Original Scholarship

Evidence-Based Message Strategies to Increase Public Support for State Investment in Early Childhood Education: Results from a Longitudinal Panel Experiment

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Policy Points:

- Investments in early childhood education can have long-lasting influence on health and well-being at later stages of the life course.
- Widespread public support and strategies to counter opposition will be critical to the future political feasibility of enhancing early childhood policies and programs.
- Simple advocacy messages emphasizing the need for affordable, accessible, high-quality childcare for all can increase public support for state investments in these policies.
- Policy narratives (short stories with a setting, characters, and a plot that unfolds over time and offers a policy solution to a social problem) that describe structural barriers to childcare and policy solutions to address these barriers may be particularly effective to persuade individuals inclined to oppose such policies to become supportive.
- Inoculation messages (messages designed to prepare audiences for encountering and building resistance to opposing messages) may protect favorable childcare policy attitudes in the face of oppositional messaging.
Context: Early childhood education (ECE) programs enhance the health and social well-being of children and families. This preregistered, randomized, controlled study tested the effectiveness of communication strategies to increase public support for state investments in affordable, accessible, and high-quality childcare for all.

Methods: At time 1 (August-September 2019), we randomly assigned members of an online research panel (n = 4,363) to read one of four messages promoting state investment in childcare policies and programs, or to a no-exposure control group. Messages included an argument-based message (“simple pro-policy”), a message preparing audiences for encountering and building resistance to opposing messages (“inoculation”), a story illustrating the structural nature of the problem and solution (“narrative”), and both inoculation and narrative messages (“combined”). At time 2 (two weeks later) a subset of respondents (n = 1,436) read an oppositional anti-policy message and, in two conditions, another narrative or inoculation message. Ordinary least squares regression compared groups’ levels of support for state investment in childcare policies and programs.

Findings: As hypothesized, respondents who read the narrative message had higher support for state investment in childcare policies than those who read the inoculation message or those in the no-exposure control group at time 1. Among respondents who were initially opposed to such investments, those who read the narrative had greater support than respondents who read the simple pro-policy message. Those who received the inoculation message at time 2 were more resistant to the anti-policy message than respondents who did not receive such a message, but effects from exposures to strategic messages at time 1 did not persist at follow-up.

Conclusions: Results offer guidance for policy advocates seeking to increase public support for early childhood policies and programs and could inform broader efforts to promote high-value policies with potential to improve population health.

Keywords: persuasive communication, education, early childhood, public policy, health policy, public opinion.

It is well established that early childhood (ages 0-5 years) is a critical age for social, emotional, and physical development with far-reaching consequences over the life course.¹ There is also a growing body of evidence that investments in early childhood education (ECE) policies and interventions can enhance long-term social well-being, economic outcomes,
and health of children and families, particularly among socially
disadvantaged groups such as low-income families and families
of color. Systematic reviews offer strong evidence that ECE
programs such as high-quality preschool and childcare increase school
readiness and prevent developmental delay. Reviews also establish
that increased availability of affordable childcare increases labor force
participation and work hours among mothers of young children. A
newer but rapidly growing body of literature has found evidence for
long-term health effects of ECE programs and interventions. Although
some studies find evidence that participation in childcare is linked to
short-term increases in some communicable diseases and missed school
days, others show no short-term differences in serious infections.
Other studies find evidence for short-term health benefits, including
reduced rates of asthma, favorable parental assessments of child
health, and increased use of health care services such as vaccination
guideline adherence. Longitudinal cohort studies provide evidence
of longer-lasting health benefits of ECE into adolescence and
beyond, including reduced smoking, lower blood pressure, higher
self-rated health, and reductions in other behavioral risk factors for
cardiovascular disease. Econometric analyses that consider the
broad set of costs and benefits of ECE programs estimate that they are
cost-effective, offering anywhere from $2 to $12 of societal return per
$1 invested. This accumulation of evidence has led many health and
social advocacy organizations to call for greater public investment in
ECE policies and programs across the globe. ECE is widely considered
to be a high-value strategy for strong population health benefits.

In recognition of the health and social benefits of ECE, a robust
literature has explored structural, political, and economic factors that
shape public support for ECE policies and programs. Most of this
work, however, has involved cross-national comparisons between Euro-
pean countries, most of which have stronger social safety nets (and
public expectations that governments provide such supports) than in the
United States. Despite strong evidence and calls for greater investment
in childcare and early education, the United States ranks near the bot-
tom of developed nations in terms of per capita investment in ECE.
Although some US federal ECE policies (including the Child Care and
Development Block Grant, Head Start, and Early Head Start programs)
have gathered bipartisan support in recent years, most ECE policies
and programs are implemented at the state and local level.
Care and Development Block Grant is distributed federally but implemented by states, and additional state-level ECE investments are funded by various budgetary mechanisms (general fund appropriations, block grants, specific state funding formulas). As a result, states vary widely in the extent to which they support pre-kindergarten programs, offer incentives to ECE providers, and/or fund training grants to promote high-quality ECE.\textsuperscript{33,34}

We focused the current study on public support for US state investment in affordable, accessible, and high-quality childcare. One challenge for broader investment in programs that make ECE affordable and accessible involves long-standing conflicts between the gender diversity of the American workforce and usually gendered ideals about the virtues of stay-at-home parenting. A large majority of both fathers (92.3\%) and mothers (71.2\%) with children are employed at least part-time outside of the home.\textsuperscript{35,36} However, survey data published in 2017 indicate that more than twice as many Americans believe that having at least one parent not work outside the home is an ideal situation for a young child in a two-parent household, compared to those who say that both parents working full time is ideal (44\% vs 18\%).\textsuperscript{37} Opposition to accessible and affordable childcare for all—which is often tied to political partisanship and emphasizes themes of family autonomy, parental responsibility, and opposition to government investment in social issues—has emerged in both historical and recent ECE-related policy discussions.\textsuperscript{36-38}

Broad public support will be critical to the future political feasibility of increased state investment in ECE policies and programs. Therefore, likely supporters will need to be engaged in and mobilized on the issue, and opposition among currently resistant constituencies will need to be overcome. The general public can influence the likelihood of policy passage in a variety of ways, including voting directly on ballot initiatives or referenda (although this influence is limited to direct-democracy states), voting for politicians who support these policies, voicing support for specific policies in public opinion polls, and applying pressure to officials and leaders of relevant organizations (e.g., schools, childcare centers) to act through a variety of advocacy behaviors, such as contacting representatives, organizing coalitions, and signing petitions. Public opinion, effective framing of policy issues, and public advocacy can influence the likelihood of policy proposals, passage, and implementation.\textsuperscript{39-44}

We had three primary aims. First, we tested four theory-based message strategies among members of the general public: an argument-based advocacy message (“simple pro-policy”); a forewarning that others
might try to persuade them with refutations of common oppositional arguments ("inoculation"); a story incorporating characters, setting, and other elements of narrative to illustrate the structural nature of the problem and solution ("narrative"); and both inoculation and narrative messages ("combined"). We were interested in whether these message strategies could increase public support for state investments to make high-quality, affordable, and accessible childcare available for all. Second, we tested whether the inoculation message strategy conferred resistance to subsequent exposure to an oppositional anti-policy message focused on the value of stay-at-home parenting, parental responsibility, and limited government intervention. Third, we explored whether the effects of narrative or inoculation messages differed based on a respondent’s pre-existing level of support for state investments in childcare policy.

**Theory-Based Message Strategies**

There is a robust literature in communication and political science, under the broad label of framing theory, that offers guidance on strategies to communicate about health and social issues in ways that invite support for policy interventions.\(^{45,46}\) Broadly speaking, this work suggests that messages (called “thematic frames”) that actively connect audiences to the causes, outcomes, and opportunities for policy action—the broader context—have potential to shift public support toward greater state investment in ECE policies and programs.\(^{45-49}\) However, this research does not offer clear guidance on formats for such messaging (e.g., didactic messages offering arguments versus stories that convey the same arguments in narrative format), and it does not identify strategies to offset oppositional arguments that are inevitable in policy debates, including those related to state investment in ECE policy.

