Eagly & Wood, 2012). The expectations for women to be warm and kind clash with the militant and sometimes violent nature of strikes, making participation in strikes a counter-stereotypical behavior for female workers. Such violations can lead to societal punishment, including heightened criticism and pressure, as seen in similar biases against female politicians who display agentic traits (Schneider, Bos, & DiFilippo, 2022).

Gender differences in the mental health impact of strikes may also arise from different coping strategies typically adopted by men and women. According to the socialization hypothesis in the coping literature, men are more used to engage in problem-focused coping behaviors that

directly address problems, while women tend to rely on emotion-focused coping strategies aimed at regulating their own psychological responses (Baker & Berenbaum, 2007; Pearlin & Schooler, 1978). Notably, emotion-focused coping behaviors are generally less effective than problem-focused strategies in managing stress (Ptacek et al., 1992). Supporting this perspective, research shows that women, on average, report higher levels of stress than men, even after controlling for sociodemographic variables and the number of stressful events (Matud, 2004). Furthermore, when experiencing stress, women are more likely to exhibit internalizing symptoms, such as depression and anxiety, whereas men are more prone to externalizing behaviors, such as aggression and delinquency (Leadbeater et al., 1999; Rosenfield & Mouzon, 2013).

Lastly, we note that women are disproportionately concentrated in essential jobs, such as teaching, nursing, and social work. These fields frequently experience strikes due to systemic challenges, yet their critical nature means that disruptions can significantly impact vulnerable populations like students, patients, and the elderly. Such strikes often attract public criticism for allegedly harming those most in need, as strikers are perceived to deviate from the altruistic norms expected of these roles, which prioritize others' welfare over personal rights. This moral judgment, coupled with the societal burden placed on women in these professions, intensifies the emotional strain and mental health toll that female workers may experience during labor actions. In summary, the above analysis suggests that the mental health impact of strikes is likely to be harmful for women, due to violation of social expectations, gender differences in coping strategies, and sex segregation in the workplace. Having outlined our theoretical framework, we now turn to the data and methods used to empirically examine the impact of strikes on workers' mental health.

Empirical Setting

Data and Variables

We use the Panel Study of Income Dynamics (PSID) to investigate the mental health impact of strikes. The PSID is a nationally representative, longitudinal survey of households in the U.S. dating back to 1968 (ISR, 2022). Interviews were conducted annually prior to 1997 and biennially thereafter. We analyze 11 waves of the data collected between 2001 and 2021, which include information on both mental health and strike activity. We focus on a sample of respondents who are in the labor force and between 18-64 years old. The PSID measures mental health using the Short Kessler Psychological Distress Scale (K6). Respondents are asked to report how often they experienced the following six feelings in the past 30 days: sadness, nervousness, restlessness, hopelessness, worthlessness, and everything being an effort. Answers are recorded on a 5-point scale ranging from 0 (none of the time) to 4 (all the time). A total score ranging from 0 to 24 is then formed to reflect the overall level of distress, with larger values indicating poorer mental health. We use the total K6 score as the key variable for mental health, as psychiatric research has demonstrated the excellent reliability and validity of the scale in measuring psychological distress and predicting mental illness (Prochaska et al., 2012; Kessler et al., 2002; Umucu et al., 2022). Missing values for the mental health variable are filled using the within-person mean.

The PSID also measures strike activity by asking respondents the following question: "Did you miss any work in the previous year because you were on strike?" Based on this information, we classify a respondent as a (time-invariant) striker if he or she has ever participated in a strike.[1] In general, strikers are rare in our data, reflecting the historical decline of strike activity in the

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[1] We excluded ten respondents who participated in more than one strike to simplify our analysis, particularly for the event study design discussed later. However, our results remain robust when including theses respondents and using more advanced econometric methods that account for complex event study design (e.g., de Chaisemartin, & d'Haultfoeuille, 2024).

United States. Of the 14,702 individuals, only 272 are strikers, representing approximately 1.8% of the respondents. Among these strikers, 133 were males and 139 were females. Over 80% of strikers were in the manufacturing, transportation and utilities, wholesale and retail trade, and service industries (e.g., personal and business services, including education and healthcare). Additionally, a quarter of the strikers reported the duration of their strikes. On average, 4.5 days (or 36 hours) of work were missed due to strikes, with the maximum reported being 18 days (or 144 hours). Note that the PSID asks about strike activity in the previous year but assesses mental health in the past 30 days. Since the data are collected biennially, we cannot match strike activity and mental health in the same year. As a result, by the nature of the design, we are only able to study the relatively long-run mental health impact of strikes (e.g., within a year following the strike) and miss the short-run transient impact.

To further understand the data, Table 1 presents summary statistics for both strikers and non-strikers. Notably, strikers differ significantly from non-strikers in many observed aspects. Compared to non-strikers, strikers show better mental health, are older, and are less likely to live in the South. Strikers are also more likely to have a college degree and remain employed than non-strikers. Moreover, strikers typically earn higher labor income and work longer hours, even if they miss some work due to strikes. Finally, strikers are more likely to work in a unionized job than non-strikers. Surprisingly, about 70% of strikers are not covered by a collective bargaining contract.[2] While other studies also find a large share of non-union strikers (e.g., Kallas et al., 2022; Massenkoff & Wilmers, 2024), the number appears to be unusually high in our data. To shed light on this issue, Figure 1 illustrates the trend in strike activity in the PSID from 1976 to 2021. It turns

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[2] Since we define strikers as individuals who have ever participated in a strike, one might speculate that job mobility could be influencing this result. However, our analysis yields a similar finding when focusing solely on the waves in which strikers reported participating in a strike in the previous year.

out that the percentage of strikes reported by unionized workers dropped sharply from 87.5% in 2001 to 25% in 2003, and the share remained below 50% for the next two decades. However, we are unable to identify specific historical events or changes in the PSID design that may explain such a significant shift. Despite this peculiarity, the number of strikes reported in the PSID has been relatively stable since the 1990s—a pattern that is consistent with the data collected by the U.S. Bureau of Labor Statistics (BLS).[3]

Identification Challenges

While we have provided a broader theory to understand the mental health impact of strikes, one key empirical challenge is that strikers may be different from non-strikers in many important ways (e.g., those shown in Table 1). This raises the concern that strike activity is not randomly assigned; instead, workers self-select into strikes based on both observed and unobserved characteristics. Addressing this issue is challenging, as the selection process remains unclear. For example, workers can select into strikes based on time-invariant individual characteristics. Importantly, the direction of this selection is ambiguous. On the one hand, the significant risk associated with strikes may lead to positive selection, such that workers with a stronger mindset and better overall mental health are more likely to participate (Leigh, 1983). On the other hand, negative selection can occur if more desperate workers, who may already face long-term mental health problems, view strikes as their last resort (Catlin, 2020; Essex et al., 2023)

Workers may also select into strikes based on time-varying individual or contextual factors. Once again, the direction of the selection is unclear. Positive selection is possible if workers strike under more favorable economic conditions (Card, 1990), such as in tight labor markets or when

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[3] See the historical trend in major work stoppages collected by the BLS.

employers experience high profits—situations that could be associated with better mental health. Conversely, negative selection might happen if workers strike in response to employers' lay-off decisions, abusive managerial practices, or other circumstances that could lead to poorer mental health (Godard, 1992). In any case, simply comparing the average difference in mental health between strikers and non-strikers may not have a causal interpretation. In what follows, we discuss two empirical strategies employed to help mitigate the selection issue. Since the self-selection problem is unlikely to be completely eliminated, we emphasize the assumptions required for each strategy to identify the causal effects of strikes on workers' mental health.

