


State-level anti-transgender laws increase past-year suicide attempts among transgender and non-binary young people in the USA

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From 2018 to 2022, 48 anti-transgender laws (that is, laws that restrict the rights of transgender and non-binary people) were enacted in the USA across 19 different state governments. In this study, we estimated the causal impact of state-level anti-transgender laws on suicide risk among transgender and non-binary (TGNB) young people aged 13–17 ($n = 35,196$) and aged 13–24 ($n = 61,240$) using a difference-in-differences research design. We found minimal evidence of an anticipatory effect in the time periods leading up to the enactment of the laws. However, starting in the first year after anti-transgender laws were enacted, there were statistically significant increases in rates of past-year suicide attempts among TGNB young people ages 13–17 in states that enacted anti-transgender laws, relative to states that did not, and for all TGNB young people beginning in the second year. Enacting state-level anti-transgender laws increased incidents of past-year suicide attempts among TGNB young people by 7–72%. Our findings highlight the need to consider the mental health impact of recent anti-transgender laws and to advance protective policies.

In the past decade in the USA, there has been important progress in regard to the rights of transgender and non-binary (TGNB) individuals¹, a community consisting of people who identify with a gender identity that is different from societal expectations surrounding their sex assigned at birth. In response to this progress, there has also been a sharp increase in anti-TGNB laws^{2–4}, which are a collection of legislative actions that restrict the rights and opportunities of TGNB individuals⁵. These laws encompass a range of issues, from limiting access to gender-affirming healthcare (for example, puberty blockers, hormone therapy and gender-affirming surgeries)² or bathrooms to prohibiting TGNB young people from participating in sports or school activities that align with their gender identity. Such legislation may not only exacerbate the challenges already faced by TGNB individuals but also create new and uniquely damaging stressors that could have negative consequences on their mental health.

Recent research has found associations between state-level transgender policies and the mental health of TGNB people^{4,6–10}. Other recent work uses quasi-natural experiments to investigate the relationship between policies related to same-sex couples and the mental health of lesbian, gay, bisexual and other sexually diverse young people^{11,12}. So far, no work has been able to identify causal mechanisms between state-level anti-transgender laws and the mental health concerns of the TGNB community, largely due to the complexities in sampling and research methodologies needed to complete such a study. This study builds on the existing literature by investigating the causal effects of state-level anti-transgender laws on the mental health of TGNB young people through quasi-natural experiments.

By the end of December 2023, 84 state-level anti-transgender laws had been enacted of the 589 proposed laws across the USA in 2023, which is over 300% more than the 26 laws enacted of the

174 proposed in 2022¹³. For TGNB young people, anti-transgender laws may signal a broader societal rejection of their identities, communicating that their identities and bodies are neither valid nor worthy of protection. Drawing from conceptual work, it has been argued⁴ that recent anti-transgender laws in the USA may be a ‘mega-threat’ to TGNB individuals and their health, which is defined by ref. 14 as a widely publicized negative event surrounding identity or diversity that can have a negative impact on a community. Furthermore, there is empirical evidence that proposed anti-transgender laws may cause indirect harm to TGNB young people, such that perceived support for the legislation among people in their social network was associated with greater rumination, depressive symptoms, physical health symptoms and fear of disclosing one’s identity to others⁴.

One of the most contentious areas of this legislative push involves access to gender-affirming healthcare. Advocates of these anti-transgender laws often cite concerns about the potential negative health effects of gender-affirming healthcare on TGNB young people¹⁵. However, gender-affirming healthcare has well-established benefits (for example, improved mental health and well-being^{16–19}), and restricting access to such care disregards the autonomy of TGNB young people, and frequently their caregivers, in making informed decisions about their health^{20,21}. Another major focus in anti-transgender laws includes prohibiting TGNB young people from participating in school sports and activities or using a bathroom that best matches their gender identity². Restricting access to sports, school activities and public facilities (for example, bathrooms and locker rooms) threatens the health and well-being of TGNB young people, while also creating an unsafe school environment^{22–24}. Research has also consistently documented the impact of an unsafe school environment on lesbian, gay, bisexual, transgender and queer (LGBTQ+) youth, linking it to missing more days at school, performing worse in courses and experiencing declines in mental health^{22,25,26}, which could occur in response to newly adopted anti-transgender legislation.

TGNB young people are already at risk for mental health concerns, often tied to experiences of minority stress, which is best understood as stress that accumulates due to negative experiences associated with one’s minority identity^{27–29}. We hypothesize that anti-transgender legislation may function as a form of structural minority stress for TGNB young people, possibly exacerbating current mental health concerns and creating new ones. Furthermore, we draw on the interpersonal theory of suicide^{30,31} as an additional framework, which suggests that feeling like a burden or disconnected from others can lead to suicidal desire, and that repeated pain or fear-inducing experiences can lead to suicidal behaviour. We hypothesize that state-wide and national discrimination could lead TGNB young people to seriously consider suicide through feeling unimportant and disconnected from others. It could also lead TGNB young people who were already seriously considering suicide due to other stressors to acquire the capability for suicide and attempt through repetitive exposure to pain and fear.

However, no research has specifically identified a causal link between anti-transgender laws and increased suicide risk among TGNB young people. Using a difference-in-differences (DD) research design, this study draws on large—but non-probability—samples of diverse TGNB young people in the USA, aged 13–24, across 5 time periods (Tables 1 and 2) to examine the causal effects of enacting anti-transgender laws on suicide risk among TGNB young people. Furthermore, because many of these laws specifically target minors, we separately examined the causal effect of their enactment on TGNB young people under the age of 18.

Results

US state legislatures follow a multistage legislative process that varies across states. Generally, a bill is introduced, considered and then voted on by the state legislature. Bills that are passed by the state legislature and signed into law by the governor are then enacted into laws³². In our

Table 1 | Sample size by survey wave

	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5
Recruitment dates	Mar. 2018 to Sep. 2018	Dec. 2019 to Mar. 2020	Oct. 2020 to Dec. 2020	Sep. 2021 to Dec. 2021	Sep. 2022 to Dec. 2022
Total sample	25,896	40,001	34,759	33,993	28,524
TGNB sample	8,367	9,889	13,121	16,217	13,646

study, we define ‘treatment’ as a state government enacting one or more state-level anti-transgender laws in a single legislative session before the start of the survey recruitment period. Furthermore, we estimate the effect of treatment in each year following the enactment of the first state-level anti-transgender law in a given state (that is, time 1 is the first time period after treatment, time 2 is the second time period, and so on). We estimate the effect by relative time periods because treatment occurs in different years in different states (for example, time 1 is 2021 in Idaho and time 1 is 2022 in Arkansas). More details on the research design are discussed in Methods.

Number of past-year suicide attempts

Figure 1 and Table 3 present estimates of the impact of enacting state-level anti-transgender laws on the number of past-year suicide attempts among TGNB young people. For the full sample of TGNB young people aged 13–24, there was no statistically significant effect in the first time period after the treatment began (that is, time 1). However, there was a sharp and statistically significant increase starting 2 time periods following the treatment (that is, time 2 and time 3), where the number of past-year suicide attempts increased by 0.16 ($P < 0.001$, 95% confidence interval (CI) (0.128, 0.191)) and 0.19 ($P < 0.001$, 95% CI (0.149, 0.224)), respectively (that is, 38% and 44% above the sample mean, respectively). In contrast, TGNB young people aged 13–17 may have been immediately affected after treatment began. There was a small but statistically significant effect in the first time period after treatment began with an increase of 0.04 ($P = 0.049$, 95% CI (0.001, 0.079); that is, 7% above the sample mean), followed by a similarly sharp and significant increase at time 2 and time 3, where the number of past-year suicide attempts increased by 0.39 ($P < 0.001$, 95% CI (0.352, 0.423)) and 0.28 ($P < 0.001$, 95% CI (0.233, 0.327)), respectively (that is, 72% and 52% above the sample mean, respectively). In each event study model, all estimated coefficients in the pre-treatment time periods were not statistically distinguishable from zero and provided minimal evidence of pretreating or a violation of the parallel trend assumption.