For additional guidance on message design, literature on policy narratives and inoculation messaging are useful. Policy narratives are short stories, such as those at the foundation of a news story or policy testimony, that describe how policies (e.g., broader access to high-quality ECE programs) can achieve favorable social outcomes or avoid unfavorable ones.\(^{50,51}\) Policy narratives typically have a setting, characters (e.g., victims, villains, heroes), a plot (which unfolds over time and organizes character motives and causal events), and a moral (i.e., the policy solution or solutions offered). Previous work on policy narratives offers many
examples of the successful use of such narratives to increase public support for a variety of health-related policies, as well as to change state legislators’ mindsets about health issues that affect children. \textsuperscript{52-55} Theory and research on policy narratives indicate that short stories about individuals and communities can convey, in a concrete way, causal linkages between social determinants of health (e.g., early childhood experiences and interventions) and health trajectories and outcomes. \textsuperscript{53-56} Narratives provide opportunities to connect audiences with characters representing groups who live in challenging physical, social, and economic environments—conditions that audience members may never have experienced but need to understand to fully consider the reasons for and potential outcomes of the policy at issue. \textsuperscript{52-56} Stories that engage, absorb, and transport the audience also reduce the likelihood of resistance to a message (which may take the form of making counterarguments to pro-policy arguments) because audience members are actively engaged in making sense of the events that are unfolding. \textsuperscript{57,58}

There is evidence that narratives are a persuasive and frequently used form of evidence in policymaking. \textsuperscript{50,51,59} However, previous research has not tested the effectiveness of policy narrative strategies in the context of ECE policies and programs.

In contrast to policy narratives, inoculation messages prepare audiences for the likelihood that they will encounter persuasive messages and can confer resistance to those messages in advance. \textsuperscript{60,61} Inoculation messaging is analogous to medical inoculation, whereby a body is exposed to a weakened virus that is powerful enough to produce antibodies and confer lasting resistance, but not strong enough to lead to full-blown infection. Similarly, exposure to a weak form of an oppositional message (e.g., a form that reveals faults in opponents’ arguments and in some cases illuminates their motives) can help individuals develop counterarguments to have at their disposal to offset oppositional messages.

A large body of work, including a meta-analysis, \textsuperscript{61} shows that inoculation messages confer resistance to subsequent persuasive messages. \textsuperscript{54,60-63} Much of this work suggests that resistance to opposing messages is particularly likely among audiences who are initially inclined toward support of the originally advocated position. \textsuperscript{60,61} In the context of promoting ECE policies and programs, one form of inoculation (the one adopted in the current study) involves warning the public about counterarguments that are likely to emerge from opponents of these policies. Inoculation messages have been found to
promote increased scrutiny of oppositional arguments, which can reduce their influence on policy support or intentions to engage in policy advocacy.

**Study Hypotheses**

Informed by framing, narrative, and inoculation theory and research, we developed a series of hypotheses for subsequent testing in a preregistered, longitudinal, randomized, and controlled messaging experiment. We preregistered the study on the Open Science Framework (OSF) website (https://osf.io/jzyps?view_only=5fa4af0139d14010b0c4cd6df2b1337b) and note throughout the paper where hypotheses and methodological decisions were included in the preregistration.

In light of evidence that narrative messages have been more persuasive than nonnarrative messages in policy contexts, we began with the prediction that narrative messages would outperform the (a) no-exposure control group (arm 1), (b) simple pro-policy message (arm 2), and (c) inoculation message (arms 4 and 7) in promoting policy support at time 1 (preregistered hypothesis 1 [PH1]). We further hypothesized that both the (a) narrative and (b) inoculation messages would outperform the (i) no-exposure control group (arm 1) and (ii) simple pro-policy message (arm 2) on policy support at time 2 in the face of opposition (preregistered hypothesis 2 [PH2]). Based on recent work, we predicted that the initial persuasive advantage of the narrative message would attenuate but not disappear entirely, and we expected the inoculation message to confer resistance to the oppositional message at time 2 and thus offset the earlier (expected) persuasive disadvantage at time 1. See Table 1 for further information on study design.

We also wanted to determine whether the timing of the narrative and inoculation messages is important in shaping subsequent policy support. Previous work in the context of policies about marketing unhealthy products found that concurrent inoculation plus narrative messages did not outperform either strategy in isolation, but previous studies did not test whether presenting these messages in sequence can enhance their impact. We therefore asked whether sequential narrative and inoculation messages (arms 6 and 7) would outperform concurrent ones (arm 5), or either strategy in isolation (arms 3 and 4), in shaping policy support,
| Arm | Approach                               | Time 1 Message (analytic n = 4,363) | Time 2 Message (target n = 2,400 total, resurveyed from time 1) |
|-----|---------------------------------------|-------------------------------------|---------------------------------------------------------------|
| 1   | Control condition                      | None                                | Anti-policy message                                           |
| 2   | Pro-policy only                        | Simple pro-policy message           | Anti-policy message                                           |
| 3   | Pro-policy narrative only              | Pro-policy narrative                 | Anti-policy message                                           |
| 4   | Pro-policy inoculation only            | Pro-policy inoculation               | Anti-policy message                                           |
| 5   | Combined, concurrent                   | Pro-policy narrative + pro-policy inoculation | Anti-policy message                                           |
| 6   | Combined, sequential, inoculation delayed | Pro-policy narrative                  | Pro-policy inoculation, then anti-policy message               |
| 7   | Combined, sequential, narrative delayed | Pro-policy inoculation               | Pro-policy narrative, then anti-policy message                |
under competition (i.e., with concurrent exposure to a competing anti-policy message), at time 2 (preregistered research question 1 [PRQ1]).

We proposed two additional, non-preregistered hypotheses about the conditional effects of prior attitudes on narrative and inoculation effects. In light of prior research findings that narrative messages may be particularly persuasive among those who are inclined to oppose an advocacy message, we hypothesized that the narrative message (arms 3 and 6) would outperform the (a) control group (arm 1), (b) simple pro-policy message (arm 2), and (c) inoculation message (arms 4 and 7) in promoting policy support at time 1 among participants who initially opposed state investment in childcare policies and programs (hypothesis 3 [H3]). In light of previous work indicating that inoculation messages tend to resonate among audiences who are initially inclined to support a policy, we hypothesized that the inoculation message (arms 4 and 7) would outperform the (a) control group (arm 1), (b) simple pro-policy message (arm 2), and (c) narrative message (arms 3 and 6) in promoting policy support at time 1 among participants who initially supported state investment in childcare policies and programs (hypothesis 4 [H4]).

Methods

Sample Selection and Demographics

We contracted with Survey Research Institute at Cornell University to recruit a national sample of US adults ages 18 and older from the Marketing Systems Group online survey research panel. A sample of panel members balanced by age, gender, and political party living in the United States received an email invitation to participate in a study described as being “about how people think about a variety of social issues that decision makers are considering in American communities.” The study was deemed exempt by the Institutional Review Boards at the authors’ home institutions. Between August 12 and September 13, 2019, 5,344 panelists completed the time 1 survey in a mean time of 15.2 minutes (median, 11.4 minutes). We emailed each respondent again and asked them to complete a follow-up study approximately 2 weeks later (time 2; mean time between surveys, 16.7 days; median, 14.6 days; range, 6.5-35.9 days; interquartile range [IQR], 12.2-21.0 days). Between August
27 and September 20, 2019, 2,237 panelists (41.9% of original respondents) completed the time 2 survey in an average of 9.1 minutes (median, 6.6 minutes).

We recorded time spent on each message page and removed from all analyses those respondents who spent fewer than 20 seconds on any study message (a duration we deemed necessary to gain at least basic understanding of the message). This decision, which we had preregistered on OSF, reduced the analytic sample for time 1 to 4,363 respondents (mean survey completion time, 16.9 minutes; median, 12.8 minutes). The analytic sample for time 2 was 1,436 respondents (mean survey completion time, 10.4 minutes; median, 7.8 minutes). The follow-up rate for the analytic sample was thus 33.5% (mean time between surveys, 17.1 days; median, 15.0 days; range, 6.5-35.9 days; IQR, 12.9-21.9 days). All subsequent data descriptions and analyses make use of the analytic sample.

