

## REVIEW

# Exploring the association of paid sick leave with healthcare utilization and health outcomes in the United States: a rapid evidence review


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## ABSTRACT

**Objective:** Paid sick leave (PSL) laws mandate employers give workers paid time off when they are sick or injured. This current study aims to examine whether access to PSL is associated with healthcare utilization and health outcomes and to summarize the types of utilization and outcomes which have been reported to be associated with PSL.

**Methods:** We conducted a rapid evidence review. Our search of seven databases, including Medline, Embase, PsycINFO, Cochrane Library, CINAHL, Scopus, and JSTOR, on September 21, 2020, identified 757 studies, 30 of which were retained.

**Results:** Previous evidence is mostly provided by cross-sectional studies with survey data. In this study, evidence suggests that PSL is significantly associated with some types of healthcare utilization and health outcomes. In terms of healthcare utilization, findings indicate PSL is associated with an increase in the use of some preventive services and a decrease in the use of emergency care; while findings are mixed regarding associations of PSL with health provider visits and the use of mammograms and pap smears. As for health outcomes, findings suggest PSL is associated with improved mental and self-rated health, decreased incidence of influenza-like illness, and lower occupational injuries and mortality rates.

**Conclusion:** PSL may be an effective tool in improving some healthcare utilization and health outcomes. Future research could help identify mechanisms through which PSL access works and identify what policy components lead to better outcomes.

## 1. Introduction

Paid sick leave (PSL) laws in the United States (US) mandate employers give workers paid time for use when they are sick or injured.<sup>1</sup> Sick workers can use PSL to visit a healthcare provider or to remain home until they feel well enough to work again, rather than working while sick to avoid lost wages.<sup>1</sup> Reporting to work sick may reduce productivity and can allow viruses to spread to coworkers.<sup>2–3</sup> Access to PSL in the United States is a continually shifting landscape. Since 2007, fourteen states and Washington, have enacted laws requiring PSL,<sup>4–5</sup> and North Carolina, Colorado, and New York City temporarily expanded access to PSL in 2020 in response to coronavirus disease 2019 (COVID-19).<sup>5</sup>

Estimates suggest that, in the past decade, about 56%–65% of working US adults had PSL benefits while more than one-third lacked PSL access.<sup>6–12</sup> Coverage estimates vary by demographic groups and industry. Those without PSL were more likely to be in a younger age, Hispanic, un-

married, a lower level of education, farm/labor workers or holding service occupations, part-time workers, earning lower income, uninsured, and report fair/poor health status or a limiting health condition.<sup>9,12–14</sup> The evidence of the association between gender and access to PSL has been inconsistent with some studies reporting decreased access among women workers compared with men and other studies reporting the opposite.<sup>9,12</sup> Specific studies have estimated PSL benefits were available to only 35% of male labor workers,<sup>15</sup> half (50%) of females with breast cancer,<sup>16</sup> less than 20% of employees with low hourly wages (i.e., < 10 USD), employees with a part-time job, and employees working in the hospitality and leisure industry.<sup>11</sup>

PSL may be associated with increased access to medical care, resulting in greater utilization of healthcare services and improved health status. Previous studies assessed the association between PSL and various healthcare utilization and health outcomes among US working adults; however, findings were inconsistent across various types of outcomes.

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**Table 1**  
Literature Search Strategy<sup>△</sup>.

Database	Strategy	Retrieved records (duplicates removed)
Medline (OVID) 1946–	(sick leave/ AND paid.ti.ab.) OR ((sick leave OR sick pay) ADJ5 (pay OR paid OR benefit*)) Limit 2010; English	345
Embase (OVID) 1988–	(sick leave/ AND paid.ti.ab.) OR ((sick leave OR sick pay) ADJ5 (pay OR paid OR benefit*)) NOT Pubmed/Medline Limit 2010; English	148 (145)
PsycINFO (OVID) 1806–	((sick leave OR sick pay) ADJ5 (pay OR paid OR benefit*)) Limit 2010; English	10 (41)
Cochrane Library	((“sick leave” OR “sick pay”) NEAR/5 (pay OR paid OR benefit*)):ti,ab Limit 2010; English	11 (33)
CINAHL (EbscoHost)	(TI (“sick leave” OR “sick pay”) N5 (pay OR paid OR benefit*)) OR (AB (“sick leave” OR “sick pay”) N5 (pay OR paid OR benefit*)) OR ((MJ “sick leave”) AND (pay OR paid OR benefit*)) Exclude Medline Records; Limit 2010; English	143 (84)
Scopus JSTOR	TITLE-ABS-KEY (“sick leave” OR “sick pay”) W/5 (pay OR paid OR benefit*) AND NOT INDEX (medline) (ti: (“sick pay”) OR ab: (“sick pay”)) AND la: (eng OR en) AND disc: (health-discipline OR healthsciences-discipline OR law-discipline OR publichealth-discipline) OR (ti:(“paid sick leave”) OR ab: (“paid sick leave”)) AND la: (eng OR en) AND disc: (health-discipline OR healthsciences-discipline OR law-discipline OR publichealth-discipline) OR (ti: (“paid sick days”) OR ab: (“paid sick days”)) AND la: (eng OR en) AND disc: (health-discipline OR healthsciences-discipline OR law-discipline OR publichealth-discipline) Limit 2010; English	100 (27) 0

<sup>△</sup> Search was conducted on September 21, 2020. Duplicates were identified using the Endnote automated “find duplicates” function with preference set to match on title, author and year, and removed from the Endnote library.

