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# Who Leads During and After a Crisis? The Pandemic's Role in Diversifying School Leadership

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Organizational crises, such as the COVID-19 pandemic, influence the appointment of leaders from underrepresented groups, including women and people of color. This study examines the relationship between the pandemic, school organizational characteristics, and the appointment of women and people of color to school leadership (e.g., Head of School, HoS) roles. Using administrative data from the Data Association for Schools and Leadership (DASL) provided by the National Association of Independent Schools (NAIS), we employed two analytic approaches: single-group interrupted time series analysis and a two-way fixed effects model. Findings indicate a significant post-pandemic increase in the representation of women, people of color, and women of color in head-of-school positions. Additionally, minority heads were more likely to serve in schools that were smaller in size, showed a lower yield rate, and had more indicators of financial duress, such as higher proportions of students applying for financial aid. Changes in the likelihood of a woman or person of color HoS were also linked to teacher attrition and increased diversity on school boards. These findings offer theoretical and empirical contributions to understanding and advancing diversity in educational leadership.

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# Who Leads During and After a Crisis?
# The Pandemic's Role in Diversifying School Leadership

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**Abstract**

Organizational crises, such as the COVID-19 pandemic, influence the appointment of leaders from underrepresented groups, including women and people of color. This study examines the relationship between the pandemic, school organizational characteristics, and the appointment of women and people of color to school leadership (e.g., Head of School, HoS) roles. Using administrative data from the Data Association for Schools and Leadership (DASL) provided by the National Association of Independent Schools (NAIS), we employed two analytic approaches: single-group interrupted time series analysis and a two-way fixed effects model. Findings indicate a significant post-pandemic increase in the representation of women, people of color, and women of color in head-of-school positions. Additionally, minority heads were more likely to serve in schools that were smaller in size, showed a lower yield rate, and had more indicators of financial duress, such as higher proportions of students applying for financial aid. Changes in the likelihood of a woman or person of color HoS were also linked to teacher attrition and increased diversity on school boards. These findings offer theoretical and empirical contributions to understanding and advancing diversity in educational leadership.

*Keywords*: leadership, leadership diversity, independent schools, school crisis, COVID-19 pandemic, glass cliff

## Introduction

Over the past 20 years, P12 school leaders have become more diverse (National Center for Education Statistics [NCES], 2023). This trend may reflect a growing organizational commitment to fostering diverse leaders who mirror the diversity of student and teacher populations and to creating inclusive environments (Bartanen & Grissom, 2023; Fuller et al., 2018; Haar & Robicheau, 2008; Wrushen & Sherman, 2008). However, despite these efforts, demographic shifts toward more diverse leadership have not kept pace with the changing demographics of the student and teacher population (Crawford & Fuller, 2015; Grissom et al., 2021; NCES, 2023; 2024). For example, racial and gender diversity among superintendents remains limited: during the 2022-2023 school year, only 28% of superintendents were women, and just 11% identified as a race other than white (Arundel, 2023; Peetz, 2024). These figures lag significantly behind the racial and gender diversity of both students and teachers (see NCES, 2023; 2024). Such disparities suggest that the processes by which leaders are hired or appointed may remain structurally exclusive and therefore limit opportunities for women and people of color to ascend to leadership roles. Moreover, this lack of diversity is evident across various school contexts, including public, charter, and independent schools.

Minoritized leaders are often appointed to schools facing crises or other organizational constraints, which subjects the leaders to significant stress, reduced capacity for problem-solving, and often negative evaluations (Gegenheimer & Goldring, 2024). Ryan et al. (2007) argue that it is not minoritized leaders who lower organizational performance but rather that organizations with declining performance are more likely to appoint minoritized leaders.

Schools, in particular, face a variety of crises, such as teacher shortages (Sutcher et al., 2016), financial hardships (Farmer & Weber, 2022), and the compounded challenges brought by the COVID-19 pandemic (Rei, 2021). These crises can significantly influence subsequent leadership appointments and retention.