Individual Fixed Effects Regression

Our first empirical strategy is individual fixed effects (FEs) regression. Utilizing the longitudinal nature of the PSID data, we estimate the following OLS model separately for male and female workers:

$$Mental\ Health_{it} = \beta_1\ Strike_{it} + X\beta + \alpha_i + \eta_t + \epsilon_{it}\ (1)$$

where the subscripts i and t denote respondents and waves, respectively. $Mental\ Health_{it}$ is the K6 total score for respondent i in wave t. $Strike_{it}$ is a dummy variable indicating whether respondent i reports strike activity in wave t. X is a vector of time-varying control variables, including age, age squared, education level, public sector, and union contract. Note that we do not control for income, which can be an outcome of strike activity. In certain specifications, we also control for region-industry effects.[4] Additionally, α_i is the time-invariant individual characteristics,

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[4] The region variable consists of five categories: Northeast, North Central, South, West, and Others (e.g., Alaska and Hawaii). The industry variable, measured for the present or last main job, consists of ten categories: agriculture, mining, construction, manufacturing, transportation and utilities, wholesale and retail trade, finance and insurance, services, public administration, and others.

and η_t is the common time trend. Finally, ϵ_{it} represents the remaining errors that vary across respondents and waves.

As the model controls for individual FEs, the coefficient β_1 captures within-person changes in mental health associated with strikes. The model thus alleviates the concern that workers select into strikes based on unobserved time-invariant individual characteristics. Furthermore, β_1 can be interpreted causally if strikes are as good as randomly assigned conditional on individual FEs. However, causal identification may be compromised if selection into strikes is also influenced by time-varying factors. Despite this limitation, individual FEs regression is a useful starting point for our analysis. In particular, we can inspect the pattern of selection by comparing the results from individual FEs regression to those from pooled OLS regression (i.e., without individual FEs but with time-invariant controls such as race). For this purpose, we will report the estimates from both models when presenting our findings.

The Event Study Design

Our second empirical strategy is an event study design, which is a generalized difference-in-differences (DiD) method that compares changes in mental health between strikers (i.e., the treatment group) and non-strikers (i.e., the comparison group) over time. Traditionally, the event study design achieves causal identification under the parallel trend assumption. That is, in the absence of treatment, the two groups should experience similar changes in the outcome. In our context, this means that if strikers had not gone on strike, their mental health would have followed the same trajectory as those of non-strikers. A key advantage of the event study is that we can directly assess whether strikers show similar mental health changes in the pre-treatment period (i.e., before strikes) compared to non-strikers. Importantly, if workers select into strikes based on

time-varying factors, we might observe a pre-trend in mental health for strikers. For instance, if strike activity is largely motivated by abusive managerial practices, we may expect strikers to experience a greater increase in mental health problems before their strikes. Conversely, a parallel trend in the pre-treatment period would strengthen our confidence in estimating the causal impact of strikes on mental health.

To implement the event study design, we start by estimating the following dynamic two-way fixed effects (TWFE) model:

$$Mental\ Health_{it} = \sum_{j}^{k} \delta_j\, D_i \times I_{i,t^0+j} + \alpha_i + \eta_t + v_{it} \ (2)$$

where the subscripts i and t denote respondents and waves, respectively. Subscripts j and k indicate the starting and ending periods of the event study window. $Mental\ Health_{it}$ is the total K6 score for respondent i in wave t. D_i is a dummy variable indicating whether respondent i is a striker. I_{i,t^0+j} is a dummy variable indicating the jth period relative to the event time t^0 in which respondent i reported a strike in the previous year. Again, α_i and η_t are the time-invariant individual characteristics and the common time trend. Finally, v_{it} represents the error term. The parameter of interest, δ_j, captures the pre-trend when $j < 0$ and the impact of strikes on mental health when $j \geq 0$. We further normalized δ_{-1} to zero to avoid perfect collinearity.

While the dynamic TWFE model is intuitive, recent econometric literature suggests that the estimator can be biased in the presence of staggered treatment adoption and heterogeneous causal effects (Callaway & Sant'Anna, 2021; de Chaisemartin & d'Haultfoeuille, 2020; Goodman-Bacon, 2021; Sun & Abraham, 2021). This issue is relevant to our study given that workers participated in strikes at different times, and that the impact of strikes may vary across groups and over time. To address this problem, we also apply the imputation estimator proposed by Borusyak

et al. (2024), which is unbiased under staggered treatment adoption and heterogeneous causal effects. Compared to alternative robust event study estimators, the imputation method is extremely transparent. In brief, it obtains individual treatment effect estimates by imputing untreated potential outcomes using individual fixed effects α_i and time fixed effects η_t of the untreated observations. A weighted sum of the individual treatment effects is then taken to form the average treatment effect on the treated. Additionally, the imputation estimator has a relatively large efficiency gain due to better use of pre-treatment information, including those from the treatment group.

Borusyak et al. (2024) also proposes a test for the pre-trend, which is different from the procedure used to obtain the treatment effects. Specifically, a separate TWFE regression of the outcome variable on a set of indicators for the pre-treatment periods is estimated using all untreated observations (with the earliest period normalized to zero). The rationale for this test is that the coefficients of the pre-treatment periods should be all zero if the parallel trend holds. Due to this different procedure for the pre-trend test, the corresponding event study is asymmetrically constructed between the pre- and post-treatment periods (Roth, 2024). As a result, when presenting the imputation results, we will distinguish between the pre-trend test and the treatment effects to avoid possible confusion.

Finally, we apply the following criteria to construct the event study sample. For the treatment group, we create a weakly balanced panel such that each striker is consistently observed from three periods before the strike to two periods after the strike (i.e., $j = -3, k = 1$). This results in a panel of 130 respondents who reported strike activity between 2007 and 2019. Of these strikers, 62 are male and 68 are female. Figure 2 visualizes the sample of strikers using the package proposed by Mou et al. (2023). The light and dark blue cells represent the pre- and post-treatment periods, respectively. The time horizon for the event study is determined by both statistical and

theoretical considerations. We include three pre-treatment periods, the minimum number required to detect a pre-trend. We focus on two post-treatment periods to capture both relatively and very long-run effects (recall that the PSID data are collected biennially, meaning that one additional post-period reflects a two-year interval). For the comparison group, we create a strongly balanced panel, where each non-striker is consistently between 2001 and 2021. This approach ensures that the event study estimates are not influenced by changes in the sample composition (i.e., workers in the treatment and control groups) caused by the unbalanced panel.

Main Results

Regression Results

Do strikes influence workers' mental health, and does the impact differ by gender? To answer these questions, Table 2 presents the results from both pooled OLS regression and individual FEs regression. For male workers, we find that strikes do not significantly affect their mental health on average. In column 1, the coefficient of strike activity from the pooled OLS regression is close to zero and not statistically significant ($b = 0.025, p > 0.1$). When controlling for individual FEs in column 2, the coefficient is again close to zero and insignificant ($b = -0.026, p > 0.1$). After including region-industry FEs in column 3, the coefficient of strike activity remains similar ($b = -0.051, p > 0.1$). Nevertheless, further interpreting these findings is challenging at this moment. On the one hand, the results could suggest that strikes do not genuinely affect male workers' mental health—at least in the relatively long run. On the other hand, it is possible that strikes do impact male workers' mental health, but with some experiencing improvement while others facing deterioration, resulting in a null average effect. We revisit this issue later in our analysis.

Turning to female workers, Table 2 shows a different picture. In column 4, the coefficient of strike activity from the pooled OLS regression is close to zero and not statistically significant ($b = 0.082, p > 0.1$). However, after controlling for individual FEs in column 5, the coefficient becomes more positive and statistically significant ($b = 0.277, p < 0.1$). The point estimate remains largely unchanged in column 6, even with the inclusion of region-industry FEs ($b = 0.291, p < 0.1$). These results suggest that after at least partly addressing the self-selection problem, strikes are harmful to female workers' mental health on average. The effect size corresponds to a 10% increase in mental health problems for a typical striker (average K6 total score $= 2.717$).[5] To better understand the effect size, we benchmark our estimates against other studies that utilize the K6 scale. We find that the mental health impact of strikes is comparable to that of a \$20,000 loss in annual income, as estimated using a twin study design (Lam et al., 2019). The effect is also approximately one-third of the impact of unemployment on mental health, as estimated using an individual FEs model with the PSID data (Cygan-Rehm et al., 2017). Given these comparisons and considering that we are studying the relatively long-run impact of strikes, the magnitude is not negligible. Once again, we note that this is an average effect, which does not rule out the possibility that some workers may experience improvement in mental health because of their strikes.