For example, Asfaw A et al. found a significant negative association between having parents with PSL and emergency room (ER) use among children, while Seixas BV et al. found this association was not statistically significant.<sup>17-18</sup> Most previous studies used cross-sectional designs, which can only speak to associations between PSL and outcomes, not to the effectiveness of PSL.<sup>19-20</sup> Further, several studies examined intermediary outcomes (e.g., awareness of PSL or attitude to PSL)<sup>21-24</sup> instead of direct healthcare utilization or health outcomes (e.g., preventive care use, influenza-like illness).<sup>25-26</sup>

Rapid reviews collect and synthesize evidence using methods similar to a systematic review, but they are conducted in a shorter amount of time.<sup>27</sup> This type of review can accelerate the review process by tightening search parameters, limiting review of the title/abstract or full text stages, restricting the amount of data extracted, or loosening standards for data quality.<sup>27</sup> Studies examining PSL interventions are evolving quickly, especially during the COVID-19 pandemic, and timely assessment of such interventions is crucial to inform current policy and research.

Thus, we conducted a rapid evidence review of PSL in the United States to examine whether access to PSL is associated with healthcare utilization and health outcomes, and to summarize the types of utilization and outcomes which have been reported to be associated with PSL.

## 2. Methods

This current review was conducted based on the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P).<sup>28</sup>

### 2.1. Eligibility criteria

Eligible studies were primary, empirical, US-based research studies published between January 1, 2010 and September 21, 2020 that were written in English and provided evidence relevant to the associations between PSL and two main outcomes: healthcare utilization and health outcomes.

### 2.2. Search strategy

The search identified primary studies in Medline, Embase, PsycINFO, Cochrane Library, CINAHL, Scopus, and JSTOR databases during the

study period. Citations were restricted to English studies published since 2010 to ensure the review was sufficiently rapid and relevant to contemporary circumstances. The search strategy was devised by an information specialist and is shown in Table 1.

### 2.3. Review process

Duplicate citations were removed prior to screening. Two coders (Suhang Song or Brian H. Calhoun) reviewed titles and abstracts of all retrieved citations. The first coder reviewed the titles and abstracts and assessed studies for inclusion. This was facilitated by rating each study as either eligible, not eligible, or might be eligible. The second coder assessed “not eligible” or “might be eligible” studies for further inclusion in the review.

All citations that were not excluded at the title and abstract stage were pulled for full-text review. The first coder reviewed all citations at this stage; the second coder only reviewed the citations excluded by the first coder. Where consensus was not achieved, articles were discussed as a team (with James E. Kucik and Kristin J. Konnyu) until consensus was reached.

### 2.4. Data extraction and synthesis

A standardized data extraction form was created and included key data elements to be abstracted. One coder extracted the data independently and a second coder checked the data for consistency, clarity, and accuracy. Data extracted included the following elements: first author, year published, title, abstract, objective, state, population, sample size, data source, statistical methods, outcome variables, outcomes/conclusions, timing, study design, future directions, journal, and affiliation.<sup>29</sup> Records were managed through Endnote, and data were extracted into Microsoft Excel. The objective was categorized into two groups based on our two key questions: associations between PSL and healthcare utilization, or associations between PSL and health outcomes.

### 2.5. Bias and quality in individual studies

The risk of bias and study quality included assessment of sample selection, study design, study period, and analysis methodologies.<sup>30</sup>

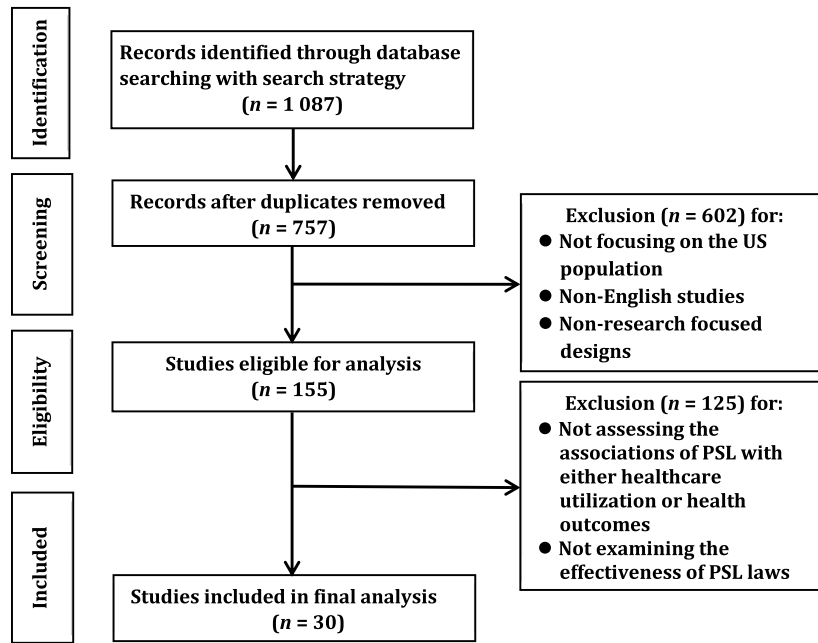


Fig. 1. PRISMA diagram of the study selection.