We compared the demographic composition of respondents in the analytic time 2 sample and those who were part of the analytic time 1 sample but were not included in the time 2 analysis (due to either attrition or failure to spend 20 seconds on the messages). We conducted $t$ tests and $\chi^2$ tests (depending on the level of measurement of the demographic variable), which revealed that the time 2 sample skewed older (time 1 mean age, 47.52 years; time 2 mean age, 51.12 years), more educated (34% with college or advanced degree at time 1; 37% at time 2), more likely to identify as a partisan (8% had no party preference at time 1; 5% at time 2), more conservative (29% conservative at time 1; 31% at time 2), more likely to identify as white (80% at time 1; 83% at time 2), less likely to identify as Black (14% at time 1; 11% at time 2), less likely to identify as races other than white, Black, or Hispanic (i.e., other race: 9% at time 1; 8% at time 2), and less likely to be parents (16% were parents of at least one child age 5 years or younger at time 1; 13% at time 2; 35% were parents of at least one child of any age at time 1; 32% at time 2). These differences were significant (see Table 2); however, with one exception, they did not differ by randomized condition. Therefore, we did not adjust estimates for differential attrition in subsequent analyses.

Of note, both time 1 and time 2 analytic study sample demographics diverged from US Census estimates of the US population as follows:
|                | Time 1 Respondents (n = 4,363) |                | Time 2 Respondents (n = 1,436) |                |
|----------------|---------------------------------|-----------------|---------------------------------|-----------------|
|                | Frequency (or Mean) % (or SD)   | \( \chi^2 \) or F for differences by randomized group, \( P \) | Frequency (or Mean) % (or SD)   | \( \chi^2 \) or F for differences by randomized group, \( P \) |
| **Age**        | 47.5 y (mean) 15.6 y (SD)       | \( F_{6,4434} = 5.48, \)                       \( P < .001 \) | 51.1 y (mean) 14.8 y (SD) | \( F_{6,1425} = 0.58, \)                       \( P = 0.75 \) |
| **Education**  |                                 | \( \chi^2 (16) = 14.41, \)                       \( P = .568 \) |                                 | \( \chi^2 (24) = 22.66, \)                       \( P = .54 \) |
| Less than high school diploma | 158 3.8 |                                 | 44 3.1 |
| High school diploma/GED | 981 23.8 |                                 | 297 20.7 |
| Some college or tech school | 1,578 38.4 |                                 | 563 39.2 |
| Bachelor’s degree | 1,014 24.6 |                                 | 379 26.4 |
| Advanced degrees | 384 9.3 |                                 | 153 10.7 |
| **Household income, $** | \( \chi^2 (20) = 19.74, \)                       \( P = .474 \) | \( \chi^2 (30) = 48.29, \)                       \( P = .019 \) |
| 0-24,999 | 956 23.3 | 298 20.8 |
| 25,000-49,999 | 1,197 29.1 | 430 30.0 |
| 50,000-74,999 | 811 19.7 | 300 20.9 |
| 75,000-99,999 | 485 11.8 | 178 12.4 |
| ≥100,000 | 583 14.2 | 201 14.0 |
| Declined to respond | 79 1.9 | 28 2.0 |
| **Sex/gender** |                                 | \( \chi^2 (8) = 11.03, \)                       \( P = .2 \) |                                 | \( \chi^2 (12) = 19.51, \)                       \( P = .077 \) |
| Female | 2,203 50.6 | 715 49.8 |

*Continued*
### Table 2. Continued

|                          | Time 1 Respondents (n = 4,363) | Time 2 Respondents (n = 1,436) | \( \chi^2 \) or \( F \) for differences by randomized group, \( P \) |
|--------------------------|-------------------------------|---------------------------------|------------------------------------------------------------------|
|                          | Frequency (or Mean)           | % (or SD)                       |                                                                   |
| Male                     | 2,137                         | 49.0                            |                                                                   |
|                          | 18                            | 0.4                             |                                                                   |
| Transgender/nonbinary    |                               |                                 |                                                                   |
| Political party          |                               |                                 |                                                                   |
| Democrat                 | 1,590                         | 36.5                            |                                                                   |
|                          | 551                           | 38.4                            |                                                                   |
| Republican               | 1,263                         | 29.0                            |                                                                   |
|                          | 443                           | 30.9                            |                                                                   |
| Independent              | 1,139                         | 26.1                            |                                                                   |
|                          | 369                           | 25.7                            |                                                                   |
| Another party/no preference | 370                       | 8.5                             |                                                                   |
|                          | 73                            | 5.1                             |                                                                   |
| Political party          |                               |                                 |                                                                   |
| (with leaners)           |                               |                                 |                                                                   |
| Democrat                 | 2,345                         | 54.3                            |                                                                   |
|                          | 782                           | 54.8                            |                                                                   |
| Republican               | 1,974                         | 45.7                            |                                                                   |
|                          | 645                           | 45.2                            |                                                                   |
| Liberal                  | 1,294                         | 31.5                            |                                                                   |
|                          | 469                           | 32.7                            |                                                                   |
| Conservative             | 1,352                         | 32.9                            |                                                                   |
|                          | 511                           | 35.6                            |                                                                   |
| Moderate                 | 1,458                         | 35.5                            |                                                                   |
|                          | 454                           | 31.7                            |                                                                   |

\( \chi^2 (12) = 18.62, \ P = .098 \)

\( \chi^2 (18) = 24.46, \ P = .141 \)

\( \chi^2 (4) = 3.05, \ P = .55 \)

\( \chi^2 (6) = 9.38, \ P = .153 \)

\( \chi^2 (8) = 5.74, \ P = .676 \)

\( \chi^2 (12) = 16.6, \ P = .165 \)

Continued
| Race/ethnicity (not mutually exclusive) | Time 1 Respondents (n = 4,363) | Time 2 Respondents (n = 1,436) |
|----------------------------------------|--------------------------------|--------------------------------|
|                                       | Frequency (or Mean) | % (or SD) | $\chi^2$ or $F$ for differences by randomized group, $P$ | Frequency (or Mean) | % (or SD) | $\chi^2$ or $F$ for differences by randomized group, $P$ |
| White                                 | 3,285 | 79.9 | $\chi^2(4) = 3.74, P = .443$ | 1,193 | 83.1 | $\chi^2(6) = 2.73, P = .842$ |
| Black                                 | 566   | 13.8 | $\chi^2(4) = 2.3, P = .68$ | 165   | 11.5 | $\chi^2(6) = 2.67, P = .85$ |
| Hispanic/Latinx                       | 399   | 9.7  | $\chi^2(4) = 1.22, P = .875$ | 122   | 8.5  | $\chi^2(6) = 2.5, P = .868$ |
| Other race                            | 382   | 9.3  | $\chi^2(4) = 2.15, P = .709$ | 114   | 7.9  | $\chi^2(6) = 5.59, P = .471$ |
| Parents (with children age $\leq 5$ y) | 643   | 15.6 | $\chi^2(4) = 7.58, P = .108$ | 184   | 12.8 | $\chi^2(6) = 7.14, P = .308$ |
| Parents (with children of any age)    | 1441  | 35.0 | $\chi^2(4) = 1.32, P = .858$ | 454   | 31.6 | $\chi^2(6) = 4.33, P = .631$ |
| Participated in time 2 wave           | 1,436 | 32.9 | $\chi^2(6) = 42.04, P < .001$ | –     | –    | – |

The columns labeled, "$\chi^2$ or $F$ for Differences by Randomized Group, $P$" present results from a formal test of whether the demographic characteristic was balanced between randomized groups, both at time 1 and at time 2. $P$ values less than .05 denote variables that were unbalanced and were therefore included as covariates in ordinary least squares regression models, a decision that we described in our preregistered analysis plan.

Denotes a significant difference between the analytic time 2 sample and the rest of the analytic time 1 sample that was not included in the time 2 analysis (due to attrition or spending less than 20 seconds on a message) in their composition on that sociodemographic variable based on a $\chi^2$ test (for categorical variables) or $F$ test (for continuous variables).