Table 2 also reveals important patterns of selection into strikes. In the male sample, we find that controlling for individual FEs does not significantly change the results for the mental health impact of strikes. This indicates that unobserved time-invariant characteristics of male workers do not have a strong systematic correlation with strike activity and/or mental health. However, in the

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[5] Psychiatric research finds that the K6 total score is positively associated with increased mental health care utilization, impairment, and substance use (Prochaska et al., 2012). It also predicts severe diagnosable mental illness, which is related to violent crime and suicidal ideation (Chamberlain et al., 2009; Fazel & Grann, 2006).

female sample, the coefficient of strike activity on mental health is downward biased when not controlling for individual FEs. In other words, the detrimental impact of strikes is underestimated when comparisons are made between female strikers and non-strikers. This suggests that female strikers are less mentally vulnerable than non-strikers, possibly due to some unobserved individual traits (e.g., optimism and openness to experience) and resources (e.g., social support from local communities). As a robustness test, Table 3 shows regression results only using the sample of strikers. We again find that on average, strikes are detrimental to the mental health of female workers but not male workers. Interestingly, in both male and female samples, the pooled OLS regression and individual fixed effects regression lead to similar conclusions. This indicates that among strikers, the unobserved time-invariant individual characteristics are less systematically correlated with strike activity and/or mental health.

Lastly, we explore if the mental health impact of strikes differs by other socio-demographic characteristics. Specifically, we estimate individual FEs regression of mental health on the interaction between strike activity and each of the following five variables: Union (whether the respondent is covered by a union contract), Non-White (whether the respondent's race is non-white), South (whether the respondent lives in the south), Public (whether the respondent works in the public sector), and Service (whether the respondent works in the service industry). The results are presented in Table 4. Columns 1-4 indicate that the mental health impact of strikes is not influenced by the presence of a union contract, non-white race, region of living, and sector of employment. None of the four interaction terms are significant at any conventional level. Moreover, the magnitude of the two-way interaction is also small, suggesting that the null effects are not driven by insufficient statistical power. These results remain similar when we further split the sample by gender.

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However, in column 5 of Table 4, we find a large, positive, and statistically significant interaction between strike activity and service industry ($b = 0.513$, $p < 0.01$), indicating that the detrimental impact of strikes on mental health is more pronounced in the service industry. This is possibly because the service industry involves more direct, ongoing interactions with neutral third parties, amplifying the negative externalities and social pressure of strikes. Interestingly, further analysis reveals that the interaction between strike activity and service industry is more positive and significant in the male sample than in the female sample (for males, $b = 0.666$, $p < 0.1$; for females, $b = 0.339$, $p > 0.1$). In other words, the mental health impact of strikes varies less by industry for female workers than for male workers. One explanation is that the adverse impact of strikes tends to be universal for female workers, due to other more general reasons such as violation of social expectations and gender differences in coping strategies.

Event Study Results

We now discuss our event study results. Recall that causal identification in the individual FEs model depends critically on the assumption that strike activity is as good as randomly assigned after controlling for time-invariant individual characteristics. However, this assumption is often untestable and would fail if workers select into strikes based on time-varying factors. The event study design helps address this concern by comparing changes in mental health between strikers and non-strikes both *before* and *after* strikes. If a pre-trend in mental health is observed for strikers, one might be concerned that mental health change in the post-treatment period is driven by other contingent factors, which may affect both strike activity and mental health (e.g., problematic managerial practices). In contrast, the absence of a pre-trend would strengthen our confidence in identifying the causal impact of strikes on mental health.

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Figure 3 presents the event study estimates from the dynamic TWFE model. Panel A shows the results for male workers. We find that the point estimates for event times less than zero are not statistically significant ($\delta_{-3} = -0.03$, $p > 0.1$; $\delta_{-2} = 0.372$, $p > 0.1$), suggesting the absence of a pre-trend. That is, in the years leading up to their strikes, male strikers show a similar pattern of changes in mental health compared to non-strikers. Furthermore, the point estimates in the post-treatment period are also not statistically significant ($\delta_0 = 0.233$, $p > 0.1$; $\delta_1 = 0.072$, $p > 0.1$). This indicates that compared to non-strikers, male strikers do not experience different changes in mental health in the years following their strikes. The event study thus leads to the same conclusion as the individual FEs regression: in the relatively long run, strikes do not have a significant effect on male workers' mental health on average.

Turn to the results for female workers in Panel B of Figure 3. The point estimates for event times less than zero are again insignificant ($\delta_{-3} = -0.048$, $p > 0.1$; $\delta_{-2} = -0.269$, $p > 0.1$), suggesting that female strikers do not experience a pre-trend in mental health. Moreover, the point estimate for event time $t = 0$ is positive and statistically significant ($\delta_0 = 0.323$, $p < 0.05$). This indicates that compared to non-strikers, female strikers show a greater increase in mental health problems in the year following their strikes. The effect size is also comparable with the estimates from the individual FEs regression. Nevertheless, the point estimate for event time $t = 1$ is small and statistically insignificant ($\delta_1 = 0.106$, $p > 0.1$). Given the biennial nature of the data, this suggests that after three years, female strikers experience similar changes in mental health compared to non-strikers. One possible interpretation is that female workers gradually recover from the negative mental health consequence of strikes over time. Yet this is a relatively slow process that may take more than a year. Despite the time dynamics, the results again indicate that strikes are detrimental for female workers' mental health even in the relatively long run.

To further strengthen our results, Figure 4 presents the event study estimates using the imputation method. The overall pattern is similar. If anything, we find that for male workers, the point estimate at event time $t = 0$ becomes much smaller using the imputation estimator ($\delta_0 = 0.121$, $p > 0.1$). This helps alleviate the concern of insufficient statistically power; that is, strikes may negatively influence male workers' mental well-being, yet we cannot confidently detect this effect due to the small sample size. For female workers, we find that the point estimate at event time $t = 0$ is slightly larger ($\delta_0 = 0.432$, $p < 0.05$), representing approximately 16% deterioration in mental health for a typical striker. Overall, the above results suggest that the dynamic TWFE estimator introduces bias in the analysis, yet our main conclusion is not affected: On average, strikes are detrimental to the mental health of female workers but not male workers in the relatively long run.

Finally, we would like to offer some additional comments on the event study results. While the absence of a pre-trend increases our confidence in causal identification, it does not ensure that the parallel trend assumption holds in the post-treatment period. For instance, strikes have been traditionally viewed as an indicator of workers' better bargaining positions (Card, 1990). The parallel trend assumption may thus be violated if strikers were able to negotiate favorable employment conditions—which could improve mental health—without resorting to strikes. In this case, we may underestimate the detrimental impact of strikes on mental health, although this will not affect our conclusion for female workers. Nevertheless, we note that strikes are likely be a noisy signal of workers' bargaining positions. In particular, after President Ronald Reagan successfully broke the 1981 Professional Air Traffic Controllers' Strike by using permanent replacements, strikes have become less effective as a weapon for labor (Cramton & Tracy, 1998; McCartin, 2011). As workers are uncertain about what strikes can realistically achieve and how

employers might respond, many labor disputes may arise from miscommunication, miscalculation, and other random factors (Massenkoff & Wilmers, 2024).

One might also be concerned that the biennial nature of the PSID may limit our ability to detect a pre-trend. For instance, workers may strike in response to sudden changes in managerial practices. However, we argue that this issue is at least partly mitigated by the way the PSID measures strike activity. Recall that the PSID asks about strike activity in the last year, meaning that the event time $t = -1$ for the reference period falls within a year prior to strikes. This is a relatively close time point given that most strikes require some organizing effort beforehand. Additionally, a large share of strikers in our data are not covered by a collective bargaining agreement (i.e., non-union workers). As a result, their strikes may be more spontaneous. This also increases the likelihood that the parallel trend assumption holds.