In the alternative specification using two-way fixed effects DD models (Table 3) to summarize the overall effects in the post-treatment period, we found small positive effects that were not statistically significant in both the model with the full sample of TGNB young people and with TGNB young people aged 13–17. Due to bureaucratic delays and other differences in implementation of new laws across different jurisdictions in a state, the effect of the laws may not be consistent over time. Thus, the event study specifications were more appropriate for this study given the plausible heterogeneity in the treatment effects over time³³.

At least one past-year suicide attempt

We also investigated the effect of enacting state-level anti-transgender laws on TGNB young people reporting at least one past-year suicide attempt (Fig. 2 and Table 4). For both the full sample of TGNB young people aged 13–24 and TGNB young people aged 13–17, there was no statistically significant effect in the first time period after treatment (time 1), followed by a sharp and significant increase in the remaining post-treatment time periods (time 2 and time 3). TGNB young people aged 13–24 experienced an increase of 0.05 ($P < 0.001$, 95% CI (0.039, 0.062)) and 0.06 ($P < 0.001$, 95% CI (0.040, 0.071)), respectively

Table 2 | Sample size by US state and territory

State/territory	<i>n</i> (%)	State/territory	<i>n</i> (%)	State/territory	<i>n</i> (%)
California	5,940 (9.70)	Wisconsin	1,342 (2.19)	Nebraska	418 (0.68)
Texas	4,530 (7.40)	Minnesota	1,246 (2.03)	New Mexico	410 (0.67)
Florida	3,365 (5.50)	Tennessee	1,214 (1.98)	West Virginia	407 (0.66)
New York	2,708 (4.42)	Maryland	1,199 (1.96)	New Hampshire	354 (0.58)
Ohio	2,368 (3.87)	New Jersey	1,191 (1.94)	Montana	295 (0.48)
Pennsylvania	2,219 (3.62)	Utah	1,104 (1.80)	Mississippi	291 (0.48)
Washington	2,209 (3.61)	Kentucky	935 (1.53)	Vermont	285 (0.47)
Illinois	2,194 (3.58)	Oklahoma	885 (1.45)	Alaska	256 (0.42)
Michigan	2,152 (3.51)	South Carolina	766 (1.25)	Delaware	247 (0.40)
Virginia	1,818 (2.97)	Kansas	739 (1.21)	Rhode Island	232 (0.38)
North Carolina	1,784 (2.91)	Alabama	735 (1.20)	South Dakota	191 (0.31)
Georgia	1,681 (2.74)	Iowa	691 (1.13)	North Dakota	188 (0.31)
Colorado	1,580 (2.58)	Connecticut	672 (1.10)	Hawaii	186 (0.30)
Indiana	1,577 (2.57)	Nevada	565 (0.92)	Wyoming	180 (0.29)
Massachusetts	1,475 (2.41)	Arkansas	540 (0.88)	Washington, DC	140 (0.23)
Oregon	1,458 (2.38)	Louisiana	538 (0.88)	Puerto Rico	24 (0.04)
Missouri	1,388 (2.27)	Idaho	518 (0.85)		
Arizona	1,375 (2.25)	Maine	435 (0.71)		

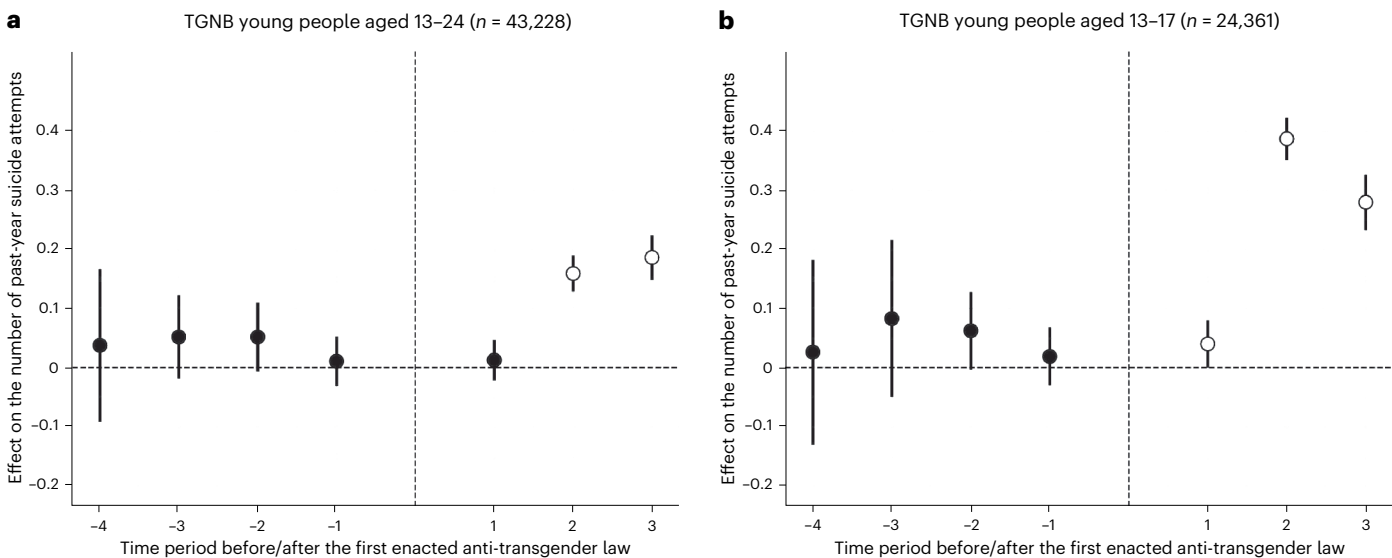


Fig. 1 | Effects of anti-transgender law on past-year suicide attempts. **a,b**, Event study plots of effects of enacted state-level anti-transgender law on the number of past-year suicide attempts among TGNB young people aged 13–24 (*n* = 43,228) (**a**) and those aged 13–17 (*n* = 24,361) (**b**). Data are presented as mean \pm 1.96 s.d. Open circles are statistically significant; filled circles are not statistically significant at 95% confidence level. Values in the x axis represent

the number of time periods before or after the first enacted anti-transgender law; values in the y axis represent the regression coefficients in the estimated equations. The dashed vertical line represents the time period during which the first anti-transgender law was enacted (that is, time period 0); the dashed horizontal line represents where the estimated regression coefficient equals zero.

(that is, 25% and 27% above the sample mean, respectively), whereas TGNB young people aged 13–17 experienced an increase of 0.13 ($P < 0.001$, 95% CI (0.112, 0.143)) and 0.08 ($P < 0.001$, 95% CI (0.065, 0.104)) in time 2 and time 3, respectively (that is, 49% and 33% above the sample mean, respectively). In each event study model, all estimated coefficients in the pre-treatment time periods were not statistically distinguishable from zero, providing minimal evidence of pretrending or violation of the parallel trend assumption.

In the alternative specification using two-way fixed effects DD models (Table 4) to summarize the overall effects in the post-treatment

periods, we found small effects that were not statistically significant in both the model with the full sample and with TGNB young people aged 13–17. Similar to the results on the number of past-year suicide attempts, the event study specifications were more appropriate for this study given the plausible heterogeneity in the treatment effects over time.