We first asked respondents, “Generally speaking, do you think of yourself as a… Republican, Democrat, Independent, Another party, or No preference?” We asked a follow-up question to respondents who answered “Independent, Another party, or No preference”: “If you had to choose, do you think of yourself as closer to the Republican Party or Democratic Party?” The variable that “includes leaners” includes respondents who picked Democrat or Republican in response to the first prompt OR chose another category but thought of themselves as closer to either the Democratic or Republican Party in the follow-up question.

The test in the Time 1 column presents results from a formal test of whether there was differential study attrition at follow-up by randomized condition.
• Years of formal education: 32.1% of the US population age 25 years and higher has a bachelor’s degree or higher, versus 34.9% of the sample at time 1 and 37.1% at time 2.
• Race: 76.3% of the US population identifies as white alone, versus 79.9% of the sample at time 1 and 83.1 at time 2.
• Ethnicity: 18.5% of the US population identifies as Hispanic/Latinx, versus 9.7% of the sample at time 1 and 8.5 at time 2.

Message Conditions and Content

We randomly assigned respondents to one of seven conditions that varied the message strategy (simple pro-policy, pro-policy narrative, pro-policy inoculation, or a no-message control group) in isolation or in different combinations, with an opposing anti-policy message delivered to all respondents at time 2 (Table 2). A key design element of the experiment was the ability to test how resilient each of these approaches was to the presence of a competing, anti-policy message at time 2—a decision designed to simulate the real-world context of public policy debates where policy advocates and opponents compete for the public’s attention and support. Therefore, we designed the randomized experiment to compare the effectiveness of each strategy in isolation in the short term (at time 1), as well as in the context of a competing message that offers arguments in opposition to the targeted ECE policies (at time 2).

At time 1, all respondents provided informed consent and then answered a series of questions about their preexisting support toward three childcare policies in the United States (“targeted policies”) embedded within a series of distractor questions about other public health and social issues. Participants randomly assigned to message arms of the study then read a pro-policy message corresponding to their assigned group. Respondents in the control group proceeded directly to the next set of questions. Respondents then proceeded to the rest of the survey, which included questions about their postexposure policy support (including the targeted policies as well as a larger set of nontargeted policies) and sociodemographics.

At time 2, respondents provided informed consent and then either read an anti-policy message (in study arms 1 through 5) or an additional pro-policy message (inoculation in study arm 6, narrative in study arm
7) followed by an anti-policy message. After the anti-policy message, respondents proceeded to answer the same set of policy support questions measured at time 1.

Each pro-policy message focused on three targeted state policies that have been proposed by early childhood development researchers and advocates to address the lack of affordable, accessible, and high-quality childcare: (a) providing subsidies to families to help families pay for childcare during parents’ working hours; (b) providing financial incentives to childcare companies/organizations to increase the number of high-quality and affordable childcare facilities available across all communities; and (c) offering financial incentives to childcare companies/organizations to provide their childcare professionals with ongoing training and a living wage. Where possible, we used verbatim language across all pro-policy messaging conditions, and all messages featured the same three basic arguments (described next). Full texts of all messages are available at the OSF preregistration link.

All of the pro-policy messages argued that positive effects of high-quality childcare endure into the early adult years and are particularly important for children whose families have very limited financial resources. Each of the messages further emphasized the need to invest more in communities that are starting with the least—thus emphasizing the value of equity. However, we avoided explicit use of the term “equity,” in an attempt to evade the strong political polarization associated with messages that explicitly articulate this value.66

The simple pro-policy message (521 words, appearing in arm 2 at time 1) offered discrete arguments about the value of investing in affordable, accessible, and high-quality childcare for all, and why state and local leaders should consider policies that support families and the professionals who provide high-quality childcare. The message emphasized three core themes: (a) parents and families nationwide recognize the challenge of finding stimulating, safe, and quality care for their children that also does not break the family bank; (b) all children, regardless of how much money their parents earn, deserve a strong start in life and the opportunity to participate in engaging and stimulating social and learning environments; and (c) states with robust childcare options are not only supporting families and creating enriching environments for their youngest children but also supporting businesses and the local economy.

We chose to feature these arguments in consultation with an advisory panel of developmental scholars and policy advocates who work on the
issue of ECE policy. The simple pro-policy message did not include key features and elements of either narrative (setting, character, and plot) or inoculation messages (forewarning or refutational preemption).

The narrative message (671 words, appearing in arms 3 and 6 at time 1, and in arm 7 at time 2) told a story about Alisha and Jason, working parents living in Denver, Colorado, who faced struggles with finding affordable and high-quality childcare for their small children. The story followed evidence-based guidance for the design of narrative messages for social change.67 The message argued that access to childcare is an increasingly common challenge when both parents have to work to support the family, and that this dilemma forces difficult choices among life essentials for many families. The message recounted Alisha and Jason’s efforts to address their childcare challenges, placed their struggles in a broader context (“parents and families nationwide recognize the challenge of...”), and described how specific targeted policies could help address the problem.

The inoculation message (694 words, appearing in arms 4 and 7 at time 1, and in arm 6 at time 2) largely mirrored the simple pro-policy message but included additional language to warn readers of attitudinal threats (forewarning) and to refute anticipated arguments (refutational preemption). In addition to language that is traditional in inoculation message scripts,60,61 we included language used in recent work54,68 to induce additional feelings of reactance toward oppositional messages: “But we all have the freedom to think for ourselves about where we stand on these types of policies and the importance of childcare to states and communities.”

The combined condition (arm 5 at time 1) displayed two messages in sequence: an abridged narrative (page 1) followed by the full-length inoculation (page 2). We shortened the narrative by cutting identical language that was used in the inoculation and narrative messages. The abridged narrative and the inoculation message were 383 and 694 words long, respectively.

The anti-policy message (443 words and appearing in all arms at time 2) used anti-policy content and language found in recent news stories about childcare policy debates. The message voiced explicit opposition to childcare policies and programs by referencing widely held American values of parental responsibility (e.g., a need to financially plan for the decision to have children in the first place), the perceived value of mothers staying out of the paid workforce to raise children at home,
and the appropriate limitation of government intervention in domestic matters.

Measures

Preexposure (Preexisting) Policy Support. Prior to message exposure, we asked participants to indicate on a scale ranging from 1, “strongly oppose,” to 7, “strongly support,” their positions on three targeted policies designed to increase affordable and high-quality childcare for all. These questions were embedded within a series of nine other distraction questions about other public health and social issues (regulating the sale and marketing of sugary drinks, alcohol, and e-cigarettes to reduce use among children). The three targeted childcare policy items comprised a reliable measure, which we averaged to form a scale (mean, 5.04; SD, 1.54; Cronbach $\alpha$, 0.86).

Postexposure Policy Support at Time 1 and Time 2. After message exposure, we asked participants to indicate on a scale ranging from 1, “strongly oppose,” to 7, “strongly support,” their positions on seven policies designed to increase affordable and high-quality childcare for all. Three of these policies were explicitly targeted in the messages (as described previously); the other four were not targeted by the messages and emphasized access to existing evidence-based programs (Head Start and Early Head Start), quality standards and benchmarks for childcare, and child and dependent care tax credits. We chose these policies, in consultation with the advisory panel described previously, to reflect a subset of recent ECE priorities and debates in states and communities across the United States. These three items on targeted policy support comprised a reliable composite measure (time 1: mean, 5.30; SD, 1.54; Cronbach $\alpha$, 0.91; time 2: mean, 5.04; SD, 1.05; Cronbach $\alpha$, 0.91). The other four nontargeted childcare policy items also comprised a reliable composite measure (time 1: mean, 5.35; SD, 1.35; Cronbach $\alpha$, 0.87; time 2: mean, 5.21; SD, 1.40; Cronbach $\alpha$, 0.85).