Heterogeneity and Mechanisms

So far, our analysis provides limited insight into treatment heterogeneity: although we have examined whether the mental health impact of strikes differs by certain socio-demographic characteristics, we do not find many meaningful results. Consequently, the empirical evidence does not sufficiently inform our theoretical discussion, which underscores the potential for strikes to both improve and impair mental health. To this end, we rely on the imputation method to more generally explore the heterogeneous impact of strikes. Recall that the imputation method obtains the average treatment effect on the treated by aggregating individual treatment effect (ITE) estimates. We can thus use the ITE estimates to directly evaluate the level of heterogeneity. For this analysis, we focus on the year immediately following a strike (i.e., at the event time $t = 0$).

Figure 5 plots the distribution of the ITE estimates of the mental health impact of strikes. For male workers, panel A shows that the ITEs have a mean of 0.121, which is the same as the aggregated estimate at event time $t = 0$ reported earlier. Moreover, the ITEs have a relatively large standard deviation of 2.496. These findings indicate that despite a small average effect, the mental health impact of strikes is heterogeneous across male workers. A closer look at the shape of the distribution provides further details. Specifically, the ITEs for male workers are approximately symmetrically distributed, with many estimates falling above and below zero. This suggests that while a large proportion of male strikers experience poorer mental health (i.e., ITE > 0), many other male strikers show improved mental health (i.e., ITE < 0). Together, the results are consistent with our theory that strikes can both enhance and harm mental health.

For female workers, panel B shows that the ITEs have a mean of 0.432, which is again the same as the aggregated estimate at event time $t = 0$. In addition, the standard deviation of ITEs is 1.876—still a large value but smaller than that in the male sample. The variance ratio test also rejects the null hypothesis that the variance of ITEs is identical in the male and female samples ($p < 0.01$). Furthermore, the distribution of ITEs is right-skewed for female workers, indicating that the number of strikers who experience much poorer mental health (i.e., large positive ITEs) is greater than the number of strikers who experience much better mental health (i.e., large negative ITEs). Overall, the results suggest that the mental health impact of strikes is also heterogeneous for female workers, but to a lesser extent than that for male workers.

A remaining question is what explains the observed heterogeneity. One possibility is that the mental health impact of strikes depends on whether collective voice leads to improved working conditions. For instance, workers may show improved mental health if strikes result in meaningful economic gains, such as higher wages. To further explore this idea, we utilize the ITEs to identify

strikers who experience mental health improvement (i.e., ITE < 0) and deterioration (i.e., ITE > 0). We then investigate whether the economic outcomes of strikes differ for these two groups of workers. Our expectation is that economic gains can help offset the psychological costs of strikes, such that strikers who show improved mental health are those who secure material benefits from strikes. To minimize the influence of extreme observations, we limit the analysis to the ITEs between the 25th and 75th percentiles. We also use the event study design to confirm that strikers with positive and negative ITEs experience different mental health consequences, and that there is no pre-trend for either group (see Table A1 in the appendix).

Is the mental health impact of strikes related to the economic outcomes of strikes? To answer this question, Figure 6 shows the impact of strikes on wages at event time $t = 0$ by ITE (i.e., by a group that experiences different mental health changes).[6] The results support a connection, while revealing some surprising findings. Specifically, for male workers, economic gains can offset the psychological costs of strikes as expected. That is, male workers who show mental health improvement are those who earn higher wages following. Conversely, male workers who experience mental health deterioration are those who do not secure wage increases. However, for female workers, economic gains appear to be a source of psychological costs. As shown in the figure, female workers with improved mental health are those who do not secure higher wages following their strikes. In contrast, female workers with deteriorated mental health are those who earn more after their strikes. While this surprising pattern may be attributed to data limitations (e.g., a small number of strikers), we speculate that there could be more substantive theoretical reasons. For instance, Amanatullah and Morris (2010) find that:

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[6] Full event study results for this analysis are presented in Figure A1 in the appendix.

"In self-advocacy contexts, women anticipate that [bargaining] assertiveness will evoke incongruity evaluations, negative attributions, and subsequent 'backlash' . . . However, in other-advocacy contexts, women achieve better outcomes as they do not expect incongruity evaluations or engage in hedging."
(p. 256)

It is thus possible that significant economic gains for female strikers represent one of the self-advocacy contexts, in which assertive bargaining may lead to backlash. Conversely, the absence of economic gains may reflect more of an other-advocacy context, such as strikes by teachers and nurses, where the focus often extends beyond self-interest (e.g., considering the well-being of students and patients). Researchers can further explore this heterogeneity by bringing in more comprehensive datasets or qualitative evidence.

Concluding Remarks

While much of the existing research on strikes focuses on their economic consequences, less attention has been paid to their psychological benefits and costs. To address this gap, we propose a dual-effect framework to theorize the impact of strikes on workers' mental health. On the one hand, we contend that strikes can improve workers' subjective well-being by providing a collective voice and fostering solidarity. On the other hand, we argue that strikes present significant risks to mental health, driven by financial hardship, heightened uncertainty, potential antagonism, and weak legal protection. We further propose that female workers are more subject to the adverse consequences of strikes, due to violation of social expectations, gender differences in coping strategies, and sex segregation in the workplace.

These theoretical considerations motivate our empirical analysis using the PSID data. Employing both individual fixed effects regression and an event study design to address endogeneity concerns, we find evidence largely consistent with our proposed theory. On average, male workers do not show significant changes in mental health in the year following a strike, while female workers experience poorer mental health. Additional analyses suggest that the mental health impact of strikes is heterogeneous, particularly for male workers. We also find that part of the heterogeneity is related to the economic outcomes of strikes, such that wage increases are associated with improved mental health for male strikers but not for female strikers. Beyond these primary findings, we also explore whether the mental health impact of strikes vary systematically across other socioeconomic factors such as regions, industries, and unionization status.

Overall, our findings have significant practical implications for both management and unions. For managers, while the economic costs of strikes to employers have been well-documented, our research highlights that strikes can also impose substantial psychological costs on workers. Given these mutual costs, it is crucial for management to prioritize proactive measures to improve industrial relations. This includes opening robust communication channels, actively engaging with workers' concerns, and collaboratively addressing their demands to foster a more constructive and equitable workplace environment. However, when strikes become unavoidable, managers should consider viewing them not solely as disruptions but as opportunities for potential meaningful changes in the workplace. For unions, our study underscores the importance of cultivating rewarding experiences during collective action. To mitigate the adverse mental health impact of strikes, unions might want to allocate resources and develop targeted interventions to safeguard the psychological well-being of strikers, especially for female workers. In our view,

providing such support not only addresses the immediate mental health impact of strikes but also strengthens long-term solidarity and resilience among union members.

Our study, however, is not with limitations. First, the biennial structure of the PSID prevents us from examining any short-run mental health impact, which may differ from their long-run consequences. Additionally, while we have carefully addressed endogeneity concerns using rigorous empirical strategies, we cannot completely rule out the possibilities of reverse causality and omitted variable bias. Our analysis is also constrained by the relatively small number of strikers in the sample, which increases sensitivity to outliers and limits statistical power. Future studies could build on our work to examine the short-run effects, use a larger representative sample, and employ alternative designs, such as regression discontinuity—particularly given that most strikes involve a voting process—to provide more robust causal evidence. Second, our study is primarily situated within the U.S. context, where institutional environments differ considerably from those in many other advanced industrialized nations. As a result, future research could investigate whether the mental health impact of strikes varies in countries with stronger legal protections and greater societal legitimacy for strike activity, or in those with more authoritarian regimes.