Seriously considered suicide in the past year

We conducted a similar series of analyses to estimate the impact of enacting state-level anti-transgender laws on TGNB young people

Table 3 | Estimated impact of enacted state-level anti-transgender laws on the number of past-year suicide attempts among TGNB young people (2018–2022)

	Number of past-year suicide attempts among TGNB young people	
	Ages 13–24	Ages 13–17
Event study model		
Time 3	0.1863 ($P < 0.001$, 95% CI (0.149, 0.224))**	0.2798 ($P < 0.001$, 95% CI (0.233, 0.327))**
Time 2	0.1593 ($P < 0.001$, 95% CI (0.128, 0.191))**	0.3873 ($P < 0.001$, 95% CI (0.352, 0.423))**
Time 1	0.0125 ($P = 0.764$, 95% CI (−0.023, 0.048))	0.0400 ($P = 0.049$, 95% CI (0.001, 0.079))*
Time 0 (omitted)		
Time −1	0.0107 ($P = 0.699$, 95% CI (−0.030, 0.052))	0.0187 ($P = 0.457$, 95% CI (−0.030, 0.068))
Time −2	0.0519 ($P = 0.195$, 95% CI (−0.007, 0.111))	0.0624 ($P = 0.064$, 95% CI (−0.004, 0.129))
Time −3	0.0519 ($P = 0.322$, 95% CI (−0.019, 0.122))	0.0829 ($P = 0.222$, 95% CI (−0.050, 0.216))
Time −4	0.0376 ($P = 0.119$, 95% CI (−0.092, 0.167))	0.0262 ($P = 0.743$, 95% CI (−0.131, 0.183))
Two-way fixed effects DD model		
Treatment × post	−0.0071 ($P = 0.615$, 95% CI (−0.050, 0.036))	0.0271 ($P = 0.193$, 95% CI (−0.035, 0.090))
Two-way fixed effects DD model, excluding 1% of DD estimates via Bacon decomposition		
Treatment × post	−0.0070 ($P = 0.743$, 95% CI (−0.049, 0.035))	0.0271 ($P = 0.403$, 95% CI (−0.037, 0.091))
Covariates		
Age	−0.0480 ($P < 0.001$, 95% CI (−0.050, −0.046))**	−0.0751 ($P < 0.001$, 95% CI (−0.083, −0.067))**
Race/ethnicity (youth of colour compared with white youth)	0.1484 ($P < 0.001$, 95% CI (0.123, 0.174))**	0.1532 ($P < 0.001$, 95% CI (0.128, 0.179))**
COVID-19	−0.0005 ($P = 0.015$, 95% CI (−0.001, 0))*	−0.0001 ($P = 0.709$, 95% CI (−0.001, 0))
Observations	43,228	24,361
States and territories	48	48
Sample mean	0.420	0.539

* $P \leq 0.05$, ** $P \leq 0.01$. Observations represent the sample size. States and territories represent the number of state-level governments included in the study. Sample mean represents the mean number of past-year suicide attempts in the sample. All other values represent regression coefficients estimated from respective models. The ‘treatment × post’ variable jointly represents whether a state is treated for a given survey wave; see equation (2) for full details.

who reported seriously considering suicide in the past year (Fig. 3). For TGNB young people aged 13–24, there was no statistically significant estimated effect on reports of seriously considering suicide in the first 2 time periods. Notably, the model estimated a significant and negative effect in time 3. However, the effect is relatively small at only 9% below the sample mean (coefficient = −0.0461, $P < 0.001$, 95% CI (−0.066, −0.026)). For TGNB young people aged 13–17, there was also no statistically significant effect in time 1 and there was a relatively small, significant positive effect in time 2 (coefficient = 0.0312, $P < 0.001$, 95% CI (0.014, 0.049), 5% above the sample mean) and a relatively small negative effect in time 3 (coefficient = −0.0356, $P = 0.001$, 95% CI (−0.056, −0.015), 6% below the sample mean). However, both event study models included a negative significant coefficient (coefficient = −0.0476, $P < 0.001$, 95% CI (−0.071, −0.024)) in the time period

before the enactment of state-level anti-transgender law (time 1), which suggests that the necessary parallel trend assumption for the DD design was violated. We concluded that our analysis provided minimal evidence that state governments enacting state-level anti-transgender laws had a statistically reliable impact on TGNB young people who reported seriously considering suicide in the past year.

Alternative designs and robustness checks

Staggered treatment timing. It has been shown that DD estimates could be biased when groups received treatment at different times³⁴. Although we did have staggered treatment timing in our study (that is, states enact anti-transgender law in different legislative sessions), we did not expect this to cause major bias in our estimates as there were very few early adopters and the timing differences between early and late adopters were relatively small given the short 5 year study period. We implemented the Bacon decomposition³⁴ to evaluate how much our overall DD estimates in the 2-way fixed effects DD models were driven by 2×2 comparisons where the two groups had different treatment times. We found that only 1% of the DD estimates was derived from comparisons of states with varying treatment times. The DD estimates in an alternative design where we excluded this 1% of 2×2 comparisons yielded very similar results. See Tables 3 and 4 for model estimates.

Alternative treatment specifications. We considered other treatment specifications that may have causal relationships with TGNB young people’s mental health outcomes. First, we examined the impact of state governments introducing anti-transgender laws by defining ‘treated’ as a state government introducing one or more state-level anti-transgender laws in a single legislative session before the survey recruitment period. Second, we examined whether the number of anti-transgender laws a state government enacted impacted the mental health outcomes of TGNB young people.

We found minimal evidence that the introduction of anti-transgender laws had a statistically observable impact on TGNB youth suicide. In the 2-way fixed effect DD model on the full sample of TGNB young people aged 13–24, the model coefficients are not statistically significant (coefficient = −0.0028, $P = 0.895$, 95% CI (−0.0443, 0.0388) for number of past-year suicide attempts, and coefficient = −0.0054, $P = 0.471$, 95% CI (−0.0200, 0.0093) for at least 1 past-year suicide attempt). For the model on TGNB minors aged 13–17, the model coefficients are also not statistically significant (coefficient = −0.0191, $P = 0.461$, 95% CI (−0.0701, 0.0318) for number of past-year suicide attempts, and coefficient = −0.0030, $P = 0.746$, 95% CI (−0.0218, 0.0156) for at least 1 past-year suicide attempt). Similarly, we found minimal evidence that enacting additional anti-transgender laws after the first one had an additional statistically observable effect on TGNB youth suicide. In the 2-way fixed effect DD model on the full sample of TGNB young people aged 13–24, the model coefficients are not statistically significant (coefficient = −0.00006, $P = 0.996$, 95% CI (−0.0212, 0.0211) for number of past-year suicide attempts, and coefficient = −0.0039, $P = 0.449$, 95% CI (−0.0141, 0.0063) for at least 1 past-year suicide attempt). For the model on TGNB minors aged 13–17, the model coefficients are also not statistically significant (coefficient = 0.0017, $P = 0.916$, 95% CI (−0.0295, 0.0329) for number of past-year suicide attempts, and coefficient = −0.0019, $P = 0.781$, 95% CI (−0.0149, 0.0112) for at least 1 past-year suicide attempt).

Placebo tests. Figure 4 presents two placebo tests we conducted to assess the validity of our design. We investigated two alternative outcome variables for which we had no theoretical reason to hypothesize that the treatment would have an impact: full-time employment and homelessness. We estimated equation (1) for these outcome variables and found minimal evidence that state governments enacting state-level anti-transgender laws had substantial impacts on either TGNB young people’s full-time employment or experience with