Analytic Approach

We used R Studio Version 1.2.5019 for all analyses. We first used $\chi^2$ and ANOVA to test whether sociodemographics were comparable across randomized groups (see Table 2). Out of 1 ANOVA test and 13 $\chi^2$
statistical tests at time 1, only the test for age \((P < .001)\) was significant at \(P < .05\). As outlined in our preregistered analysis plan on OSF, we included age as a covariate in all analyses testing study hypotheses at time 1. At time 2, only the test for household income \((P = .019)\) was significant at \(P < .05\). We included income as a covariate in all analyses testing study hypotheses at time 2. In an exploratory sensitivity analysis, we analyzed study data without covariates and the results were substantively equivalent (indeed, nearly identical), providing evidence that the inclusion of covariates did not influence our interpretations or conclusions.

We estimated ordinary least squares (OLS) regression models using indicator variables for message conditions to test hypotheses about the effects of narrative, inoculation, and simple pro-policy messages on promoting policy support at time 1 (PH1), as outlined in our preregistered analytic plan. We combined the two narrative conditions (arms 3 and 6) and inoculation conditions (arms 4 and 7) at time 1 because they were functionally equivalent (they differed only in time 2 messages). We rotated the comparison group by omitting different conditions from the list of independent variables in the model to test for differences between the narrative message and the control group (PH1a), simple pro-policy message (PH1b), and inoculation message (PH1c). We applied a Holm adjustment to all statistical tests to account for the fact that most hypothesis tests involved two or three different pairwise comparisons.

We also used OLS regression to test hypotheses about the effects of inoculation and narrative messages on policy support at time 2, this time considering all seven arms separately (PH2). We again rotated the comparison group by omitting that condition from the list of independent variables in the model to test for differences between the narrative and inoculation messages and the control group (PH2a), and simple pro-policy message (PH2b). Similarly, we used OLS regression to test the influence of sequential narrative and inoculation messages on policy support at time 2, comparing it to the influence of concurrent narrative and inoculation messages, or the influence of either strategy in isolation (PRQ1). We rotated the comparison group between the concurrent arm (PRQ1a), narrative in isolation (PRQ1b), and inoculation in isolation (PRQ1c) to address each aspect of PRQ1.

In a separate analytic step, we created interaction terms between preexisting policy support and dummy variables for each randomized condition to test whether the effects of condition differed by baseline
levels of targeted policy support (H3, H4). For H3, we rotated the comparison group to permit comparisons to the control group (H3a), simple pro-policy message (H3b), and inoculation message (H3c). For H4, we rotated the comparison group to permit comparisons to the control group (H4a), simple pro-policy message (H4b), and narrative message (H4c). We probed significant interactions using the Johnson-Neyman technique to test whether strategic messages had different effects by variations in baseline targeted policy support.70 We present results from all statistical tests in the text of this article and show group differences using bar and line graphs to aid in the ease of interpretation.

We tested the robustness of our results with additional analyses, including ordered logistic regression models on an ordinal version of the targeted policy support scale (computed by adding responses to the three items that comprised the scale, producing an ordered variable ranging from 3 to 21) to account for the fact that the original items used an ordinal scale. All tests of preregistered hypotheses and research questions using this method produced substantively equivalent results (see Table 3), confirming that our results are robust to use of OLS or ordered logistic regression models.

We also repeated each test of time 1 hypothesis or research questions with the subset of respondents who completed both waves of the study (see Table 4). These analyses also produced generally similar results, although a few formal tests of hypotheses involving comparisons between message conditions and the no-exposure control group were reduced in magnitude or became nonsignificant due to a loss of statistical power. The results involving the full sample remain the most valid tests of time 1 study hypotheses because they make use of all available data, but we acknowledge that divergence in some results for the cohort subsample (combined with high study attrition) raises questions about the generalizability of tests in the time 2 data, a concern we return to in the Discussion section.

Finally, we conducted a series of additional exploratory analyses to test for the possibility of conditional effects by selected variables that were not the focus of study hypotheses: political party, political ideology, and whether a respondent had children (any age) or young children (age 5 years or under). These analyses did not provide evidence of systematic differences in the effects of messages on policy support by any of these potential moderating variables. Data and syntax for all study analyses are available at https://doi.org/10.7298/63k2-dy26.
Table 3. Summary of All Formal Tests of Preregistered Hypotheses and Research Questions Using OLS and Ordered Logistic Regression Models

| Supported? | Reference | Comparison | $b$  | $\beta$ | $P$  |
|------------|-----------|------------|------|---------|------|
| **OLS regression model results, PH1** | | | | | |
| PH1a       | Yes       | Control    | Narrative | 0.48 | 0.14 | <.001 |
| PH1b       | No        | Simple     | Narrative | 0.05 | 0.01 | .527  |
| PH1c       | Yes       | Inoculation| Narrative | 0.22 | 0.06 | <.001 |
| **Ordered logistic regression model results, PH1** | | | | | |
| PH1a       | Yes       | Control    | Narrative | 0.58 | –    | <.001 |
| PH1b       | No        | Simple     | Narrative | 0.03 | –    | .360  |
| PH1c       | Yes       | Inoculation| Narrative | 0.26 | –    | <.001 |
| **OLS regression model results, PH2** | | | | | |
| PH2a       | No        | Control    | Inoculation| 0.10 | 0.02 | .520  |
| PH2b       | No        | Simple     | Inoculation| 0.05 | 0.01 | .749  |
| PH2c       | No        | Control    | Narrative | 0.02 | 0.00 | .926  |
| PH2d       | No        | Simple     | Narrative | −0.03| −0.01| .845  |
| **Ordered logistic regression model results, PH2** | | | | | |
| PH2a       | No        | Control    | Inoculation| 0.09 | –    | .602  |
| PH2b       | No        | Simple     | Inoculation| 0.01 | –    | .938  |
| PH2c       | No        | Control    | Narrative | 0.02 | –    | .925  |
| PH2d       | No        | Simple     | Narrative | −0.06| –    | .753  |

*Continued*
### Table 3. Continued

| Supported? | Reference     | Comparison                  | $b$   | $\beta$ | $P$   |
|-----------|---------------|-----------------------------|-------|---------|-------|
| **OLS regression model results, PRQ1** |               |                             |       |         |       |
| PRQ1a     | Yes           | Narrative Delayed           | 0.60  | 0.12    | <.001 |
|           |               | Inoculation Delayed         | 0.51  | 0.10    | .003  |
| PRQ1c     | Yes           | Concurrent Delayed          | 0.41  | 0.08    | .019  |
|           |               | Narrative Delayed           | 0.39  | 0.08    | .019  |
| PRQ1e     | No            | Inoculation Delayed         | 0.30  | 0.06    | .063  |
|           |               | Concurrent Delayed          | 0.20  | 0.04    | .232  |
| **Ordered logistic regression model results, PRQ1** |               |                             |       |         |       |
| PRQ1a     | Yes           | Narrative Delayed           | 0.63  | –       | <.001 |
|           |               | Inoculation Delayed         | 0.56  | –       | .001  |
| PRQ1c     | Yes           | Concurrent Delayed          | 0.42  | –       | .017  |
|           |               | Narrative Delayed           | 0.45  | –       | .010  |
| PRQ1e     | No            | Inoculation Delayed         | 0.38  | –       | .025  |
|           |               | Concurrent Delayed          | 0.24  | –       | .166  |