PSL: Paid sick leave.

**Table 2**  
Summary of study design by data source and study objective [n (%)].

Study design	Overall <sup>†</sup>	Objective <sup>†</sup>		Data source <sup>†</sup>	
		Association with healthcare utilization	Association with health outcomes	Survey	Other
Cross-sectional	27 (90.0)	16 (94.1)	11 (84.6)	27 (96.4)	0 (0.0)
Independent cross-sectional	17 (56.7)	10 (58.8)	7 (53.8)	17 (60.7)	0 (0.0)
Pooled cross-sectional	10 (33.3)	6 (35.3)	4 (30.8)	10 (35.7)	0 (0.0)
Panel	3 (10.0)	1 (5.9)	2 (15.4)	1 (3.6)	2 (100.0)
Total*	30 (100.0)	17 (56.7)	13 (43.3)	28 (93.3)	2 (6.7)

<sup>†</sup>The percentages presented were column percentages within the category. \*The percentages presented were row percentages within total studies.

### 3. Results

#### 3.1. Study screening

The literature search yielded 757 unique citations. Of those, 602 studies were excluded during the first round of screening for title and abstract, because they were written in a non-English language, focused on non-US populations, or were not primary research articles (e.g., editorials, commentaries, opinions, conference abstracts, etc.). Of the remaining 155 studies screened at full-text review, 125 studies were not relevant to the study topic and were excluded, and 30 studies were ultimately included in the review. The PRISMA diagram of the study selection process is shown in Fig. 1.

#### 3.2. Overview of study designs and data sources

Table 2 shows the study design by data source and study objective. The 30 included studies focused on two study objectives: 17 of them examined the associations between PSL and healthcare utilization, and 13 studies investigated the associations between PSL and health outcomes. As for the study designs, cross-sectional studies were most common overall (90.0%, 27/30) and within each study objective. The majority (94.1%, 16/17) of healthcare utilization studies and 84.6%

(11/13) of health outcomes studies were cross-sectional. One-third of the studies (33.3%, 10/30) were conducted with pooled-cross-sectional designs (i.e., pooled data of random individuals across multiple independent cross-sectional surveys). These 27 cross-sectional studies described the coverage of PSL and explored the association between PSL and healthcare utilization or health outcomes, controlling for the characteristics of PSL beneficiaries, such as demographics and socioeconomic status. Three out of 30 studies (10.0%) used panel datasets to conduct a quasi-experimental study with difference-in-differences (DID) analysis. These studies leveraged states' implementation of PSL laws to evaluate the effectiveness of these laws by measuring changes in healthcare utilization or health outcome trends before and after the implementation. In terms of the data source, the majority of studies (93.3%, 28/30) analyzed survey datasets, like the National Health Interview Survey (NHIS) and Medical Expenditure Panel Survey (MEPS). The other two studies used administrative data and Google Flu trends data.

#### 3.3. Bias and quality of studies

Among most studies examined, common limitations included recall and response bias, selection bias, cross-sectional studies, short study period, and a lack of confounders/stratifiers and disparity analysis.<sup>29-30</sup>