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Table 1. Means of Variables, PSID 2001-2021

	Definition	Strikers (1)	Non-Strikers (2)	T-Test (3)
Mental Health	K6 total score for the past 30 days (min = 0, max = 24)	2.717	3.095	-0.377***
Female	Dummy for whether the respondent is female	0.504	0.491	0.013
Non-White	Dummy for whether the respondent is non-white	0.383	0.381	0.001
Age	Respondent's age	43.510	40.442	3.068***
South	Dummy for whether the respondent lives in the south	0.376	0.428	-0.052***
High School	Dummy for whether the respondent has a high school degree	0.607	0.598	0.009
College	Dummy for whether the respondent has a college degree	0.350	0.320	0.029***
Employed	Dummy for whether the respondent is employed	0.970	0.943	0.027***
Public	Dummy for whether the respondent works in the public sector	0.218	0.216	0.002
Labor Income	Total labor income in the last year (adjusted to 2021 dollars)	68096	58139	9957***
Hours of Work	Total hours of work in the last year	2032	1997	34**
Union	Dummy for whether the respondent has a union contract	0.307	0.154	0.153***
Number of Observations		1874	74956	
Number of Respondents		272	14433	
Average Number of Waves		6.9	5.2	

Notes: The sample includes respondents who were in the labor force and between 18-64 years old. Columns 1 and 2 show the means of variables for strikers and non-strikers. A respondent is classified as a striker for all waves if any strike activity is reported. Column 3 shows the t-test results between strikers and non-strikers. *, **, *** indicate significance levels at 0.1, 0.05, and 0.01, respectively. Source: PSID 2001-2021.

Table 2. OLS Regression of Mental Health on Strike Activity (Strikers and Non-Strikers)

	Male Workers			Female Workers		
	(1)	(2)	(3)	(4)	(5)	(6)
Strike	0.025	-0.026	-0.051	0.082	0.277*	0.291*
	(0.290)	(0.172)	(0.178)	(0.217)	(0.156)	(0.154)
Controls	×	×	×	×	×	×
Time FE	×	×	×	×	×	×
Individual FE		×	×		×	×
Region-Industry FE			×			×
Observations	39088	39088	39088	37742	37742	37742
R-squared	0.030	0.579	0.580	0.045	0.608	0.609

Notes: This table shows the OLS regression results of mental health on strike activity. The sample includes both strikers and non-strikers in the PSID 2001-2021. Mental health is measured for the past 30 days using the total K6 score, with higher values indicating more psychological distress. Strike activity is defined as missing any work due to participation in a strike in the previous year. Standard errors (in parentheses) are two-way clustered at the individual level and the region-industry level. *, **, *** indicate significance levels at 0.1, 0.05, and 0.01, respectively.

Table 3. OLS Regression of Mental Health on Strike Activity (Strikers Only)

|	Male Workers			Female Workers		
	(1)	(2)	(3)	(4)	(5)	(6)
Strike	0.119	-0.064	-0.121	0.392**	0.278*	0.350**
	(0.227)	(0.176)	(0.185)	(0.183)	(0.146)	(0.158)
Controls	×	×	×	×	×	×
Time FE	×	×	×	×	×	×
Individual FE		×	×		×	×
Region-Industry FE			×			×
Observations	930	930	930	944	944	944
R-squared	0.076	0.623	0.647	0.063	0.561	0.581

Notes: This table shows the OLS regression results of mental health on strike activity. The sample includes only strikers in the PSID 2001-2021. Mental health is measured for the past 30 days using the total K6 score, with higher values indicating more psychological distress. Strike activity is defined as missing any work due to participation in a strike in the previous year. Standard errors (in parentheses) are two-way clustered at the individual level and the region-industry level. *, **, *** indicate significance levels at 0.1, 0.05, and 0.01, respectively.

Table 4. OLS Regression of Mental Health on Interaction between
Strike Activity and Other Potential Moderators

|	(1)	(2)	(3)	(4)	(5)
Strike	0.086	0.134	0.171	0.115	-0.072
	(0.124)	(0.137)	(0.160)	(0.152)	(0.149)
Strike $\times$ Union	0.113				
	(0.313)				
Strike $\times$ Non-White		0.022			
		(0.190)			
Strike $\times$ South			-0.130		
			(0.185)		
Strike $\times$ Public				-0.046	
				(0.289)	
Strike $\times$ Service					0.513***
					(0.167)
Controls	$\times$	$\times$	$\times$	$\times$	$\times$
Time FE	$\times$	$\times$	$\times$	$\times$	$\times$
Individual FE	$\times$	$\times$	$\times$	$\times$	$\times$
Region-Industry FE	$\times$	$\times$	$\times$	$\times$	$\times$
Observations	76830	76830	76830	76830	76830
R-squared	0.594	0.594	0.594	0.594	0.594

Notes: This table shows the OLS regression results of mental health on two-way interaction between strike activity and each of the following five variables: union contract coverage, non-white race, living in the south, public sector, and service industry. Standard errors (in parentheses) are two-way clustered at the individual level and the region-industry level. *, **, *** indicate significance levels at 0.1, 0.05, and 0.01, respectively. Source: PSID 2001-2021.

Figure 1. Strike Activity in the PSID 1976-2021
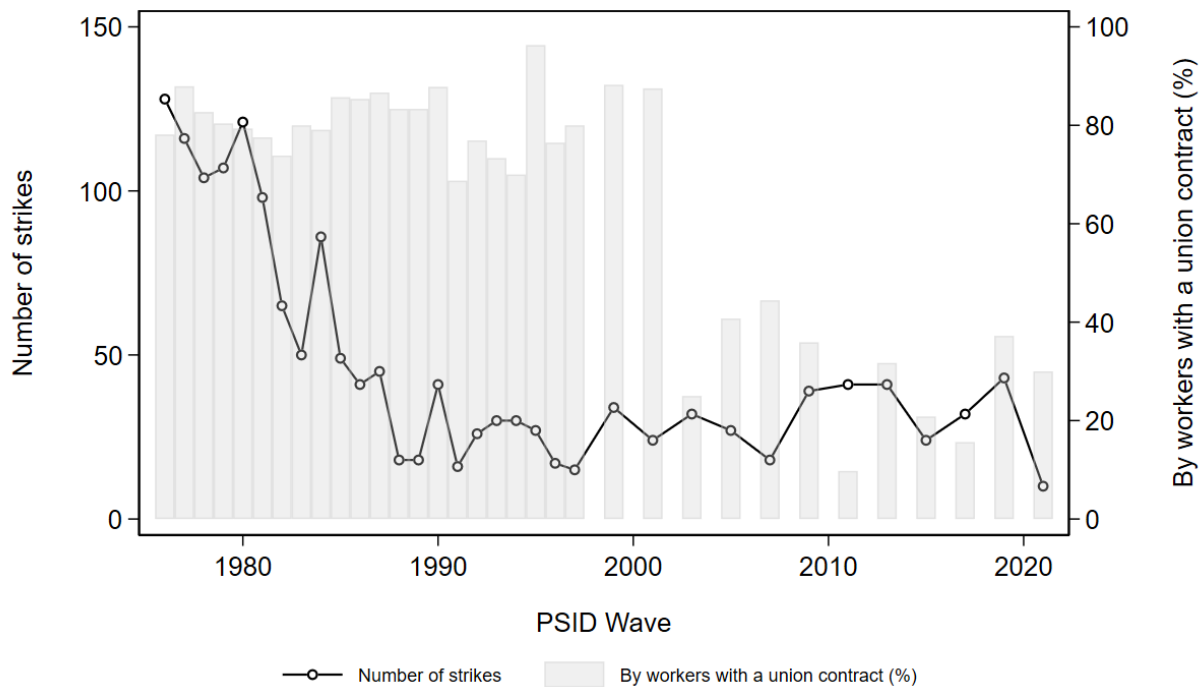
Notes: This figure plots the number of strikes reported in the PSID 1976-2021, along with the percentage of strikes reported by workers who are covered by a union contract. No sample restrictions are imposed on the data.