Abbreviations: OLS, ordinary least squares; PH, preregistered hypothesis; PRQ, preregistered research question.
Table 4. Summary of All Formal Tests of Hypotheses and Research Questions at Time 1 Using the Overall Time 1 Sample \((n = 4,363)\) and the Subset of Respondents Who Completed Both Time 1 and Time 2 \((n = 1,436)\)

| Supported? | Reference | Comparison | \(b\) | \(\beta\) | \(P\) |
|------------|-----------|------------|--------|--------|------|
| OLS regression results, PH1, full sample \((n = 4,363)\) | | | | | |
| PH1a | Yes | Control | Narrative | 0.48 | 0.14 | <.001 |
| PH1b | No | Simple pro-policy | Narrative | 0.05 | 0.01 | .527 |
| PH1c | Yes | Inoculation | Narrative | 0.22 | 0.06 | <.001 |
| OLS regression results, PH1, cohort sample \((n = 1,436)\) | | | | | |
| PH1a | No | Control | Narrative | 0.22 | 0.06 | .098 |
| PH1b | No | Simple pro-policy | Narrative | 0.09 | 0.02 | .538 |
| PH1c | Yes | Inoculation | Narrative | 0.28 | 0.08 | .013 |
| OLS regression results, H3, full sample \((n = 4,363)\) | | | | | |
| H3a | Yes | Control | Narrative*preexisting policy support | –0.07 | –0.10 | .019 |
| H3b | No | Simple pro-policy | Narrative*preexisting policy support | –0.12 | –0.19 | <.001 |
| H3c | Yes | Inoculation | Narrative*preexisting policy support | –0.14 | –0.22 | <.001 |
| OLS regression results, H3, cohort sample \((n = 1,436)\) | | | | | |
| H3a | No | Control | Narrative*preexisting policy support | –0.07 | –0.11 | .135 |

Continued
| Supported? | Reference          | Comparison                                   | $b$   | $\beta$ | $P$   |
|------------|--------------------|----------------------------------------------|-------|---------|-------|
| H3b        | No                 | Simple pro-policy                            | −0.10 | −0.15   | .041  |
| H3c        | Yes                | Inoculation                                  | −0.12 | −0.18   | .003  |

**OLS regression results, H4, full sample (n = 4,363)**

| Supported? | Reference     | Comparison                                   | $b$   | $\beta$ | $P$   |
|------------|---------------|----------------------------------------------|-------|---------|-------|
| H4a        | Yes           | Control                                      | 0.07  | 0.11    | .009  |
| H4b        | No            | Simple-Pro                                   | 0.02  | 0.03    | .490  |
| H4c        | Yes           | Narrative                                    | 0.14  | 0.21    | <.001 |

**OLS regression results, H4, cohort sample (n = 1,436)**

| Supported? | Reference     | Comparison                                   | $b$   | $\beta$ | $P$   |
|------------|---------------|----------------------------------------------|-------|---------|-------|
| H4a        | No            | Control                                      | 0.05  | 0.07    | .308  |
| H4b        | No            | Simple-Pro                                   | 0.02  | 0.02    | .759  |
| H4c        | Yes           | Narrative                                    | 0.12  | 0.18    | .003  |

Abbreviations: H, hypothesis; OLS, ordinary least squares; PH, preregistered hypothesis.
Results

Effects of Narrative, Inoculation, and Their Combination on Policy Support at Time 1

Respondents exposed to the narrative message had greater targeted policy support at time 1 than those in the control group ($b = 0.48, \beta = 0.14, P < .001$; supporting PH1a) and those who read the inoculation message ($b = 0.22, \beta = 0.06, P < .001$; supporting PH1c), but not relative to those who read the simple pro-policy message ($b = 0.05, \beta = 0.01, P = .527$; rejecting PH1b). (See Figure 1.) The concurrent combination of narrative plus inoculation messages produced greater targeted policy support than was observed in the no-exposure control group, but the concurrent combination did not confer an additional persuasive advantage over the narrative or inoculation messages in isolation.

Although we did not offer any hypotheses about the potential for spillover effects into nontargeted policies, we also observed a similar pattern of spillover effects of the narrative message on nontargeted policy.
support at time 1. Respondents exposed to the narrative message had
greater nontargeted policy support at time 1 than those in the control
group ($b = 0.38, \beta = 0.13, P < .001$) and those who read the inoc-
ulation message ($b = 0.15, \beta = 0.05, P = .007$), but not relative to
those exposed to the simple pro-policy message ($b = 0.02, \beta = 0.01,$
$P = .712$). The concurrent combination of narrative plus inoculation
messages again outperformed the control group in levels of support for
nontargeted ECE policies, but the combination did not outperform any
of the other message conditions in isolation.

Effects of Narrative and Inoculation Messages
on Policy Support at Time 2

Respondents exposed to the narrative message at time 1 without a de-
layed pro-policy message at time 2 (arm 3) did not have significantly
greater levels of targeted policy support than the no-exposure control
group (arm 1; $b = 0.02, \beta = 0.00, P = .926$; rejecting PH2a) or those exposed to the simple pro-policy message at time 1 (arm 2;$b = -0.03, \beta = -0.01, P = .845$; rejecting PH2ai). (See Figure 2.)
Respondents exposed to the inoculation message at time 1 without an
additional pro-policy message at time 2 (arm 4) also did not have sig-
nificantly greater levels of targeted policy support than the no-exposure
group (arm 1; $b = 0.10, \beta = 0.02, P = .520$; rejecting PH2b) or those exposed to the simple pro-policy message at time 1 (arm 2; $b =
0.05, \beta = 0.01, P = .749$; rejecting PH2bi). Study results thus of-
fer no support for the idea that narrative or inoculation messages from
2 weeks prior were durable for 2 weeks, or that they conferred delayed
resistance to an anti-policy message that respondents were exposed to
approximately 2 weeks later. A series of exploratory analyses found no
evidence that the time between survey waves (which ranged between a
week and over a month) made a difference in message effects at time 2.

Results were substantively equivalent for nontargeted policies. The
narrative message (arm 3) did not outperform the no-exposure control
group (arm 1; $b = -0.06, \beta = -0.01, P = .683$) or simple pro-policy
message (arm 2; $b = 0.13, \beta = 0.03, P = .370$) in levels of support
for nontargeted policies at time 2. The inoculation message (arm 4) also
did not outperform the no-exposure control group (arm 1; $b = 0.06,$
$\beta = 0.02, P = .630$) or simple pro-policy message (arm 2; $b = 0.25,$
Effects of Delayed Narrative and Inoculation Messages on Policy Support at Time 2

Addressing PRQ1, respondents exposed to the narrative message at time 1 and the inoculation message at time 2 (arm 6) had higher levels of targeted policy support at time 2 than those exposed to both narrative and inoculation at time 1 without an additional, delayed pro-policy message (concurrent, arm 5; \(b = 0.41, \beta = 0.08, P = .019\)), the narrative message alone at time 1 without an additional pro-policy message (arm 3; \(b = 0.60, \beta = 0.12, P < .001\)), and the inoculation message alone at time 1 without an additional pro-policy message (arm 4; \(b = 0.51, \beta = 0.10, P = .003\). (See Figure 2.) Accounting for a Holm correction for alpha inflation associated with multiple hypothesis tests, there were no statistical differences in targeted policy support between respondents.
exposed to the inoculation message at time 1 and the narrative message at time 2 (arm 7) and those exposed to the narrative message alone at time 1 without an additional pro-policy message at time 2 (arm 3; $b = 0.39, \beta = 0.08, P = .019$), those exposed to the inoculation message alone at time 1 without an additional pro-policy message at time 2 (arm 4; $b = 0.30, \beta = 0.06, P = .063$), or those exposed to both narrative and inoculation at time 1 without an additional, delayed pro-policy message at time 2 (arm 5; $b = 0.20, \beta = 0.04, P = .232$).

From the overall pattern of results, we conclude that a recent inoculation message (immediately preceding the anti-policy message) likely conferred short-term resistance to oppositional messaging but did not confer long-term resistance (as evidenced by the fact that the time 1 inoculation message without an additional delayed message did not produce higher levels of policy support than the no-exposure control group). We further conclude that the persuasive effects of a recent narrative message attenuate in the face of competition from an oppositional message, as we did not observe the same persuasive advantage for the narrative message over the inoculation message at time 2 (when messages were under competition) that we observed at time 1 in the absence of oppositional messaging.