**Table 3**  
Findings on the effect of paid sick leave (PSL) interventions on healthcare utilization.

First author and publish years	Study population and sample size	Study time, study design, data source and statistical methods	Main findings and conclusions
Cook WK, 2011 <sup>6</sup>	US working adults aged 18 or older who were employed for pay at a job or business, 14 302	2007, cross-sectional, NHIS, logistic regression	(1) Access to PSL was significantly associated with outpatient care use (OR 1.164, 95% CI: 1.027 to 1.318, $P < 0.05$ ) but not with ER use (OR 0.810, 95% CI: 0.801 to 1.034, $P > 0.05$ ). (2) Among working adults with health insurance coverage, those with access to PSL were more likely to use outpatient care (OR 1.148, 95% CI: 1.001 to 1.317, $P < 0.05$ ) and less likely to use ERs (OR 0.837, 95% CI: 0.732 to 0.956, $P < 0.05$ ).
DeRigne L, 2020 <sup>7</sup>	US workers aged 18–64 years who have diagnosed asthma, 1 676	2018, cross-sectional, NHIS, <i>t</i> -tests & Chi-square tests	There was no relationship between having PSL and the receipt of preventive asthma care, measures of asthma control, receipt of patient education, and asthma medication use.
DeRigne L, 2017 <sup>8</sup>	Working US adults, 13 545	2015, cross-sectional, NHIS, logistic regression	(1) Workers without PSL were significantly less likely than workers with PSL to report having used 6 of 8 preventive health services in the last 12 months (all $P < 0.001$ ). (2) Not having PSL increased by 30% the odds that workers did not have a blood pressure check in the last 12 months, a 40% increase in the odds of not having had a cholesterol check, 24% of not having a fasting blood sugar check, 61% of not having received a flu vaccine, 19% of not having seen or talked to a doctor, and 23% of not having had a pap smear (all $P < 0.001$ ). (3) PSL was not a significant factor in having undergone two cancer-related screenings: colon cancer testing and mammogram. (4) Adults without PSL have at least a 3.8% to as much as 9.7% higher risk of not obtaining preventive health services than adults with PSL.
DeRigne L, 2016 <sup>9</sup>	Civilian noninstitutionalized US population, 18 655	2013, cross-sectional, NHIS, logistic and linear regression	(1) Nearly 65% of families with incomes below USD 35 000 had no PSL, compared to 25% of families who earned more than \$100 000 per year. (2) Workers without a PSL benefit had a significant ( $P < 0.05$ ) increase in predicted risk of delaying medical care (0.3 percent versus 0.9 percent) for themselves and a family member (0.8 percent versus 1.6 percent) compared to those with PSL benefits. Moreover, the lowest-income group of workers without PSL was at the highest risk of delaying and forgoing medical care for themselves and their family members.
Peipins LA, 2012 <sup>10</sup>	Working US adults, 74 236	2008, cross-sectional, NHIS, Chi-square test & logistic regression	(1) The proportion of workers undergoing mammography, pap test, endoscopy and medical care-seeking was significantly higher for those with PSL as compared to those without PSL. (2) The proportion of workers receiving a home fecal occult blood test was not associated with having PSL. (3) Among working adults, lack of PSL maybe a greater barrier to cancer testing and medical care-seeking than lack of insurance or poverty.
Zhai Y, 2018 <sup>12</sup>	US workers aged 18 years and older, 15 933	2009, cross-sectional, NHFS, <i>t</i> -tests & Chi-square tests & logistic regression	Not having PSL benefits was associated with a lower likelihood of receiving an influenza vaccination and visiting a health professional when sick with influenza-like illness.
Hammig B, 2019 <sup>15</sup>	Working US males, 8 553	2013–2016, pooled cross-sectional, NHIS, logistic regression	(1) PSL was significantly associated with utilization of preventive screening services and utilization of healthcare services. (2) With regard to screening behaviors, those who reported receiving a blood pressure screening (adjusted OR 2.2, 95% CI: 1.9 to 2.6), cholesterol screening (adjusted OR 2.3, 95% CI: 1.9 to 2.8), and/or blood glucose screening (adjusted OR 1.7, 95% CI: 1.3 to 2.2) within the past 12 months had a significantly higher odds of having PSL at their place of employment. (3) Workers who visited a health care provider (adjusted OR 1.8, 95% CI: 1.5 to 2.0) or a dentist (adjusted OR 2.1, 95% CI: 1.8 to 2.5) during the past 12 months also had a higher odds ratio of receiving PSL benefits.
Seixas BV, 2020 <sup>17</sup>	Working US adults, 21 235	2013–2017, pooled cross-sectional, NHIS, <i>t</i> -test & Chi-square statistic & logistic regressions & negative binomial regression & zero-inflated model	(1) Children with at least one parent with access to PSL had 27% greater odds of having any visit to a medical office in the past 12 months, 18% greater odds of having a general doctor visit, 19% greater odds of having a mental health professional visit, and 21% greater odds of getting a flu vaccination than children whose parents did not have this benefit. (2) There was no statistically significant association between having a parent with PSL access and child ER use.
Asfaw A, 2017 <sup>18</sup>	Civilian noninstitutionalized US population, 40 289	2011–2015, pooled cross-sectional, NHIS, regression	(1) The odds of children whose parents have access to PSL receiving annual flu vaccinations and well-child checkups were 12.5% and 13.2% higher than children whose parents did not have access to PSL, respectively. (2) With parental access to PSL, the odds of children receiving delayed medical care because of time mismatch were 13.3% lower than those of children without parental access to PSL. (3) The odds of children with parents having access to PSL to be taken to the ER for either treatment or medical advice were 53.6% lower than those of children whose parents lacked access to PSL. (4) The number of ER visits for children whose parents had access to PSL was 11% lower than the number of ER visits for children whose parents lacked access to PSL.
Chen W, 2017 <sup>19</sup>	Households with children aged 19 to 35 months, 4 160	2008, cross-sectional, National Immunization Survey, logistic regression	(1) 67.7% (weighted 95% CI: 64.8 to 70.5) of parents of up-to-date (UTD) children had PSL, and 61.7% (weighted 95% CI: 56.7 to 66.5) of parents of not UTD children had PSL. (2) Among parents of the children UTD on the vaccine series, a higher percentage, relative to those of the not UTD children, had access to PSL ( $P = 0.04$ ). (3) Lack of PSL was significantly negatively associated with UTD status (PR 0.9, 95% CI: 0.9 to 1.0, $P = 0.03$ ) in the bivariable analysis but not in the multivariable analysis (PR 1.0, 95% CI: 0.9 to 1.0, $P = 0.26$ ).
DeRigne L, 2018 <sup>25</sup>	US workers aged 49–57 years, 3 235	2014, cross-sectional, National Longitudinal Survey of Youth, generalized estimating equations	(1) The median number of paid sick days was 7 days. Nearly 27% of the sample reported having no paid sick days. 10% of the sample had more than 20 paid sick days. (2) Workers with 10+ paid sick days had increased odds of reporting five different preventive health care services, including flu shot, cholesterol screening, blood sugar screening, blood pressure check and mammogram, compared with those with 0 to 2 paid sick days. Overall, we observed a 26% to 85% increased odds in preventive care use among those with at least 10 or more paid sick days compared with those with 0 to 2 paid sick days. (3) The pap smear model was not statistically significant with regards to paid sick days.