Figure 2. Visualization of the Event Study Sample (Strikers Only)
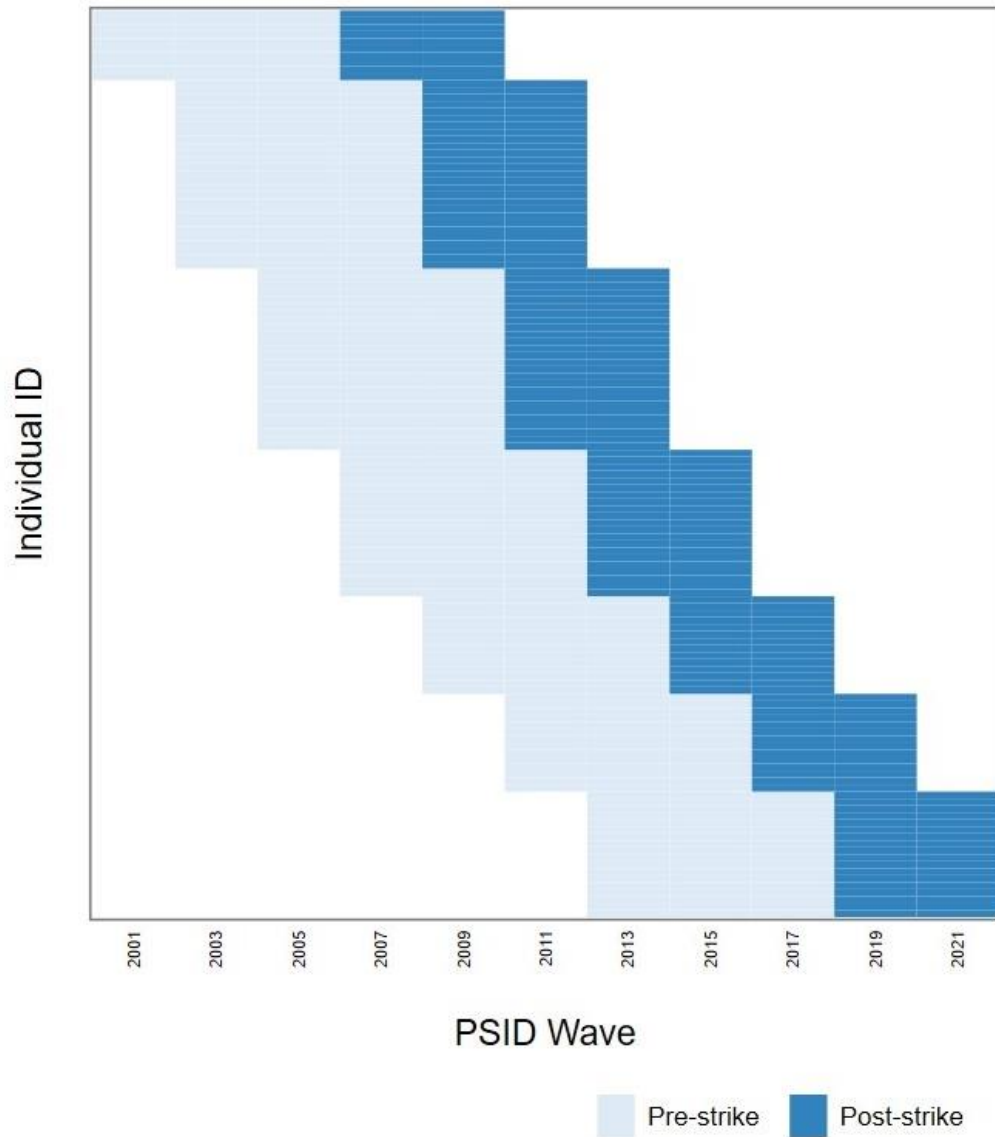
Notes: This figure shows the data structure for the event study sample of strikers (N = 130). The x-axis represents PSID waves. The y-axis represents individual ID, sorted by the timing of strikes. The light and dark blue cells indicate the pre- and post-strike periods, respectively. The striker sample is weakly balanced with all strikers observed for three pre-strike periods and two post-strike periods.
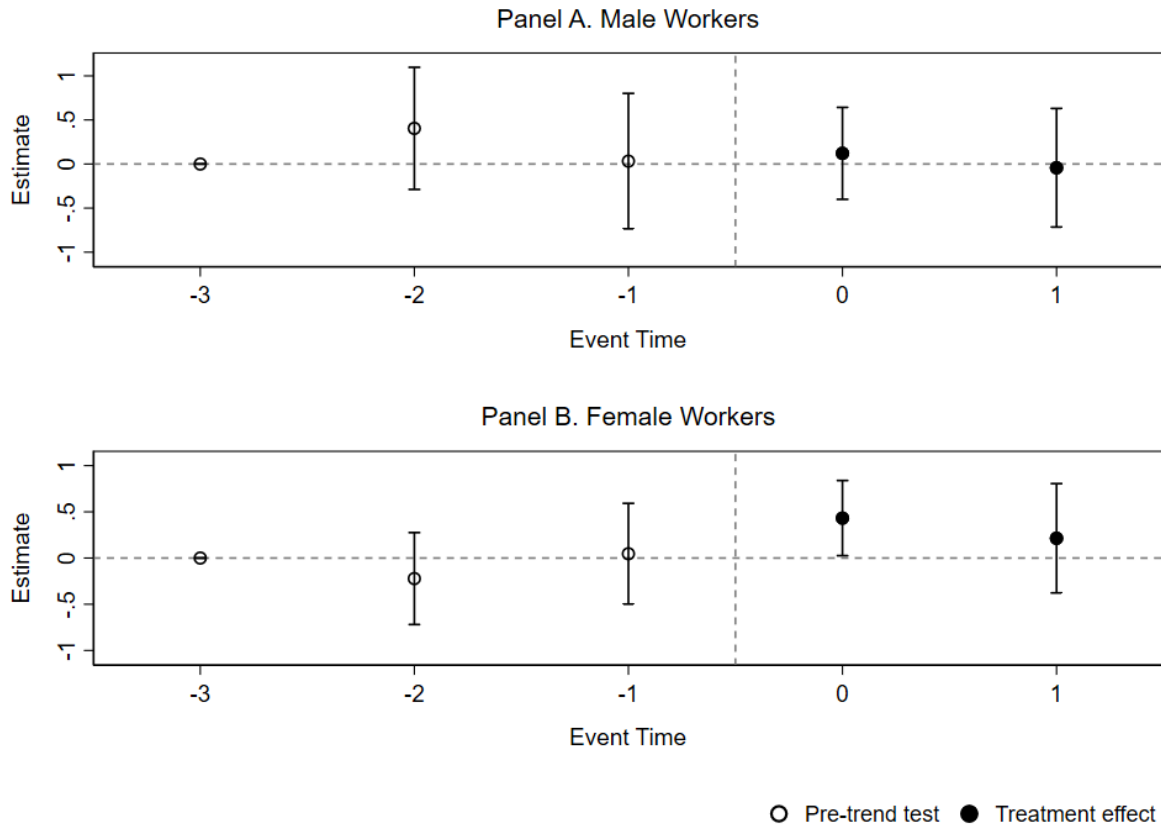
Figure 3. Event Study Estimates of the Mental Health Impact of Strikes
(Dynamic TWFE Model; 95% CIs)