The pattern of effects for nontargeted policies was substantively equivalent to that observed for targeted policies. With regard to shaping support for nontargeted ECE policies, sequential messages with a delayed inoculation message (arm 6) outperformed the narrative message at time 1 in isolation (arm 3; $b = 0.45, \beta = 0.11, P = .002$), the inoculation message at time 1 in isolation (arm 4; $b = 0.33, \beta = 0.08, P = .019$), and the concurrent narrative plus inoculation messages at time 1 without an additional pro-policy message (arm 5; $b = 0.28, \beta = 0.07, P = .045$). Similar to targeted policy support, accounting for a Holm correction, sequential messages with a delayed narrative message (arm 7) did not outperform the narrative message at time 1 in isolation (arm 3; $b = 0.31, \beta = 0.08, P = .026$), the inoculation message at time 1 in isolation (arm 4; $b = 0.19, \beta = 0.05, P = .164$), or the concurrent narrative plus inoculation messages at time 1 without a delayed message (arm 5; $b = 0.14, \beta = 0.04, P = .288$) in shaping nontargeted policy support.
Effects of Narrative and Inoculation Conditional on Preexisting Levels of Policy Support

We next compared the effects of the narrative message (arms 3 and 6) on targeted policy support at time 1, conditional on preexisting levels of policy support, relative to the (a) control group (arm 1), (b) simple pro-policy message (arm 2), and (c) inoculation message (arms 4 and 7). In step 1, we regressed targeted policy support at time 1 on the four dummy-coded condition variables and a continuous preexisting policy support variable—functionally, this was a test of whether baseline targeted policy support predicted targeted policy support immediately after viewing the message. As expected, the preexisting policy support variable was a strong and statistically significant \( (P < .001) \) predictor of targeted policy support at time 1. Step 2 added interaction terms between preexisting policy support and dummy-coded condition variables into the model, rotating the comparison group to permit various pairwise comparisons. Adding the interaction terms between preexisting policy support and dummy-coded condition variables significantly improved overall model fit \( (R^2 \text{ change} = .003, F \text{ change} = 8.72, P < .001) \). The coefficient for the narrative*preexisting policy support was negative and significant when using the control condition (arm 1; \( b = -0.07, \beta = -0.10, P = .019 \)), the simple pro-policy message (arm 2; \( b = -0.12, \beta = -0.19, P < .001 \)), and the inoculation message (arms 4 and 7; \( b = -0.14, \beta = -0.22, P < .001 \)) as the comparison. This finding indicates that the narrative message was significantly more effective than all three other messages among respondents with lower preexisting policy support than those with more preexisting support. These results offer strong support for hypotheses H3a, H3b, and H3c.

The Johnson-Neyman technique (Figure 3) showed that the narrative message was significantly more effective than the simple pro-policy condition in increasing targeted policy support \( (P < .05) \) when the value of preexisting support was less than 4.99, but it was not statistically different at higher levels of preexisting support. The Johnson-Neyman technique also showed that the narrative message was significantly more effective than the inoculation message in increasing targeted policy support \( (P < .05) \) when the value of preexisting support was less than 5.61, but it was not statistically significant with higher preexisting support. We conclude that narrative message had favorable effects on policy sup-
Figure 3. Johnson-Neyman Technique Estimate of the Relative Persuasive Advantage of the Narrative Message vs the Simple Pro-Policy Message in Support for Targeted Early Childhood Education Policy at Time 1, Conditional on Levels of Preexisting Policy Support

When preexisting policy support is outside the interval [4.99, 7.00], the difference between the narrative and simple advocacy pro-policy message is $P < .05$.

We used the same regression analysis strategy to compare effects of the inoculation message and the (a) control group (arm 1), (b) simple pro-policy message (arm 2), and (c) narrative message (arms 3 and 6) on targeted policy support at time 1. The coefficient for the inoculation message was positive and significant when using either the control condition (arm 1; $b = 0.07, \beta = 0.11, P = .009$) or the narrative message (arms 4 and 7; $b = 0.14, \beta = 0.21, P < .001$) as the comparison, but not when the simple pro-policy message (arm 2; $b = 0.02, \beta = 0.03, P = .490$) was the comparison. This indicates that the narrative message was significantly more effective than the control group and the narrative message among respondents with higher preexisting policy support compared with those with lower preexisting support; thus the finding...
supports hypotheses H4a and H4c, but not H4b. The Johnson-Neyman technique (Figure 4) estimates that the inoculation message was significantly more effective than the control condition in increasing targeted policy support ($P < .05$) when the value of preexisting policy support was greater than 4.23, but the results were not significant at lower levels of preexisting support. We conclude that the inoculation message had favorable effects on policy support among respondents with higher baseline support when compared to the control condition.

**Discussion**

ECE programs and interventions enhance the health and social well-being of children and families. Informed by theory and research in communication and political science, we sought to identify effective strategies to increase public support for increased state investment in afford-
able, accessible, and high-quality childcare for all. Results offer concrete and actionable guidance for those who seek to confer population benefits by increasing state investment in ECE policies and programs. They also contribute to the literature on strategic communication in competitive messaging contexts by, for example, reinforcing the limitations of using single exposures to advance strategically framed messages in a competitive messaging environment. In the discussion that follows, we briefly summarize study results, discuss implications of this work for population health improvement via strategic efforts to broaden public support for ECE, describe the theoretical contributions of this work, acknowledge limitations of the research, and conclude with recommendations for future work to advance messaging in support of population health.

Summary of Results and Implications for Research and Practice

Evidence from our study demonstrates that simple advocacy messages emphasizing the need for affordable, accessible, and high-quality childcare for all can increase public support for state investment in these policies, at least in the short term. Although these effects were not large in magnitude, they show that public support for state investments in ECE policies and programs is malleable via strategically designed messages. We also found evidence that effects of these and other messages were not limited solely to the specific policies emphasized in the message—we consistently observed spillover effects of comparable magnitude for childcare policies that were not described in the messages. We designed all pro-childcare policy messages to reflect points of emphasis in recent ECE policy advocacy debates, including (a) broad acknowledgment of the need for stimulating, safe, and quality childcare, (b) the principle that all children deserve a strong start in life, and (c) the idea that robust state-level childcare infrastructure confers broader societal benefits for families, businesses, and economies. We structured messages around descriptions of what equitable contexts and solutions require, although we did not use the word “equity” because the term can invite politically polarized responses. This finding suggests it is possible to communicate effectively about principles of equity in ways that do not promote backlash, and that such messages can resonate across the political spectrum among members of the US public.
ECE has been touted as a policy domain with strong potential to enhance social well-being and health across the life course, making it a high-value population health investment. However, most Americans do not consider the health impacts of ECE as a primary factor shaping their support or opposition to ECE policies and programs. Therefore, we employed a messaging strategy that did not emphasize health benefits of ECE, although the message did begin by asserting that “quality child care is essential not only to the health and wellbeing of families, but also to the health of communities, businesses, and the local economy.” Whether or not health arguments are used to make the case for ECE investment may be inconsequential if broader access to affordable, high-quality childcare confers health benefits to children and families even when the policy is implemented for other reasons. It remains an open question whether advocacy for population health investments (such as ECE) is more successful when messengers make the case that such investments improve health. Future work should explore whether messages with a more central focus on health outcomes associated with ECE resonate with respondents.

We also found evidence that short stories that describe the structural barriers to childcare in concrete ways, as well as policy solutions to address them, can also shift public support toward greater state investment in childcare policies and programs. Notably, these stories were particularly resonant (relative to both a control group and a simple advocacy message) among respondents who, prior to message exposure, were inclined to oppose such investments. Subsequent analyses revealed that the pattern of message effects did not differ by political party or ideology, suggesting that narratives could potentially bridge partisan divides on this issue. This finding builds on previous work that has suggested that narrative formats may be particularly useful in communicating with people who hold oppositional attitudes to a social policy. Theory and research on narrative persuasion suggests that people process stories differently than they process arguments and other forms of evidence such as statistics and statements of fact. Narratives offer concrete examples of larger abstract concepts (such as the need for childcare as exemplified by characters Alisha and Jason), and, to the extent to which they engage readers in a story, narratives can reduce the likelihood of the audience engaging in counterarguing of the central message.