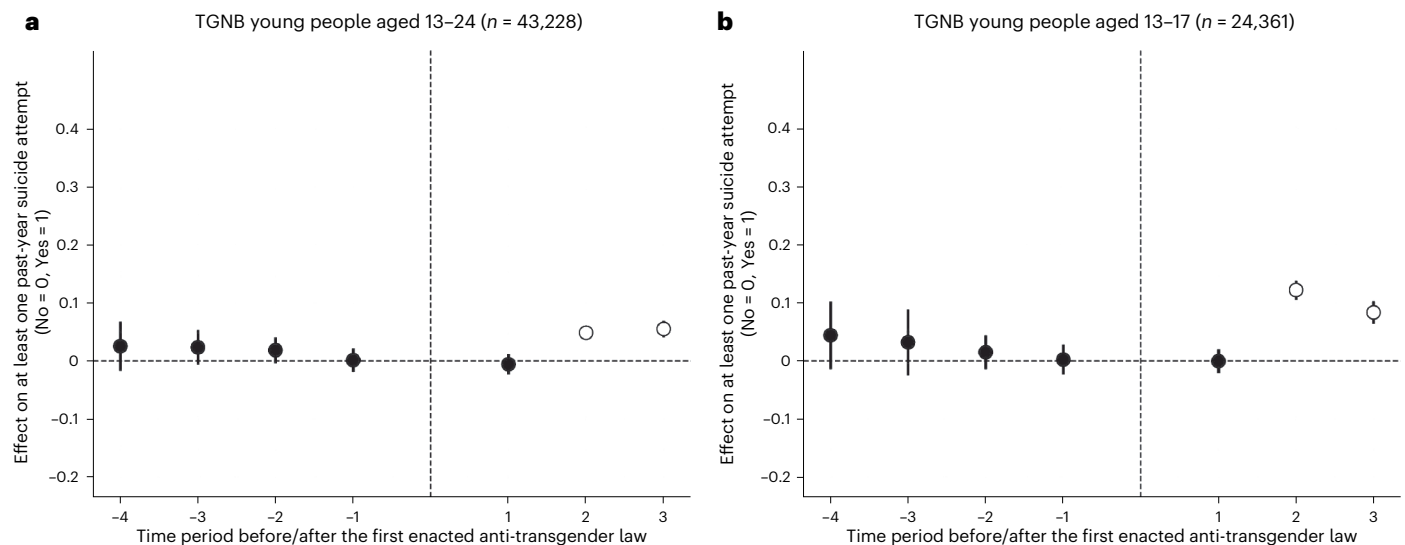


Fig. 2 | Effects of anti-transgender law on reporting of at least one past-year suicide attempt. a,b, Event study plots of effects of enacted state-level anti-transgender law on TGNB young people aged 13–24 (n = 43,228) (a) and those aged 13–17 (n = 24,361) (b) reporting at least 1 past-year suicide attempt. Open circles are statistically significant; filled circles are not statistically significant.

homelessness. See Fig. 4 and Supplementary Tables 1 and 2 for the full results.

Controlling for covariates. We considered the potential impact of two demographic variables available across all five waves of our survey: race/ethnicity and age. Due to subgroup sample size limitations, we coded self-reported race/ethnicity into two groups: youth of colour (all young people who did not identify as white) and white youth. We estimated equation (1) using the two demographic covariates. The estimated effect of treatment was similar in both models (that is, coefficients in the models without the additional covariates and the coefficients in the models that added the two covariates were similar). The models yielded relatively small but statistically significant effects on the demographic covariates. Youth of colour were more likely to report past-year suicide attempts compared with white youth, and younger youth were more likely compared with their older peers. Statistics to support this finding are reported in Tables 3 and 4.

We also considered the potential impact of the coronavirus disease 2019 (COVID-19) pandemic, as waves 3, 4 and 5 of our survey were conducted after the start of the pandemic. We used population-adjusted COVID-19 death counts by year as a proxy for the overall impact of COVID-19 in a given state for a given time period. These death counts were calculated from state-level COVID-19 death counts reported by the Centers for Disease Control and Prevention (CDC)³⁵ and state-level population estimates reported by the US Census³⁶. We estimated equation (1) using the additional COVID-19 covariate and yielded very similar overall results. We concluded that there was minimal evidence that COVID-19 increased suicide attempts among TGNB young people in states where the state governments enacted anti-transgender laws. Statistics to support this finding are reported in Tables 3 and 4.

Legislative timeline of anti-transgender laws

Among the 48 state-level anti-transgender laws included in this study, the number of days between the initial introduction and enactment of the laws spanned a wide range, with an average of 102 days (mean (M) = 101.70, s.d. = 88.98) and a maximum of over 1 year (478 days). In contrast, once the laws were enacted, the timeline of the laws going into effect followed a shorter and more predictable timeline, with an average of 13 days (M = 12.93, s.d. = 28.68) and a maximum of 105 days. However, data are not available regarding how quickly and effectively

these laws were implemented at the local government level (that is, city or school district).

Discussion

In this study, we estimated the causal impact of state governments enacting anti-transgender laws on past-year suicide attempts among TGNB young people. Our findings point to evidence that TGNB young people in states where anti-transgender laws were enacted experienced statistically significant increases in both the number of past-year suicide attempts and the reporting at least 1 past-year suicide attempt, especially 1 and 2 years after anti-transgender law enactment. Our findings build on recent scholarship that shows the association between enactment of state-level anti-transgender laws and increased suicide-related Internet searches by people living in those states³² by providing evidence of a causal relationship between enactment of state-level anti-transgender laws and increased suicide attempts among TGNB young people.

We also found that the estimated effects among TGNB young people aged 13–17 were consistently larger than the estimated effects among the full sample of TGNB young people aged 13–24. As a result of states enacting anti-transgender laws, TGNB young people aged 13–17 reported a 7–72% increase in the number of past-year suicide attempts, and TGNB young people aged 13–24 reported a 38–44% increase in the number of past-year suicide attempts. Similarly, states enacting anti-transgender laws led to TGNB young people aged 13–17 reporting 33–49% higher rates of at least 1 past-year suicide attempt and TGNB young people aged 13–24 reporting 25–27% higher rates. This trend is consistent with many state-level anti-transgender laws targeting minors under the age of 18 and therefore limiting the ability of these young people to access gender-affirming care or facilities and participate in activities with their peers. Furthermore, compared with TGNB adults, TGNB minors may have less access to LGBTQ+ affirming resources and experience less connection with the LGBTQ+ community. They may also need to rely on their parents or guardians to access gender-affirming healthcare or other important resources. These additional complications, with the combined effect of anti-transgender legislation, probably compound for younger TGNB people, leading to the effects described in this study.

To better understand the timing of the effects, we looked to the legislative timelines of the anti-transgender laws to provide possible

Table 4 | Estimated impact of enacted state-level anti-transgender laws on TGNB young people reporting at least one past-year suicide attempt (2018–2022)

At least one suicide attempt in the past year among TGNB young people		
	Ages 13–24	Ages 13–17
Event study model		
Time 3	0.0558 ($P<0.001$, 95% CI (0.040, 0.071))**	0.0844 ($P<0.001$, 95% CI (0.065, 0.104))**
Time 2	0.0503 ($P<0.001$, 95% CI (0.039, 0.062))**	0.1278 ($P<0.001$, 95% CI (0.112, 0.143))**
Time 1	−0.0027 ($P=0.229$, 95% CI (−0.018, 0.013))	0.023 ($P=0.794$, 95% CI (0.003, 0.043))
Time 0 (omitted)		
Time −1	0.0025 ($P=0.915$, 95% CI (−0.184, 0.199))	0.0028 ($P=0.858$, 95% CI (−0.023, 0.028))
Time −2	0.0174 ($P=0.207$, 95% CI (0, 0.035))	0.0182 ($P=0.359$, 95% CI (−0.009, 0.046))
Time −3	0.0234 ($P=0.222$, 95% CI (−0.002, 0.049))	0.0346 ($P=0.307$, 95% CI (−0.018, 0.088))
Time −4	0.0342 ($P=0.362$, 95% CI (−0.011, 0.079))	0.0534 ($P=0.162$, 95% CI (−0.003, 0.110))
Two-way fixed effects DD model		
Treatment×post	−0.0105 ($P=0.054$, 95% CI (−0.020, −0.001))	−0.0024 ($P=0.727$, 95% CI (−0.024, 0.019))
Two-way fixed effects DD model, excluding 1% of DD estimates via Bacon decomposition		
Treatment×post	−0.0106 ($P=0.056$, 95% CI (−0.021, 0.0003))	−0.0024 ($P=0.820$, 95% CI (−0.024, 0.019))
Covariates		
Age	−0.0214 ($P<0.001$, 95% CI (−0.022, −0.020))**	−0.0269 ($P<0.001$, 95% CI (−0.031, −0.023))**
Race/ethnicity (youth of colour compared with white youth)	0.0560 ($P<0.001$, 95% CI (0.046, 0.065))**	0.0576 ($P<0.001$, 95% CI (0.046, 0.069))**
COVID-19	−0.0002 ($P=0.016$, 95% CI (0.000, 0.000))**	−0.0001 ($P=0.463$, 95% CI (0.000, 0.000))
Observations	43,228	24,361
States and territories	48	48
Sample mean	0.205	0.259

* $P\leq 0.05$, ** $P\leq 0.01$. Observations represent the sample size. States and territories represent the number of state-level governments included in the study. Sample mean represents the mean number of at least one past-year suicide attempts in the sample. All other values represent regression coefficients estimated from respective models. The 'treatment × post' variable jointly represents whether a state is treated for a given survey wave; see equation (2) for full details.

explanations. The long and unpredictable timeline may diffuse the effects the bill debates had on the mental health of TGNB young people and explain the lack of an observable anticipatory effect in the time periods leading up to the enactment of the laws. The lack of a statistically reliable effect in event year 1 for the full group of people aged 13–24 may be explained by the bureaucratic delays across different jurisdictions within a state. Future research should investigate how differences in the implementation of the same state-level anti-transgender laws across local governments may affect the mental health of TGNB young people.