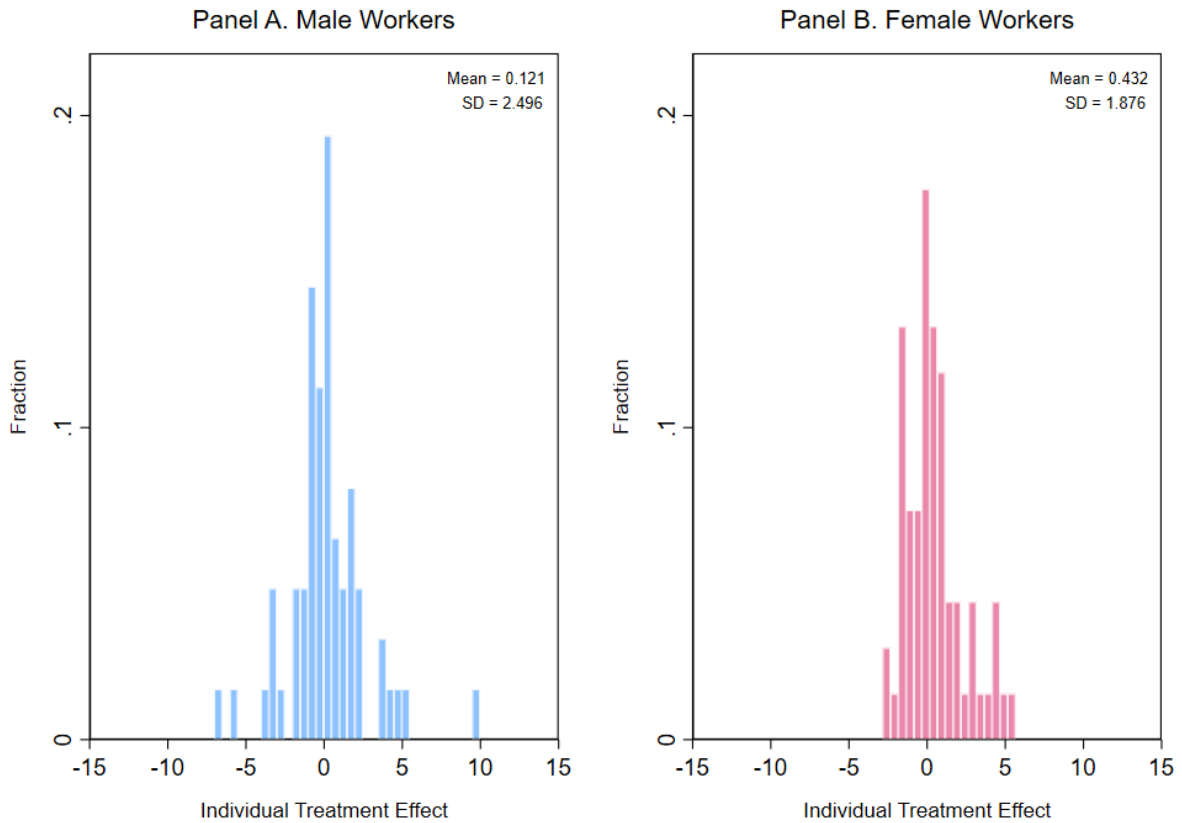**Panel A. Male Workers**

Panel B. Female Workers
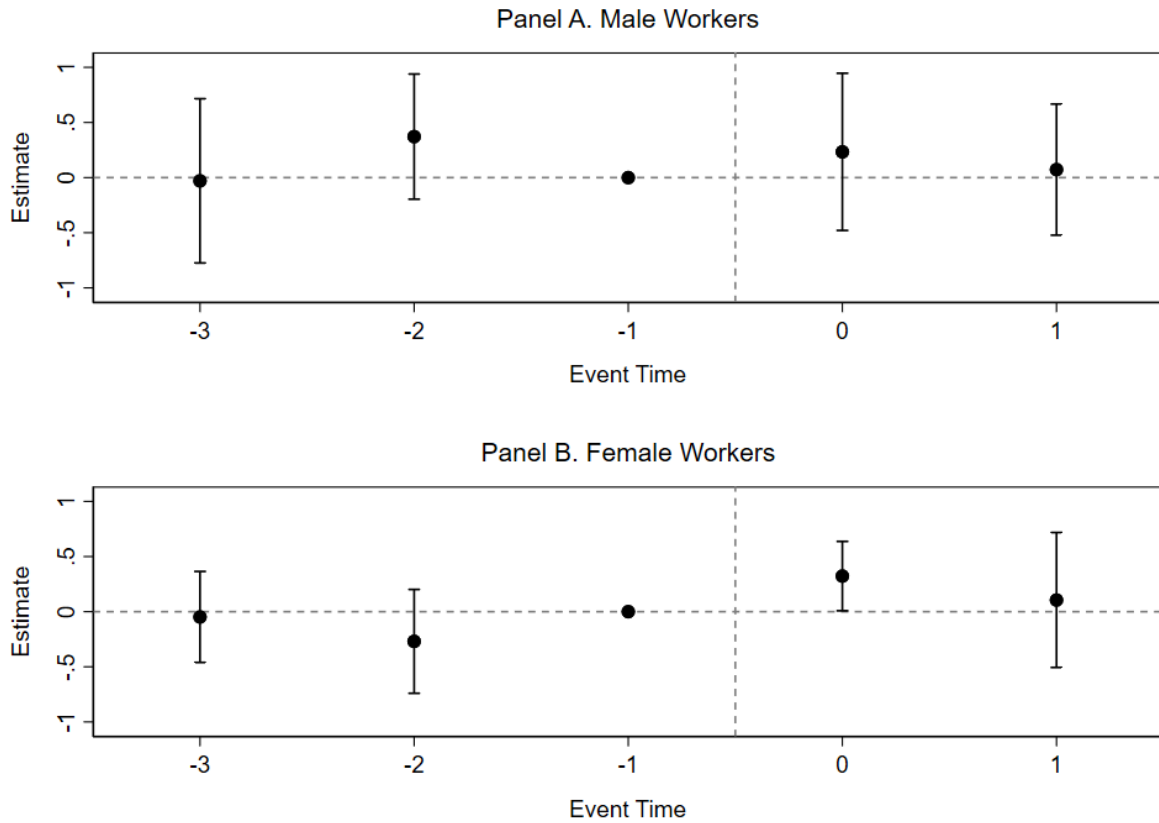
Notes: This figure presents the dynamic TWFE event study estimates of the impact of strikes on mental health. Panel A shows the results for male workers, and panel B shows the results for female workers. The bars denote the 95% confidence intervals. Standard errors are two-way clustered at the individual level and the region-industry level. Source: PSID 2001-2021.

Figure 4. Event Study Estimates of the Mental Health Impact of Strikes
(Imputation Method; 95% CIs)

Panel A. Male Workers

Panel B. Female Workers
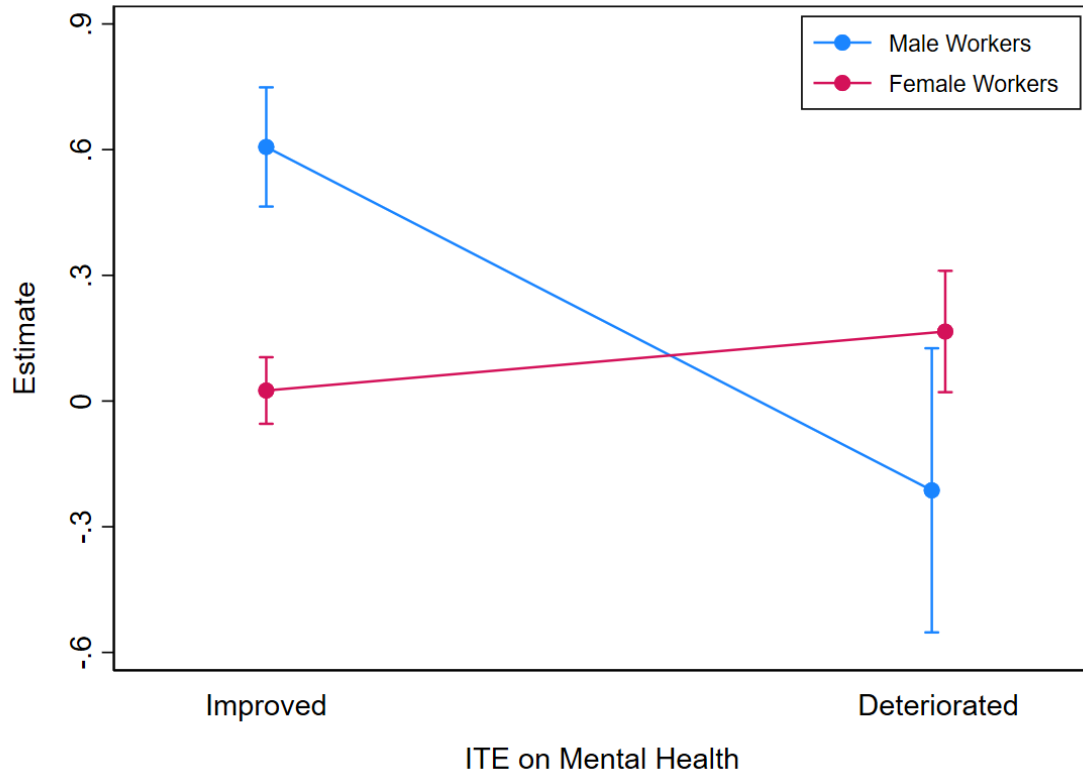
O Pre-trend test ● Treatment effect