(continued on next page)

Table 3 (continued)

First author and publish years	Study population and sample size	Study time, study design, data source and statistical methods	Main findings and conclusions
Chen J, 2020 <sup>38</sup>	US workers aged 18–64 years who experienced a job change and change in access to PSL, 4 236	2000–2013, panel, MEPS, difference-in-differences	Most estimates of the effect of PSL on office-based visits are statistically insignificant, and we cannot rule out the presence of preexisting differential trends in these models.
Bhuyan SS, 2016 <sup>40</sup>	Civilian noninstitutionalized US population, 42 460	2012–2014, pooled cross-sectional, NHIS, logistic regression	(1) Respondents with PSL were 14% less likely to be moderate Emergency Department (ED) service users than those without PSL. (2) The effect of PSL was even stronger for repeated ED users. (3) Respondents with PSL were 32% less likely to be repeated ED users.
Bleser WK, 2019 <sup>41</sup>	Working US adults with household children, 23 014	2013–2015, pooled cross-sectional, NHIS, zero-inflated negative binomial regression	Child influenza vaccination was associated with significantly lower sick day usage, but only among adults with PSL (PR 0.79, 95% CI: 0.67 to 0.93), equating to average annual sick days of 4.07 versus 3.29 in adults with unvaccinated versus vaccinated household children (difference = 0.78 fewer days annually).
Kim N, 2018 <sup>24</sup>	Working US adults, 11 702	2010, cross-sectional, NHFS, Bayesian endogenous covariates regression model	(1) PSL for workers increased the probability of vaccination. (2) Low-income workers were willing to be vaccinated because their expected loss of using PSL was significantly high. (3) High-income workers considered the current cost of vaccination, but not the expected loss of using PSL when they were sick.
Shepherd-Banigan M, 2017 <sup>34</sup>	US children aged 0 to 17 years whose mothers were employed, 3 755	2008–2010, cross-sectional, NHIS & MEPS, logistic regression	PSL was associated with increased adherence to recommended well-child visits (marginal $P = 0.12$ , 95% CI: 0.23 to 0.01), preventive dental care (marginal $P = 0.28$ , 95% CI: 0.34 to 0.33), and receipt of the influenza vaccine (marginal $P = 0.09$ , 95% CI: 0.13 to 0.05).
Wilson FA, 2014 <sup>44</sup>	US workers aged 18 years and older, 51 471	2006–2010, pooled cross-sectional, MEPS, Chi-square test & logistic regression & negative binomial regression	(1) The odds of receiving a vaccination were 42% greater among those with PSL versus those without it. (2) Universal PSL is predicted to increase vaccinations by 1.6 million, resulting in 63.8 thousand fewer absences from work and 18.2 thousand fewer healthcare visits for the flu annually.

NHIS: National Health Interview Survey; OR: Odds ratio; CI: Confidence interval; ER: Emergency room; NHFS: National H1N1 Flu Survey; MEPS: Medical Expenditure Panel Survey; PR: Prevalence ratio.

The majority (93.3%, 28/30) of the studies used self-reported survey data, which could result in recall and response bias, especially for some information requested at a younger age and stigmatized health conditions.<sup>31–36</sup> Some studies collected survey data using small sample sizes.<sup>14,37</sup> Selection bias might be observed if participants were not randomly selected. Even though most of the studies with survey data used nationally representative surveys, such as NHIS and MEPS, there may also be selection bias if appropriate weighting did not occur. As most of the studies were cross-sectional, it may not be possible to identify a causal association between PSL and healthcare utilization or outcomes; however, these studies help understand potential associations which may be explored in further comparative longitudinal designs.<sup>17</sup> There were only three studies that used DID analysis in a quasi-experimental study design; the authors reported some limitations of the policy evaluation, including small sample size, imperfect pair-matching, and that the datasets used can only support an inconclusive association.<sup>26,38–39</sup> Except for the three panel studies, all the other 27 studies included less than 4 years of data. The short timeframe limits the ability to describe utilization trends or incidence and to compare the outcomes before and after PSL became accessible, therefore, these studies may not provide strong quality evidence to assess the effectiveness of PSL. Moreover, some studies reported that they did not examine the associations by socioeconomic status, occupation, type of healthcare utilization and health outcomes, insurance status, and social determinants, even though several previous studies have examined the associations with some basic demographic variables, like age, gender, and race.<sup>9,14,18</sup> Although biases and poor quality of study designs are discussed in the limitation section of previous studies, the summary of their main findings is broadly applicable to conclude the effectiveness of PSL intervention.

### 3.4. Association of PSL with healthcare utilization and health outcomes

Key findings from each study are reported in Table 3 and Table 4. For each study, we report the first author, year of publication, study population and sample size, study time, study design, data source, statistical methods, main findings, and conclusions.

#### 3.4.1. Healthcare utilization

Seventeen studies reported several significant associations between access to PSL and healthcare utilization; some studies reported consistent associations, whereas others reported inconsistent associations (Table 3).