We investigated two possible pathways for the increase in past-year suicide attempts among TGNB young people: (1) enacting state-level anti-transgender laws also impacts self-reports of seriously considering suicide in the past year, or (2) enacting state-level anti-transgender laws

leads more TGNB young people who were already seriously considering suicide due to other stressors to attempt suicide. We found more evidence that supported the latter. Although we did not find evidence to support that enacting state-level anti-transgender laws had an impact on TGNB young people seriously considering suicide in the past year, our findings do show evidence that it does increase TGNB young people reporting at least one past-year suicide attempt. This finding is consistent with the interpersonal theory of suicide, which suggests that acquiring the capability to overcome one's natural fear of death combined with the desire for suicide leads to a serious suicide attempt, and such capability of suicide may be acquired through repeated exposure to painful and fear-inducing events^{30,31,37}. Empirical evidence in previous research suggests that perceived discrimination may be an example of a fear-inducing event from which individuals from certain minoritized groups may acquire suicide capability³⁸.

Although, as previously stated, this study does not differentiate the laws based on type or scope, the different laws may also lead to the increased suicide risk among TGNB young people through contributing to different types of minority stress³⁹. The laws restricting access to gender-affirming bathrooms and banning participation in sports may lead to more experiences of rejection, social isolation and bullying^{40,41}. The laws restricting access to gender-affirming healthcare and the ability to update identification documents may lead to less access to vital resources and create more opportunities for discrimination and harassment^{42–44}. In short, enacted anti-transgender laws may be a source of increased minority stress that leads to increased suicide risk or other mental health issues. Furthermore, our finding that there was no statistically significant effect of state-level anti-transgender laws on TGNB youth suicide at the immediate time of their introduction builds on previous work that shows introducing or debating anti-transgender laws does not have an association with Internet searches related to suicide or depression³². Future research should explore the potential relationships between introductions of state-level anti-transgender laws and other mental health outcomes related to minority stress, such as anxiety and self-harm, both to understand whether introductions affect these outcomes and to investigate the mechanisms that lead to minimal effects on TGNB youth suicide.

Although our study includes a large, diverse sample of TGNB young people from across the USA and collects key measurements on their suicide risk during an important period of time where rights for TGNB individuals are being contested, there are also several important limitations. First, as this is a series of cross-sectional studies and not a longitudinal study that tracks the same group of young people over time, we cannot ensure time-varying characteristics of the respondents remain controlled. For instance, a respondent may move to a different state just before responding to one of our survey waves. This may result in misclassification of whether this respondent was exposed to the anti-transgender laws in question and the length of the exposure. However, in general, we expect that this type of misclassification will bias our estimates towards zero⁴⁵. Second, the non-probability sampling method in our surveys may contain sampling bias and may not accurately represent the full population. However, our dataset contains large sample sizes for the treated states across all survey waves and all the reported results are at least at a 95% confidence level. Third, our surveys do not contain measurements on belongingness, community connectedness or perceived burdensomeness in wave 1 and 2 of the survey. Therefore, we do not have the necessary data to further investigate the mechanisms according to the interpersonal theory of suicide³¹ that may have led to the lack of a significant effect on reporting seriously considering suicide in the past year. Furthermore, in some cases the enactment of anti-transgender laws may increase TGNB young people's sense of belongingness and community connectedness to the TGNB community through the shared goal of advocacy and resistance. It is a limitation of this study that we do not have the necessary measurements to assess the relationship between community strength and the

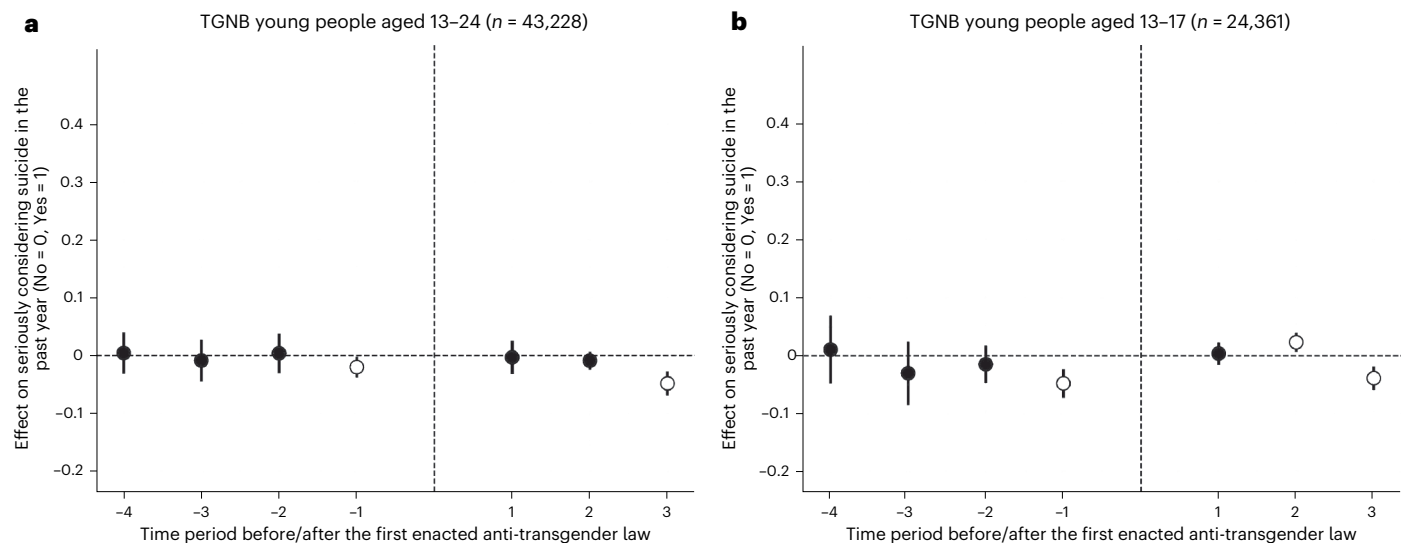


Fig. 3 | Effects of anti-transgender law on reports of seriously considering suicide in the past year. a,b, Event study plots of effects of enacted state-level anti-transgender law on TGNB young people aged 13–24 (*n* = 43,228) (**a**) and

those aged 13–17 (*n* = 24,361) (**b**) reporting seriously considering suicide in the past year. Data are presented as mean \pm 1.96 s.d. Open circles are statistically significant; filled circles are not statistically significant.

mental health of TGNB young people in the face of anti-transgender laws. Fourth, we do not have the necessary granular location data (that is, zip code or county) in our survey to assess whether living near a neighbouring state that has enacted anti-transgender laws has any potential spillover effects on TGNB youth suicide. However, because our findings suggest that anti-transgender policies (that is, laws being enacted), as opposed to debates (that is, laws being introduced), are the key causal links to increased suicides, we believe there is minimal evidence of a spillover effect from geographic proximity to a treated state. Furthermore, we expect any potential spillover effect to bias our estimates towards zero, instead of increasing the estimated effects. Fifth, we do not consider the potential protective effect of pro-transgender laws enacted in the same time period, which may serve as a time-varying confounding factor that violates the parallel trend assumption. However, there are few states that enacted explicitly pro-transgender laws² and they all belong to the never-treated control group in our study. We believe these laws contribute minimal biases in our estimates.

This study examines the causal effect of enacting state-level anti-transgender laws on suicide risk among TGNB young people. Our findings highlight the negative impacts that anti-transgender laws have on TGNB young people, especially TGNB minors between the ages of 13 and 17. These laws are not abstract legislative actions; they have the power to shape the mental health and life trajectories of a vulnerable community. Such laws may exacerbate social isolation, hinder educational access and achievement, and as a result, limit economic opportunities through wage and other systemic disparities. The laws that pose barriers to quality healthcare, especially gender-affirming care, may undermine overall life satisfaction by reducing access to necessary healthcare that could save lives. These policies may also affect relationships and civic participation, and concurrently reduce TGNB representation and negatively shape public perceptions. To comprehensively understand the impact of these laws, it is essential to consider their multidimensional effects on the TGNB community.