Notes: This figure presents the event study estimates of the impact of strikes on mental health, using the imputation method proposed by Borusyak et al. (2024). Panel A shows the results for male workers, and panel B shows the results for female workers. The hollow markers represent pre-trend estimates, whereas the solid markers represent treatment effect estimates. These estimates are not directly comparable, as the imputation method constructs the event study in an asymmetrical way (see our discussion of the event study design for more details). The bars denote the 95% confidence intervals. Standard errors are clustered at the individual level as two-way clustering is not allowed in the imputation method. Source: PSID 2001-2021.

Figure 5. Distribution of Individual Mental Health Impact of Strikes
(Imputation Method)

Notes: This figure plots the distribution of individual treatment effects of strikes on mental health, obtained using the imputation method. Panel A shows the results for male workers, and Panel B shows the results for female workers. Source: PSID 2001-2021.

Figure 6. Economic Returns to Strikes by ITE on Mental Health

Notes: This figure investigates whether the impact of strikes on (log) wage at t = 0 differs by individual treatment effect (ITE) of strikes on mental health. The blue and red markers indicate the results for male and female workers, respectively. Estimates are obtained using the imputation method proposed by Borusyak et al. (2024). The bars denote the 95% confidence intervals. Standard errors are clustered at the individual level. Full event study results are shown in Figure A1 in the appendix. Source: PSID 2001-2021.
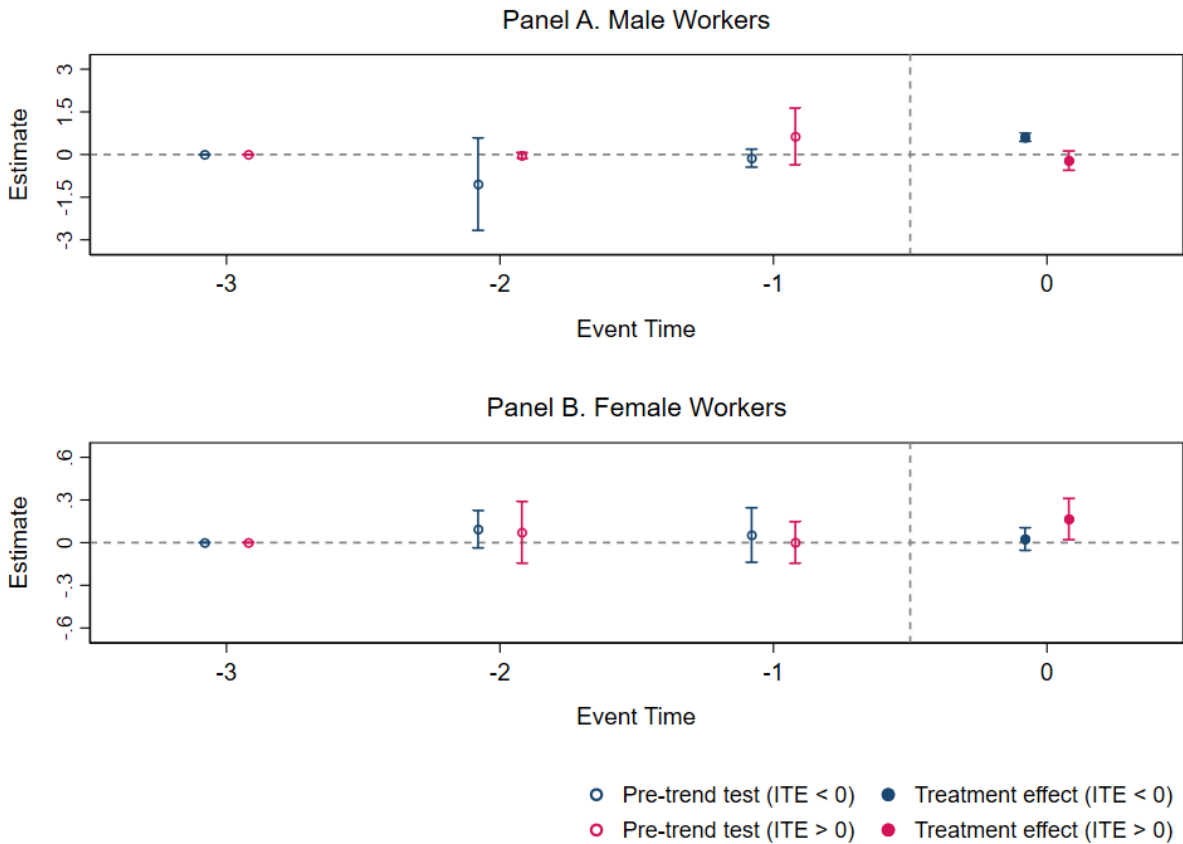
Appendix

Table A1. Heterogeneous Impact of Strikes on Mental Health
(Imputation Method)

	Male Workers		Female Workers	
	ITE < 0	ITE > 0	ITE < 0	ITE > 0
	(1)	(2)	(3)	(4)
Pre-Trend Test				
t = -2	-0.360	0.495	0.240	0.005
	(0.631)	(0.512)	(0.407)	(0.297)
t = -1	-0.218	0.936	0.620	-0.351
	(0.613)	(0.683)	(0.590)	(0.432)
Treatment Effect				
t = 0	-0.506***	0.403***	-0.319***	0.494***
	(0.055)	(0.067)	(0.055)	(0.081)
t = 1	-0.946***	-0.059	-0.410	1.149**
	(0.217)	(0.259)	(0.291)	(0.548)
Observations	9420	9440	6896	6936

Notes: This table presents the event study estimates of the mental health impact of strikes by individual treatment effect (ITE). Columns 1-2 show the results for male workers. Columns 3-4 show the results for female workers. A negative ITE indicates mental health improvement after strikes, while a positive ITE indicates deterioration. Standard errors (in parentheses) are clustered at the individual level. *, **, *** indicate significance levels at 0.1, 0.05, and 0.01, respectively. Source: PSID 2001-2021.

Figure A1. Event Study Estimates of the Impact of Strikes on Wage

(Imputation Method; 95% CIs)

Panel A. Male Workers

Panel B. Female Workers

○ Pre-trend test (ITE < 0) ● Treatment effect (ITE < 0)
○ Pre-trend test (ITE > 0) ● Treatment effect (ITE > 0)

Notes: This figure presents the event study estimates of the impact of strikes on (log) wage, using the imputation method proposed by Borusyak et al. (2024). Panels A and B show the results for male and female workers by mental health change (i.e., individual treatment effect, ITE), respectively. The blue color indicates workers who experience improved mental health after strikes (i.e., ITE < 0), while the red color indicates workers who experience deteriorated mental health (i.e., ITE > 0). The hollow markers represent pre-trend estimates, and the solid markers represent treatment effect estimates. The bars denote the 95% confidence intervals. Standard errors are clustered at the individual level. Source: PSID 2001-2021.