Although our findings suggest the promise of using narrative strategies to engage members of the general public who are ambivalent or in-
clined to oppose childcare policies, it remains to be seen whether these patterns are generalizable to key political stakeholders in the policymaking process, including ECE advocates, state legislators, and federal officials. There also remain important questions about how a narrative’s characters, setting, and plot may shape public or broader stakeholder responses to the message. The narrative in our study featured a couple with gender-traditional names, which may have invited inferences about their sexuality. We also deliberately chose character names that could be interpreted as identifying with multiple racial groups. By making these decisions, we did not explicitly engage with questions of sexual, gender, or racial/ethnic inequity in ECE or beyond. Future work should examine how people make sense of narratives with a more diverse set of characters, family structures, relationships, and identities.

Our study found evidence that inoculation messages protected favorable policy attitudes in the face of oppositional messaging, but this protective effect was only observed when exposure to these messages occurred within close temporal proximity to an oppositional message. Respondents who were exposed to an inoculation message immediately preceding an anti-policy message at time 2 were more likely to support childcare policies than those who were exposed to pro-policy messages two weeks earlier. The fact that exposure to the narrative message immediately prior to the oppositional message at time 2 did not produce the same advantage observed at time 1 in the absence of an oppositional message suggests that the inoculation strategy conferred some degree of resistance to the anti-policy message.

Time 1 analyses that were conditional on preexisting levels of support provide evidence that the inoculation strategy may have been resonant only among those respondents who were initially inclined to support the message’s advocated position. This finding is consistent with the idea embedded in previous work that inoculation may be particularly useful at protecting existing, favorable attitudes and policy support, but inoculation is less effective at changing the minds of individuals with initially unfavorable attitudes/policy opposition. ECE and population health advocates alike might consider using inoculation strategies under circumstances where there are broad and targeted coalitions of support who are likely to face well-funded oppositional messaging from groups and organizations opposed to the targeted policy change. The findings in our study about inoculation messaging also may have implications for timing of messages, such as across the trajectory of a policy campaign.
Our results suggest that inoculation messages may be particularly useful in contexts where citizens are exposed to oppositional messages immediately after pro-policy message exposure, such as a political candidate debate or a series of political ads aired during commercial breaks.

None of the message strategies tested in the current study produced measurable effects that endured beyond the short term (minutes following exposure). On the one hand, ECE policy advocates may be disappointed with this finding—which is consistent with meta-analytic evidence about the limited effects of strategically framed messages in competitive messaging contexts—because it demonstrates the limited persuasive efficacy of single exposures to strategic messages. On the other hand, it is by no means given that a forced exposure to a strategic message will generate even short-term changes in support for a social policy.

Research has made clear the fact that repeated message exposures are essential to catalyze sustained changes in attitude, behavior, and public policy. We liken our study to something akin to an efficacy trial in clinical medicine, as we assessed whether a (message) intervention produced an effect under ideal circumstances (focused attention to a message, invitation to reflect on the content in the form of subsequent survey questions). We nevertheless argue that such evidence is of value for strategic message design and planning, as these theory- and evidence-based strategies have proven successful in a controlled environment and thus hold promise for broader dissemination.

**Theoretical Contributions**

Our results contribute to broader theorizing about messaging in competitive contexts. As noted previously, a large body of literature (including hundreds of prior studies) has found that framing effects tend to be short-lived in isolation and reduced in magnitude when evaluated in the context of a competing message advocating an opposing point of view. The current study contributes to this body of work by complicating these conclusions—we found that the format and content of a competitive message matters—and by demonstrating that variance in the effects of different message formats and content is associated with prior attitudes toward the issue. Narrative message strategies seem to hold promise in shifting attitudes in audience members initially opposed to a policy, whereas inoculation message strategies may resonate
more effectively among those who are already inclined to support the policy. Furthermore, although single exposures to narrative and inoculation messages did not exert long-term influence on policy support when respondents were exposed to a subsequent oppositional message about two weeks later, a concurrent exposure to an inoculation message seemed to offer a (short-term) advantage in a competitive messaging context. In the context of a policy advocacy campaign, short-term shifts in public opinion can be meaningful. None of these strategies are panaceas, as the overall magnitude of effects remains limited even in the most favorable light of interpretation, but we hope that these results inspire further inquiry into how various message formats (narrative vs argument), timing (recent or delayed), and volumes of exposure (one exposure vs multiple exposures) shape public response to competitive messages in health and social policy contexts.

**Study Limitations**

The study’s reliance on a web-based sample precludes broad generalization of its results to the larger population of US residents or voters. Although we used quota sampling to ensure a reasonably balanced representation of age groups, genders, and political parties, the participants did not reflect the breadth of racial, ethnic, and socioeconomic diversity of the United States.

The study is further limited by its low follow-up rate, with less than 40% of time 1 respondents participating in the time 2 survey wave. Whereas there was strong evidence of differential attrition by a variety of sociodemographic categories, there was far less differential attrition by randomized study condition (for which the groups only differed on income). We thus feel confident that we have drawn valid causal inferences from the sample, but we acknowledge that differences between sample demographics and US Census estimates limit the extent to which results observed from this sample generalize to the US population as a whole. We further acknowledge that high rates of attrition and divergence in time 1 results between the full sample and the subset of cohort respondents who completed time 1 and 2 raise further concerns about the generalizability of results from the cohort subsample that were used in all time 2 analyses.
We also want to emphasize that members of the general public sometimes play a limited role in the policy process, although there are certainly examples where citizens directly influence state policy (as in direct democracy states, voting for politicians who carry out their policy promises). Our study does not address the variety of other relevant key stakeholders for policy messaging, such as elected officials (e.g., state legislators, governors, mayors, city council members) and members of coalitions and organizations that intersect with the issue (e.g., organizations that support ECE professionals, parent advocacy groups). These audiences might respond differently to the message strategies employed in our study.

Our conclusions are also limited by our reliance on a limited set of messages, each emphasizing the same three core themes, without repeated exposure, over a limited period of time. Other message strategies could also resonate among members of the general public; our data do not speak to this possibility. The no-exposure control group did not include any message content, and we cannot rule out the possibility that the presence of any message (whether simple, narrative, or inoculation) primed respondents to adopt more favorable policy responses.

The study also employed a design that was oriented toward testing the effectiveness of various theory-informed strategies (narrative and inoculation) to promote policies that support affordable, accessible, and high-quality childcare. We did not test the effectiveness of these strategies in messages in opposition to state investments in these policies and programs; rather, we only employed anti-policy messages at time 2 as a test of the resilience of pro-childcare policy message strategies. The study cannot address questions of whether narrative or inoculation strategies employed by those opposed to state investments in childcare policies and programs can also shape public attitudes toward these initiatives.

We chose to use the colloquial “childcare” rather than the phrase “early childhood education” in our messages and survey instruments. We made this decision because the term “childcare” is far more frequently used than the concept of ECE in US public discourse surrounding these issues, and both childcare and ECE have appeared in the formal language of policies on US states’ recent legislative agendas. However, previous research indicates that the term “childcare” can be conceptually limiting in its focus on supervision versus education and development. We cannot ascertain whether our use of “childcare” language may have affected levels of support among respondents.
Finally, from a topical perspective, it is important to note that this research was conducted in the context of the United States, where ECE policy discussions have historically differed substantially from other countries. It remains unclear the extent to which findings in this context may be generalizable to other nations and cultures. In addition, the study was conducted in the latter half of 2019, before physical distancing requirements enacted to limit COVID-19 transmission caused ECE facilities across the United States (and elsewhere) to shutter. It is possible that were we to repeat this research now, with many people having lost access to the childcare and educational services they previously relied on, attitudes toward both the conditions described in the study’s messages and the proposed policies would differ. This question may have greater urgency in an age in which many parents have experienced the challenges of ECE firsthand.

Conclusion

Efforts to improve population health will require broad changes across a variety of sectors. A growing body of evidence shows that investments in ECE can contribute to a variety of positive outcomes for children and families that extend beyond the early childhood years, including meaningful effects on health and well-being. The current study offers guidance, informed by communication theory and research, for the design of strategic messages to increase public support for state investment in childcare policies and programs, at least in the short term. It also reveals the limitations of single exposures to even theory- and evidence-based messaging strategies in environments characterized by competition between policy advocates and opponents. Future work in this area could offer additional insight to inform broader efforts to promote high-value investments with strong potential to improve population health outcomes.

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