As of February 2024, five additional US states have enacted state-level anti-transgender laws beyond the scope of this study, and similar legislation will probably be passed in the future. Legislators and other involved parties must consider the negative impacts of these laws on TGNB people when enacting similar future legislation, while prioritizing legislation that fosters acceptance of TGNB people and equity. With the understanding that anti-transgender laws can directly

impact the lives of TGNB people, we argue that increasing access to gender-affirming care, resources and facilities could be life-saving for TGNB people, especially TGNB minors.

Methods

Each research proposal was reviewed and approved by an independent institutional review board, Solutions IRB. The protocol numbers for the five surveys in chronological order are 2017114, 2019101, 20200719, 20210726 and 20220721. Participation was voluntary and informed consent was obtained. We obtained a waiver of parental consent for young people aged 13–17 years as the research posed minimal risk and could have presented potential harm for those who were not out to their parents about their LGBTQ+ identity. No names or personal details were included to ensure confidentiality and privacy. None of our studies were pre-registered.

Participants

Data were from 5 waves of non-probability cross-sectional online surveys of young people aged 13–24 who resided in the USA and identified as LGBTQ+ during 5 distinct time periods between 2018 and 2022 (Table 1): February 2018 to September 2018 (*n* = 25,896), December 2019 to March 2020 (*n* = 40,001), October 2020 to December 2020 (*n* = 34,759), September 2021 to December 2021 (*n* = 33,993) and September 2022 to December 2022 (*n* = 28,524).

Potential respondents were recruited via targeted advertisements on social media (that is, Facebook, Instagram and Snapchat). In each survey, eligibility criteria were used to determine the final analysis sample: having a unique IP address, completing an initial demographic screening, meeting recruitment requirements (that is, being aged 13–24 and living in the USA), reaching the midpoint of the survey and passing a validity check. We also removed dishonest and mischievous responders (that is, through self-reporting and manual review). Respondents who met the eligibility criteria completed a secure online questionnaire that included a maximum of 142–150 questions, depending on the survey year. The survey questions covered topics such as mental health, suicide risk, protective factors (for example, access to care, access to affirming spaces and LGBTQ+ representation) and risk factors (for example, anti-LGBTQ+ victimization, discrimination and experiences with conversation therapy). See Supplementary Information for full details on the survey recruitment process.

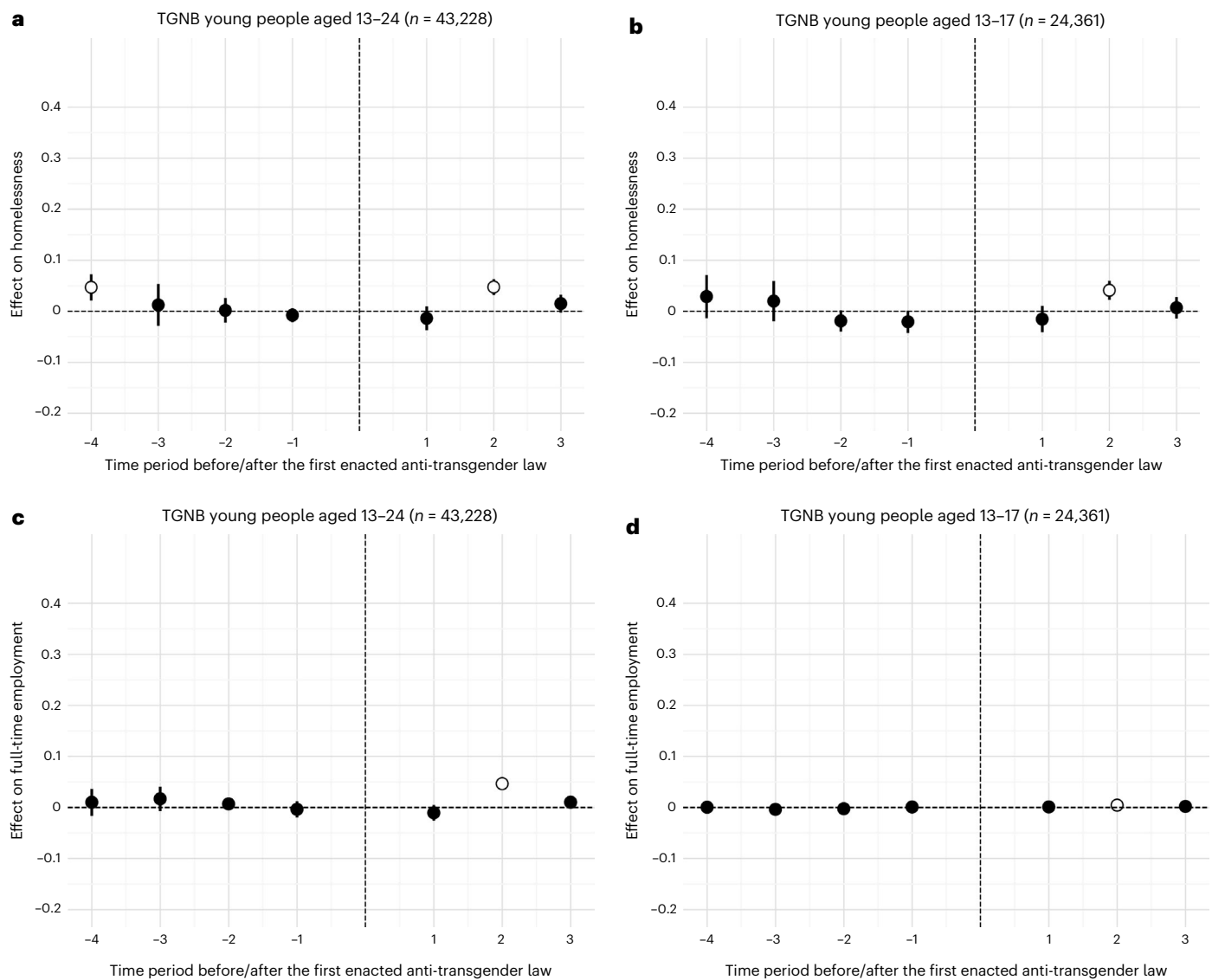


Fig. 4 | Event study plot for placebo tests. Effects of enacted state-level anti-transgender law on homelessness among TGNB young people aged 13–24 ($n = 43,228$) (a) and those aged 13–17 ($n = 24,361$) (b), and on full-time employment among TGNB young people aged 13–24 ($n = 43,228$) (c) and those aged 13–17 ($n = 24,361$) (d). Data are presented as mean \pm 1.96 s.d. Open circles are statistically significant; filled circles are not statistically significant at 95%

confidence level. Values in the x axis represent the number of time periods before or after the first enacted anti-transgender law; values in the y axis represent the regression coefficients in the estimated equations. The dashed vertical line represents the time period during which the first anti-transgender law was enacted (that is, time period 0); the dashed horizontal line represents where the estimated regression coefficient equals zero.

Pooling all survey waves resulted in an initial sample of 163,168 observations on LGBTQ+ young people. Given our focus on anti-transgender laws and their possible impact on health outcomes, we only conducted analyses on the subsample of young people who self-identified as TGNB in this study. This resulted in a final sample of 61,240 TGNB young people. All US states were represented in the final sample, with California having the highest sample size at 5,940 and Wyoming having the smallest sample size at 180. Table 2 shows the sample size breakdown by state and territory. No statistical methods were used to predetermine sample sizes but our sample sizes are larger than those reported in previous publications^{6–8,10}.