The aim of this study is therefore to examine schools where women and people of color occupy leadership roles, with a specific focus on investigating the circumstances surrounding their leadership and how crises influence organizations' choice of a leader. We examine in particular the role of head of school (HoS), which is unique to independent schools and shares characteristics with both superintendents and principals in public school contexts. Like a superintendent, a HoS carries broad responsibilities, including fundraising, community relations, political engagement, and organizational direction-setting (Frankel & Schechtman, 2010; Hoven, 1981). However, like a principal, the HoS most often manages one school rather than a network of schools. The study seeks to analyze trends among HoSs during and after the COVID-19 crisis, as well as patterns of other indicators of organizational crisis, such as teacher attrition and financial hardship. We employ the Data and Analysis for Survey on Leadership (DASL) database, which is maintained by the National Association of Independent Schools (NAIS). We examine the association between the likelihood of minoritized group members (i.e., women, persons of color, and women of color) in heads of school roles (HoSs) and time-varying and invariant factors. Specifically, we address the following research questions:

1. What patterns of headship are evident among minoritized individuals, including women, people of color, and women of color, during and after the onset of the COVID-19 pandemic?

2. To what extent is the headship of a minoritized person in any year related to school-level contextual challenges or crises?

We turn next to a review of relevant literature that addresses the benefits of diverse leaders in schools—specifically, women and people of color—as well as the current patterns of promotion among school leaders broadly. Our literature review also includes a review of challenges or obstacles to cultivating and retaining a diverse school leader workforce, many of which are salient to the research questions we pose in this paper.

## *Benefits of Diverse School Leaders*

School leaders whose demographics reflect their student and teacher populations tend to improve school performance, particularly in areas such as teacher retention, job satisfaction, and student academic outcomes (Perrone, 2022). Gender congruence between teachers and principals decreases teacher mobility (Husain et al., 2023; Nadav et al., 2023; Viano et al., 2023), while increasing teacher efficacy (Bellibas & Liu, 2017) and motivation (Marvel, 2015). Similarly, racial congruence between school leaders and teachers contributes to lower teacher turnover and improved student outcomes (Bartanen & Grissom, 2019; 2023). Research from Texas (Edwards & Anderson, 2023) and Wisconsin (Goff et al., 2018) suggests that racial congruence increases the likelihood of retaining novice teachers for longer periods. Leaders from minoritized

backgrounds often hire teachers who reflect their identities and can better provide culturally relevant instruction and resources to diverse students (Bartanen & Grissom, 2019; 2023). Given that demographic representation shapes behaviors and outcomes within organizations, leaders who reflect their constituent populations may be better positioned to serve their schools effectively (Mosher, 2016). Despite their underrepresentation relative to teachers and students, evidence shows that leaders from minoritized groups, including women and people of color, positively impact teacher career paths, school outcomes, and student achievement (Perrone, 2022), pointing to the critical importance of representation and diversity in leadership.

Prior literature also shows that minoritized leaders are either more actively engaged in leadership practices that are beneficial to school improvement or not significantly different from non-minoritized leaders. Eagly, Karau, and Johnson's (1992) meta-analysis revealed that women principals are more inclined towards democratic and participative leadership styles and are less likely to be autocratic and directive. In a more recent study, Hallinger et al. (2016) conducted a meta-analysis and concluded that women principals engage in significantly more active instructional leadership practices than men. In addition, women educational leaders engage in instructional leadership more actively (Shaked et al., 2017); spend their time on student affairs and instructional leadership practices; work with other teachers when setting goals (Sebastian & Moon, 2017); and score higher in servant leadership practices, including emotional healing, wisdom, persuasive mapping, and organizational stewardship compared to male principals (Xu et al., 2015).

The literature on the leadership practices of school leaders from minoritized racial groups is sparse and inconsistent; however, a limited number of scholars have investigated the differences in leadership practices among racially diverse leaders, primarily through qualitative studies (e.g., Aaron, 2024; Brooks & Jean-Marie, 2007), alongside a few quantitative studies (e.g., Jang & Alexander, 2022; Keese et al., 2020; Price, 2011). Taken together, these studies suggest that educational leaders of color are associated with teachers' elevated levels of satisfaction and cohesion, they provide greater support to teachers, and they demonstrate superior instructional leadership behaviors and collective responsibility.

## *Systemic Barriers to Diverse School Leadership*

In the context of public school systems, school leader hiring and promotion are processes that continue to be biased in favor of men and White people (e.g., Fuller & Young, 2022; Goldring et al., 2021; Templeton et al., 2021; Tran et al., 2023). Women and people of color have been found to have more instructional experience than White men, but they remained in assistant principalships longer than did White men, who were more rapidly promoted to principalships, and people of color are the least likely group to ever be promoted to a principalship (Authors, 2020). Relatedly, White graduates of a leadership preparation program (LPP) are more likely to be principals than assistant principals within five years of program completion; Black and Latino/a graduates are more likely to be assistant principals in the same time period (Fuller et al., 2016). Even in the superintendent role, there is a consistent underrepresentation of women at the national and district level (White, 2023). Within these pathways, aspiring leaders of color face ongoing challenges and structural racism, which may

delay their upward trajectories or act as 'push' forces out of the profession (Templeton et al., 2021). Those authors go on to find that less than 1% of Black teachers in their 19-year study become principals.