Among US working adults, access to PSL was significantly associated with an increase in the use of preventive services, such as influenza and other vaccinations,<sup>8,12,25,42,44</sup> cholesterol screening,<sup>8,15,25</sup> blood sugar screening,<sup>8,15,25</sup> blood pressure check,<sup>8,15,25</sup> and endoscopy.<sup>10</sup> While access to PSL was significantly associated with a decrease in delaying medical care<sup>9</sup> and ER visits.<sup>6,40</sup> However, the association between access to PSL and colon cancer screening didn't reach significance.<sup>8,10</sup> Among workers aged 18–64 years diagnosed with asthma, PSL was not associated with the use of preventive asthma care, measures of asthma control, patient education level, and asthma medication use.<sup>5</sup>

Among beneficiaries with children, access to PSL was significantly associated with children having up-to-date vaccinations (including influenza vaccination),<sup>17–19,41,43</sup> use of checkup visits,<sup>17–18,43</sup> visits to a medical office,<sup>17</sup> and visiting a general/mental health doctor or a dentist.<sup>18,32</sup> Among children whose parents had access to PSL, PSL was significantly associated with a decrease in delaying medical care compared to children whose parents lacked access to PSL.<sup>18</sup>

It is worth noting that current evidence showed inconsistent findings. Six studies reported that PSL was associated with an increase in mammogram<sup>10,25</sup> and pap smear<sup>8,10</sup> screening tests, and visiting a health provider or a dentist<sup>6,8,10,12,15</sup> with significance. However, evidence from three studies indicated that PSL was not associated with these outcomes (i.e., mammogram,<sup>8</sup> pap smear<sup>25</sup> and office-based visits<sup>38</sup>). Among those with children, two studies reported a non-significant<sup>17</sup> and a negative<sup>18</sup> association between PSL and ER visits, respectively.

#### 3.4.2. Health outcomes

The associations between PSL and health outcomes varied (Table 4). PSL was positively associated with improved mental health and self-rated health scores,<sup>45</sup> caring for a family member<sup>45</sup> and having no trouble staying asleep.<sup>20</sup> PSL was negatively associated with the incidence of influenza-like illness and occupational injuries and illnesses,<sup>14,26,46–47</sup>