Measures

Attempted suicide. Past-year suicide attempts were assessed using an item based on the CDC Youth Risk Behavior Survey (YRBS)^{46–48}. Young people who reported ever having seriously considered suicide were asked, ‘During the past 12 months, how many times did you actually

attempt suicide?’ Response options were (1) zero times, (2) one time, (3) two or three times, (4) four or five times and (5) six or more times. The first analysis in this study focuses on the number of times that TGNB young people reported attempting suicide in the past year. This outcome was coded by taking the lower bound of each response option (that is, zero, one, two, four and six, respectively). We also investigated the effect of these laws on attempting suicide at least once in the past year by coding responses as (0) did not attempt suicide in the past year (including those who did not seriously consider suicide) and (1) attempted suicide in the past year. Young people who declined to answer questions on suicide attempts ($n = 5,222$; 8.5% of total sample) were excluded from the analyses of past-year suicide attempts. It is important to note that previous research has shown there is little evidence that suggests asking about suicidality in surveys results in harmful outcomes on the participants⁴⁹.

Seriously considered suicide. Using an item based on the CDC’s YRBS⁴⁶, young people were asked, ‘Have you ever seriously considered

attempting suicide?’ Young people who responded ‘yes’ were subsequently asked, ‘During the past 12 months, did you ever seriously consider attempting suicide?’ Responses were coded as (0) did not seriously consider suicide in the past 12 months (including those who had never seriously considered attempting suicide) and (1) considered suicide in the past 12 months. Young people who declined to answer questions on seriously considering suicide ($n = 4,946$; 8.1% of total sample) were excluded from the analyses of seriously considering suicide. Similar to the previous measure, previous research has shown that there is little evidence that suggests asking about suicidality in surveys results in harmful outcomes on the participants⁴⁹.

Additional outcome measures for placebo tests. To assess the validity of our research design, we selected two additional outcome measurements for placebo tests: full-time employment and homelessness. If a significant result was found that enacting anti-transgender laws increased either of these outcomes, it would suggest that our method might be flawed or that there were confounding variables that were not adequately accounted for in the proposed design.

Full-time employment. Young people were asked, ‘Are you currently employed?’ Response options were (1) no, (2) yes, part-time and (3) yes, full-time. For assessing full-time employment as a placebo test, young people who responded ‘no’ or ‘yes, part-time’ were re-coded as ‘no’. Young people who declined to answer questions on employment ($n = 941$) were excluded from the placebo tests on full-time employment.

Homelessness. For wave 1, young people were asked, ‘Have you ever been homeless (even if only for a short period of time)?’ Response options were (1) yes and (2) no. For waves 2–5, young people were asked, ‘Are you currently or have you ever been homeless (even if only for a short period of time)?’ Response options were (1) no, (2) yes, I have been in the past but am currently not and (3) yes, I am currently homeless. For assessing young people’s experience of homelessness as a placebo test, young people’s responses were re-coded ‘yes’ and ‘no’ for all survey waves. Young people who declined to answer questions on homelessness ($n = 791$) were excluded from the placebo tests on homelessness.

See Supplementary Information for the full list of survey measures.

Anti-transgender laws

Data on state-level anti-transgender laws from 2018 to 2022 were obtained from the public legislation mapper by the American Civil Liberties Union and cross-validated with the Track Trans Legislation tracker, LegiScan and The Trevor Project legislative tracker^{2,3,13,50}. Overall, 19 states enacted a total of 48 anti-transgender laws from 2018 to 2022. These laws discriminate against transgender individuals in regard to participating in sports (30 laws), having access to gender-affirming healthcare (7), being able to update legal identification documents (4), participating in activities in school (3), having access to the bathroom (3) and lacking protection against religion-based discrimination (1). No anti-transgender laws included in the main analyses were enacted in the USA during the survey recruitment periods due to laws being enacted in the first half of the calendar year while our survey recruitment took place near the end of the calendar year. Four of the 19 states were excluded in the final analyses based on exclusion criteria discussed in ‘Research design’.

Research design

In our study, we define treated as a state government enacting one or more state-level anti-transgender laws in a single legislative session before the survey recruitment period. Conversely, ‘not treated’ is defined as a state government never enacting any state-level anti-transgender law before survey recruitment. Furthermore, we did not

differentiate the laws based on type or scope to capture the generalized impact of state-level anti-transgender policy programmes.

To estimate the causal effect of state-level anti-transgender laws on past-year suicide attempts among TGNB young people, we conducted a DD analysis. This analysis relies on identifying how the suicide risk of TGNB young people changed in treated states, compared with not-treated states, after the anti-transgender laws were enacted. Specifically, we estimated this using an event study model that included state fixed effects (γ_s) that reflects time-invariant differences across states, and time fixed effects (δ_w) capturing national changes in the suicide risk of TGNB young people at a given time. The robust standard errors are clustered at the state level (s). We estimated the following model (implemented with Python v.3.9.5 libraries pandas v.1.4.2 and statsmodels v.0.13.2) using individual-level data from all five waves of our survey:

$$\text{Outcome}_{isw} = \text{Treatment}_s \times \sum_{t=-4, t \neq 0}^3 \beta_t + \gamma_s + \delta_w + \epsilon_{isw} \quad (1)$$

As described earlier, each individual (i) responded to our cross-sectional survey wave (w) and reported their state of residence (s). In the equation, t represents the number of time periods before or after the treatment, that is, $t = 1$ represents one time period after treatment and $t = -1$ represents one time period before treatment. β_t represents the estimated treatment effect at time period t , and ϵ represents the error term. From 2018 to 2022 when our surveys were conducted, treated states had at most 3 post-treatment periods; therefore, equation (1) only included t up to 3. We used the same equation to estimate three dependent variables: (1) how many times the young person reported attempting suicide in the past year, (2) whether the young person reported at least one suicide attempt in the past year, and (3) whether the young person reported seriously considering suicide in the past year. As many of the state-level anti-transgender laws targeted minors, we conducted two analyses for each outcome variable: one with the entire sample of TGNB young people (that is, ages 13–24) and a second analysis with only TGNB minors (that is, ages 13–17). The corresponding event study plots were generated using Python v.3.9.5 library plotnine v.0.10.1.

The DD research design assumes that there are no time-varying confounders between treatment and control states (that is, the parallel trends assumption)⁵¹. If rates of the outcome variable trend similarly before the enactment of state-level anti-transgender laws, we expect the estimated coefficients in the event study associated with event times $t = -4$ to $t = -1$ will be statistically indistinguishable from 0. Furthermore, we test this assumption by controlling for other confounding covariates in alternative specifications.

In addition to the event study analyses, we also present two-way fixed effects DD estimates to summarize the effect across all post-treatment waves. These estimated effects are produced using the following model:

$$\text{Outcome}_{isw} = \text{Treatment}_s \times \text{Post}_w + \gamma_s + \delta_w + \epsilon_{isw} \quad (2)$$

Equations (1) and (2) are identical, except that the event study indicators are replaced with a single variable (that is, Post_w) denoting a treated state during the post-treatment period.

Indiana enacted an anti-transgender law in early 2018 before the conclusion of wave 1 of our survey. The lack of data from any preperiod in Indiana prevented us from testing the parallel trend assumption in the DD design. Alabama, Florida and Tennessee enacted anti-transgender laws across multiple survey waves. Having newly enacted laws between multiple survey periods may violate the assumption of no anticipatory effects in the DD design. To avoid violating core assumptions in our research design, Alabama, Florida, Indiana and Tennessee were excluded from the main analyses.

Reporting summary

Further information on research design is available in the Nature Portfolio Reporting Summary linked to this article.

Data availability

Data are not publicly available because they contain information that could compromise research participant privacy. The data that support the findings of this study will be made available upon request, by contacting the corresponding author, only to accredited researchers who have received ethics approval from their institutions.

Code availability

The main analysis was conducted in Python 3.9.5 with packages such as pandas 1.4.2, statsmodels 0.13.2 and plotnine 0.10.1. Python code that supports the finding of this study is available from the corresponding author upon request, although restrictions may apply due to privacy reasons.

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Author contributions

W.Y.L. conceptualized the study and research design. W.Y.L. and J.N.H. conducted the analyses. W.Y.L., J.N.H. and S.H. drafted the article. M.N.P., J.P.D. and R.N. provided substantial feedback and revisions on the article. W.Y.L., S.H. and R.N. coordinated revisions and submission. All authors reviewed and approved this article before submission. All authors have read and agreed to the published version of the article.

Competing interests

The authors are current or former employees of The Trevor Project, which is a non-profit organization with 501(c)(3) status and Federal EIN 95-4681287. The Trevor Project provides crisis services for LGBTQ+ young people, along with research, education, public awareness and advocacy.