**Table 4**  
Findings on the effect of paid sick leave (PSL) interventions on health outcomes.

First author and publish years	Study population and sample size	Study time, study design, data source and statistical methods	Main findings and conclusions
Kim D, 2017 <sup>13</sup>	US workers aged 18–85 years, 57 323	2000–2002, pooled cross-sectional, NHIS, Cox proportional hazards models	(1) Having PSL was associated with 10%, 14%, and 22% significantly lower risk of all-cause mortality after average follow-up times of 11.1, 6.5, and 4.5 years, respectively. (2) PSL was associated with 24% and 35% lower risks of dying from heart diseases and unintentional injuries, respectively.
Kumar S, 2012 <sup>14</sup>	Civilian noninstitutionalized US population, 2 042	2009–2010, cross-sectional, first-handed survey, path analysis	Work-related inability engaged in social distancing, as indicated by lack of PSL, was related to a higher self-reported influenza-like illness incidence in the 2009 H1N1 pandemic.
Collins C, 2020 <sup>20</sup>	US workers aged 18–64 years, 12 780	2018, cross-sectional, NHIS, logistic regression	(1) There was no statistically significant difference between respondents with and without PSL benefits in terms of the number of hours they reported sleeping on average each night. (2) There was no statistically significant difference between respondents with and without PSL benefits in terms of reporting trouble falling asleep. (3) The odds of respondents with PSL benefits reporting having little to no trouble staying asleep was 1.12 times higher than for respondents without PSL ( $P = 0.03$ ). (4) There were no statistically significant differences between respondents who did and did not have PSL benefits in terms of their use of medication to help them fall or stay asleep. (5) Contrary to the hypothesis, the odds of respondents who had PSL benefits reporting feeling rested was significantly lower than for respondents without PSL ( $P < 0.01$ ).
Pichler S, 2019 <sup>26</sup>	Cities that implemented sick pay mandates between 2006 and 2015 and that didn't implement sick pay mandates, 81	2003–2015, Panel, Google Flu Trends data, DID	(1) Reductions in population-level influenza-like illness rates by 6%–7% after PSL mandates were implemented at the city level. (2) Implementing a PSL mandate in a metropolitan area with 1 million inhabitants is estimated to provide sick leave coverage for 200 000 employees and prevent the transmission of around 3 000 influenza-like illness cases per year.
Albelda R, 2019 <sup>37</sup>	Employed patients who underwent bone marrow transplantation, 377	2014–2015, cross-sectional, first-handed survey, OLS regression & ordered logit regression	(1) Access to PSL was associated with greater quality of life. (2) For the self-reported overall health and perceived stress outcomes, all of the effects of PSL operated indirectly through reductions in financial burden. For quality of life outcomes, there appears to be both a direct and indirect effect of PSL on patient-reported health. Over 80% of the effect of PSL on improvements in quality of life are direct while the remaining effect operates indirectly through reductions in financial burden.
Hsuan C, 2017 <sup>39</sup>	US, 1 440	2000–2014, panel, administrative data, DID	Foodborne illness rates declined after implementation of the PSL law in jurisdictions with laws more supportive of employees taking leave, but increased in jurisdictions with laws that are less supportive. In adjusted analyses, PSL laws that were more supportive of employees taking sick leave were associated with an adjusted 22% decrease in foodborne illness rates ( $P < 0.005$ ). These results are driven by campylobacteriosis.
Earle A, 2011 <sup>45</sup>	Working US adults, 2 455	2006, cross-sectional, Work, Family, Community Nexus Survey, OLS regression	(1) Access to PSL was associated with a 2.0-point increase in mental health score ( $P = 0.039$ ). (2) Having access to PSL is associated with a 2.9-point higher self-rated health score ( $P = 0.009$ ). (3) In the case of self-rated health, having access to PSL remained a significant workplace policy and substantially offset the reductions in health status associated with caring for a family member with significant health issues ( $P < 0.01$ ).
Asfaw A, 2012 <sup>46</sup>	Civilian noninstitutionalized US population, 38 139	2005–2008, pooled cross-sectional, NHIS, logistic regression	(1) Workers with access to PSL were 28% less likely than workers without access to PSL to be injured. (2) The availability of PSL and the incidence of occupational injuries varied across sectors and occupations, with the greatest differences occurring in high-risk sectors and occupations. (3) Findings suggest that introducing or expanding PSL programs might help businesses reduce the incidence of nonfatal occupational injuries, particularly in high-risk sectors and occupations.
Hawkins D, 2019 <sup>47</sup>	Workers in Connecticut, New York and the entire US. Connecticut: 748 090 pre-law and 766 470 post-law; New York: 4 328 190 pre-law and 4 636 270 post-law; US: 61 016 200 pre-law and 64 218 420 post-law	2009–2014, pooled cross-sectional, Bureau of Labor Statistics Survey, Poisson regression	(1) The rate of occupational injuries and illnesses involving at least one lost workday showed a greater decline in Connecticut following the introduction of a PSL law compared with rates in New York and the United States during the same period. (2) This decline was greater among service occupations that were addressed by the law, with rates in these occupations declining significantly more compared with both other occupations within Connecticut and to the same service occupations in New York and the United States. (3) Within Connecticut, injury and illness rates showed a greater decline in occupations specified by the law ( $-17.8\%$ , 95% $CI$ : $-15.6$ to $-19.9$ ) compared with other occupations ( $-6.8\%$ , 95% $CI$ : $-6.6\%$ to $-7.0\%$ ) between the two periods. (4) The rate ratios for the change in rates of occupational injuries and illnesses varied greatly among the detailed service occupations affected by the law, which may suggest that the impact of PSL on occupational injuries and illnesses is differential with respect to the occupation.
Hawkins D, 2019 <sup>48</sup>	Workers in Massachusetts who died of opioid-related overdoses, 1 155	2011–2015, pooled cross-sectional, Bureau of Labor Statistics Survey, Poisson regression	The opioid-related overdose death rate was higher in occupations where a lower percentage of workers had access to PSL, compared with occupations where a higher percentage of workers had access to PSL ( $RR = 4.01$ , 95% $CI$ : $3.75$ to $4.29$ , $P < 0.05$ ).
Luckhaupt SE, 2017 <sup>49</sup>	Working US adults, 27 157	2010, cross-sectional, NHIS, Chi-square tests	Workers were more likely to have fair/poor health if they had no PSL (adjusted $PR = 1.35$ , 95% $CI$ : $1.11$ to $1.63$ ).
Stoddard-Dare P, 2018 <sup>50</sup>	US workers aged 18–64 years, 17 897	2015, cross-sectional, NHIS, OLS regression	Workers without PSL benefits reported significantly higher levels of psychological distress and were 1.45 times more likely to indicate that their distress symptoms interfere a lot with their life or activities compared with workers with PSL.
Park S, 2014 <sup>51</sup>	Working US adults, 15 121	2010, cross-sectional, NHIS, logistic regression	No significant association between having PSL and obesity.

NHIS: National Health Interview Survey; DID: Difference-in-differences; OLS: Ordinary least square;  $CI$ : Confidence interval;  $RR$ : Risk ratio;  $PR$ : Prevalence ratio.

foodborne illness rates,<sup>39</sup> all-cause mortality,<sup>13</sup> mortalities due to heart disease and opioid-related overdose and unintentional injuries,<sup>13,48</sup> self-reported fair/poor health,<sup>49</sup> psychological distress<sup>50</sup> and feeling rested.<sup>20</sup> PSL was not associated with obesity<sup>51</sup> and other sleep-related issues,<sup>20</sup> including the number of sleeping hours each night, trouble falling asleep, use of medication to help fall or stay asleep. Among employees who underwent bone marrow transplantation, PSL was directly associated with improved quality of life.<sup>37</sup>

#### 4. Discussion

To the best of our knowledge, this is the first rapid review of evidence on the association of access to PSL with healthcare utilization and health outcomes. Previous evidence is mostly provided by cross-sectional studies with survey data. In the current study, evidence suggests that PSL is associated with some, but not all, types of healthcare utilization (i.e., preventive services and emergency care) and health outcomes (i.e., self-rated health, mortality, mental health, influenza-like illness, and occupational injuries) with statistical significance.