Additional information

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Reporting Summary

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Statistics

For all statistical analyses, confirm that the following items are present in the figure legend, table legend, main text, or Methods section.

n/a	Confirmed
<input type="checkbox"/>	<input checked="" type="checkbox"/> The exact sample size (<i>n</i>) for each experimental group/condition, given as a discrete number and unit of measurement
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<input type="checkbox"/>	<input checked="" type="checkbox"/> A description of any assumptions or corrections, such as tests of normality and adjustment for multiple comparisons
<input type="checkbox"/>	<input checked="" type="checkbox"/> A full description of the statistical parameters including central tendency (e.g. means) or other basic estimates (e.g. regression coefficient) AND variation (e.g. standard deviation) or associated estimates of uncertainty (e.g. confidence intervals)
<input checked="" type="checkbox"/>	<input type="checkbox"/> For null hypothesis testing, the test statistic (e.g. <i>F</i> , <i>t</i> , <i>r</i>) with confidence intervals, effect sizes, degrees of freedom and <i>P</i> value noted <i>Give P values as exact values whenever suitable.</i>
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<input checked="" type="checkbox"/>	<input type="checkbox"/> For hierarchical and complex designs, identification of the appropriate level for tests and full reporting of outcomes
<input checked="" type="checkbox"/>	<input type="checkbox"/> Estimates of effect sizes (e.g. Cohen's <i>d</i> , Pearson's <i>r</i>), indicating how they were calculated

Our web collection on [statistics for biologists](#) contains articles on many of the points above.

Software and code

Policy information about [availability of computer code](#)

Data collection	Qualtrics, SPSS version 29.
Data analysis	Python version 3.9.5, including packages pandas 1.4.2, statsmodels 0.13.2 and plotnine 0.10.1. The codes that support the findings of this study are available from the corresponding author upon reasonable request, although restrictions may apply due to privacy reasons.

For manuscripts utilizing custom algorithms or software that are central to the research but not yet described in published literature, software must be made available to editors and reviewers. We strongly encourage code deposition in a community repository (e.g. GitHub). See the Nature Portfolio [guidelines for submitting code & software](#) for further information.

Data

Policy information about [availability of data](#)

- All manuscripts must include a [data availability statement](#). This statement should provide the following information, where applicable:
- Accession codes, unique identifiers, or web links for publicly available datasets
 - A description of any restrictions on data availability
 - For clinical datasets or third party data, please ensure that the statement adheres to our [policy](#)

Data are not publicly available due to their containing information that could compromise research participant privacy. The data that support the findings of this study will be made available upon request by contacting the corresponding author only to accredited reseachers who have received ethics approval from their institutions.

Research involving human participants, their data, or biological material

Policy information about studies with [human participants or human data](#). See also policy information about [sex, gender \(identity/presentation\), and sexual orientation](#) and [race, ethnicity and racism](#).

Reporting on sex and gender	Gender and sex were collected in this study. Analyses based on gender identity was conducted and reported in this study, as the transgender and nonbinary (TGNB) young people were the primary focus on the study.
Reporting on race, ethnicity, or other socially relevant groupings	Self-reported age was used to group participants into legal minors and adults. Many of the laws our study aimed to study specifically targeted minors. This social grouping was important to estimate the disproportional effects these laws had on minors, compared to their adult peers. Self-reported race / ethnicity was used as a demographic covariate. Self-reported experience with homeless and full-time employment were used in placebo test to examine the robustness of the research design.
Population characteristics	Self-reported age and race /ethnicity were used as covariate-relevant population characteristics in our study. For controlling for COVID-19 covariate, population-adjusted COVID-19 death counts by state was used as a proxy for the overall impact of COVID-19 in a given state.
Recruitment	Participants were recruited via targeted ads on social media (i.e., Facebook, Instagram, and Snapchat). Some biases might be present in our recruitment strategy. First, it precluded any young people not on social media. Second, the surveys had a maximum of 142-150 questions. Our strategy biased toward young people who had the time and privacy to fill out a long survey. We believe these biases had minimal impact on our survey given the large sample size, and we believe any self-selection biases would drive our estimates towards zero.
Ethics oversight	Research proposals for each of the five survey waves were reviewed and approved by an independent Institutional Review Board, Solutions IRB. The protocol numbers for the five surveys in chronological order are #2017114, #2019101, #20200719, #20210726, and #20220721

Note that full information on the approval of the study protocol must also be provided in the manuscript.

Field-specific reporting

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☐ Life sciences ☒ Behavioural & social sciences ☐ Ecological, evolutionary & environmental sciences

For a reference copy of the document with all sections, see nature.com/documents/nr-reporting-summary-flat.pdf

Behavioural & social sciences study design

All studies must disclose on these points even when the disclosure is negative.

Study description	Quantitative cross-sectional surveys across 5 distinct time periods.
Research sample	The study includes a sample of LGBTQ young people ages 13 to 24 living in the United States across five distinct time periods from 2018 to 2022. The sample is not representative, although it is a large national sample including all U.S. states. It is chosen to collect the largest feasible and most diverse sample of LGBTQ young people living in the U.S. Each of the five surveys was conducted as independent cross-sectional surveys, and we used a difference-in-differences research design to examine the causal effects of enacting anti-transgender laws on suicide risks among TGNB young people.
Sampling strategy	We used a nonprobability convenience sampling strategy to recruit participants via targeted ads on social media (i.e., Facebook, Instagram, and Snapchat). Sample size was not predetermined. Instead, we predetermined recruitment periods based on budget constraints, and collected the largest possible sample during the recruitment period. To ascertain racial and gender diversity, sample quotas were created across sex assigned at birth and race/ethnicity based on U.S. Census estimates. Once quotas were met, participants from overrepresented groups would no longer be eligible to complete the survey. We determined that the sample size was sufficient since we had meaningful samples among demographic subgroups to conduct subgroup analyses.
Data collection	Data was collected via secure online questionnaire on desktop or mobile computer devices that included a maximum of 142-150 questions depending on survey wave. Since the participants completed the surveys without contact or presence of the researcher, we could not confirm if anyone other than the participant was present. However, given the private nature of the survey subject, we believe most participants filled out of the survey without anyone else present. Finally, the researcher was not blinded to the experimental condition or study hypothesis during data collection.
Timing	Wave 1. 02/2018-09/2018; Wave 2. 12/2019-03/2020; Wave 3. 10/2020-12/2020; Wave 4. 09/2021-12/2021; Wave 5. 09/2022-12/2022
Data exclusions	LGBTQ participants who did not identified as transgender or nonbinary (TGNB) were excluded, since the study specifically focused on the TGNB sub-sample. In total, there were exactly 101,928 exclusions.
Non-participation	No participant dropped out.

Reporting for specific materials, systems and methods

We require information from authors about some types of materials, experimental systems and methods used in many studies. Here, indicate whether each material, system or method listed is relevant to your study. If you are not sure if a list item applies to your research, read the appropriate section before selecting a response.

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<input checked="" type="checkbox"/>	<input type="checkbox"/> Animals and other organisms
<input checked="" type="checkbox"/>	<input type="checkbox"/> Clinical data
<input checked="" type="checkbox"/>	<input type="checkbox"/> Dual use research of concern
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Methods

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Plants

Seed stocks

Report on the source of all seed stocks or other plant material used. If applicable, state the seed stock centre and catalogue number. If plant specimens were collected from the field, describe the collection location, date and sampling procedures.

Novel plant genotypes

Describe the methods by which all novel plant genotypes were produced. This includes those generated by transgenic approaches, gene editing, chemical/radiation-based mutagenesis and hybridization. For transgenic lines, describe the transformation method, the number of independent lines analyzed and the generation upon which experiments were performed. For gene-edited lines, describe the editor used, the endogenous sequence targeted for editing, the targeting guide RNA sequence (if applicable) and how the editor was applied.

Authentication

Describe any authentication procedures for each seed stock used or novel genotype generated. Describe any experiments used to assess the effect of a mutation and, where applicable, how potential secondary effects (e.g. second site T-DNA insertions, mosaicism, off-target gene editing) were examined.