For healthcare utilization, based on studies identified in our review, some evidence to suggest that PSL may be associated with an increase in the use of some preventive services, and a decrease in the use of emergency care. Evidence was limited on the associations between PSL and use of health provider visits or certain preventive cancer screenings, like mammograms and pap smears. Further research in this area may provide more evidence for decision makers to understand PSL's effectiveness in increasing the use of breast and cervical cancer screenings and other outpatient visits.

Current evidence indicates that access to PSL may be associated with positive outcomes such as improved mental and self-rated health, and a decrease in the incidence of influenza-like illness, occupational injuries, and mortality rates. However, PSL may be not associated with obesity and sleep issues.

There are numerous challenges in evaluating the effects of PSL on healthcare utilization and health outcomes, which may partly explain the dissensus in the findings. First, the benefits of PSL policies vary across states, localities, and employers. DeRigne L et al. reported a 26% to 85% greater use of preventive services among those with  $\geq 10$  paid sick days compared with those with 0 to 2 days, indicating that heterogeneity in implementation may be related to the effectiveness of PSL.<sup>25</sup> However, studies focusing on the detailed benefits of the policy were scarce, and only 5 out of 30 studies assessed the effectiveness at a state level. Thus, the policies with different benefits or coverage across states may have different or even conflicting impacts among different populations included in individual studies. Additionally, there are policies similar to PSL, such as paid family leave and paid maternal leave, which, to some extent, provide similar benefits and leave opportunities.<sup>52-61</sup> For instance, it is possible for employees to use paid family leave when their PSL has been exhausted and vice-versa. The concurrent implementation of multiple interventions may affect the extent to which we can evaluate PSL's effectiveness since the effectiveness of other paid leave policies cannot be isolated. Moreover, other factors may also influence the results, such as data source, study period, target population, statistical methodology, study design, etc.

Based on the evidence reviewed in this study, we have identified five gaps or opportunities for further research on this topic. First, the exploration of additional correlates of PSL, such as social determinants and health outcomes, would help decision makers better understand the magnitude of associations across groups.<sup>34-36</sup> This may help identify the specific population groups with the most needs or influencing factors when designing and implementing targeted or tailored policies.<sup>9,14,18,62-63</sup> A second opportunity for further research is examining potential mechanisms for the associations of PSL with healthcare utilization and health outcomes to shed light on significant or insignificant associations.<sup>47</sup> Third, since workers with access to PSL may vary in the extent to which they use these benefits, it is of great importance to ex-

amine which personal and workplace factors (e.g. workers' ability or willingness) are linked with PSL use.<sup>6,64-65</sup> Fourth, in order to tailor a more cost-effective range of paid sick days, it would be helpful to compare and understand specific elements of PSL benefits and to assess the effectiveness of PSL by the number of paid sick days.<sup>8-9,25,46-47,63</sup> The cost-effectiveness analysis regarding the greater use of preventive services versus the lesser use of emergency care is warranted in future research. Finally, a key opportunity for future research is to capitalize on high-quality research designs to better understand and assess changes in healthcare utilization and health outcomes before and after PSL policy implementation. Longitudinal designs that allow for long-term impacts to be assessed, and studies that replicate findings using a larger sample size would make an impactful contribution to this area of research.<sup>7-8,16-17,20,41,43,45,47,49</sup>

#### 5. Limitations

This review has two limitations. First, any rapid evidence review completed in a short time is susceptible to missing some relevant studies. Considering the tradeoffs taken to speed up the process, some of the rigors of a full systematic review were relaxed to maximize the speed with which we could summarize the evidence. However, rapid review methods are very close to those of a systematic review, including the development of a study protocol and two independent reviewers for both rounds of reviews. The second limitation is that this review did not capture the complexity of the relationship of PSL with healthcare utilization and health outcomes. We did not include similar paid leave policies and many of the studies reviewed did not control for other similar policies. Also, many potential confounders related to PSL and healthcare utilization and health outcomes were not included. However, this review is a first step to informing decision makers' thinking on this complex topic and is an opportunity to extend this inquiry for further research and a way to conceptualize and improve how we understand the effectiveness of PSL policies.

#### 6. Public health implication

PSL has been receiving increased interest in the United States as a public health tool for disease prevention and health promotion, and a growing body of evidence indicates that PSL may be associated with the use of some, but not all, preventive services and multiple health outcomes. Although limited studies have evaluated the effects of the growing number of PSL laws on healthcare utilization and health outcomes, emerging evidence suggests that state and local PSL laws could be promising legal interventions that improve the health of the public. Additional research could help inform our understanding of the mechanisms through which paid leave interventions work to improve public health, and could help elucidate the specific policy components associated with higher effectiveness.

#### Availability of data and materials

The data and materials are available from corresponding author on a reasonable request.

#### Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

#### Consent for publication

This study doesn't contain any individual data.

## CRediT authorship contribution statement

**Suhang Song:** Conceptualization, Methodology, Formal analysis, Data curation, Writing – original draft, Writing – review & editing, Visualization, Supervision, Project administration. **Brian H. Calhoun:** Methodology, Formal analysis, Data curation, Writing – review & editing. **James E. Kucik:** Conceptualization, Writing – review & editing, Supervision, Project administration. **Kristin J. Konnyu:** Conceptualization, Writing – review & editing. **Renata Hilson:** Writing – review & editing, Project administration.

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