As mentioned above, the literature demonstrates that racially minoritized individuals or women in school leadership roles possess adequate leadership knowledge, skills, and ambition, as evidenced by their positive or mixed influence on the organizations they helm. Nevertheless, the pathways of marginalized individuals to positions of leadership remain restricted (Authors, 2020), resulting in a lack of representativeness such that leaders do not reflect the demographic composition of students and teachers (Fuller et al., 2018). This absence of representation implies the presence of biased hiring practices, which uphold stereotypes and prefer White and male candidates using 'fit' criteria (Weiner et al., 2022). Hence, it is crucial to investigate the systematic trends of underrepresented leadership in all contexts throughout the field of education and deliberate on strategies to dismantle this prevailing stereotype and bias.

## *Organizational Crises and Diverse Leadership*

In the field of business, it has been widely noted that organizational crises are closely linked to the leadership appointments of individuals who might otherwise be atypical leaders in that sector or organization. Specifically, the glass cliff phenomenon suggests that minoritized leaders are often appointed during times of crisis with the expectation that they will clean up the mess left by the prior leader (Ryan et al., 2007). This concept highlights a pattern in which organizations in turmoil are more likely to select minoritized leaders to navigate challenging

situations (Bruckmuller & Branscombe, 2010; Morgenroth et al., 2020; Ryan et al., 2007). Furthermore, the glass cliff phenomenon is evident in educational leadership as well, where leaders from marginalized groups are selected to address organizational crises. For instance, Haslam and Ryan's (2008) experimental study demonstrated that high school students in the United Kingdom preferred a female candidate for a youth consultant role when organizational performance was declining. Similar patterns have been observed in secondary school leadership (Bronars, 2015), higher education management (Peterson, 2015), district leadership (Smith, 2015), and among superintendents (Timmer & Woo, 2023). Given that schools encounter diverse crises that include natural disasters and student deaths (Sokol et al., 2021), fiscal instability (Farmer & Weber, 2022), declining student outcomes (Pharris-Ciurej et al., 2012), and teacher shortages (Sutcher et al., 2016), it is likely that numerous school leadership positions might experience drastic changes during such crises.

Among these, the COVID-19 pandemic stands out as an especially severe crisis, bringing about complex challenges, including teacher workforce issues (Camp et al., 2022; Carver-Thomas et al., 2021), deteriorating working conditions for teachers (Rosenberg & Anderson, 2021; Zamarro et al., 2022), and increased student absenteeism and learning loss (Engzell et al., 2021; Moscoviz & Evans, 2022). As Ryan et al. (2007) suggest, such crises could significantly influence the demographics of leadership, with schools potentially turning to leaders from marginalized groups during turbulent times.

Despite a potential increase in diversity among school leaders during the crises, these leaders often face significant challenges that hinder their effectiveness and longevity in their

roles. They frequently encounter limited support and resources (Kruse & Krumm, 2018; McGee, 2010), systemic biases (Jean-Marie, 2013; McCray et al., 2007), and the glass ceiling effect (Cotter et al., 2001). This contributes to the underrepresentation of minority leaders in educational leadership, despite their increasing appointments. Therefore, it is crucial to examine how school crises, including the COVID-19 pandemic, are related to leadership demographics and to identify the systemic barriers that hinder the success and retention of leaders from marginalized groups.

## *Theoretical Perspective*

A complex adaptive system (CAS) consists of semi-autonomous agents that interact with one another in interdependent ways, resulting in system-wide patterns that subsequently influence the agents' behavior (Dooley, 1997; Zimmerman, 1993). Complex adaptive systems theory (CAST), then, suggests that organizations—such as schools—continuously attempt to adapt and survive in response to internal and external stimuli, like living organisms (Dooley, 1997; Holland, 1995; Zimmerman et al., 1993). Individual agents' actions shape the functions of the organization, which in turn informs the behavior of the individuals within the system.

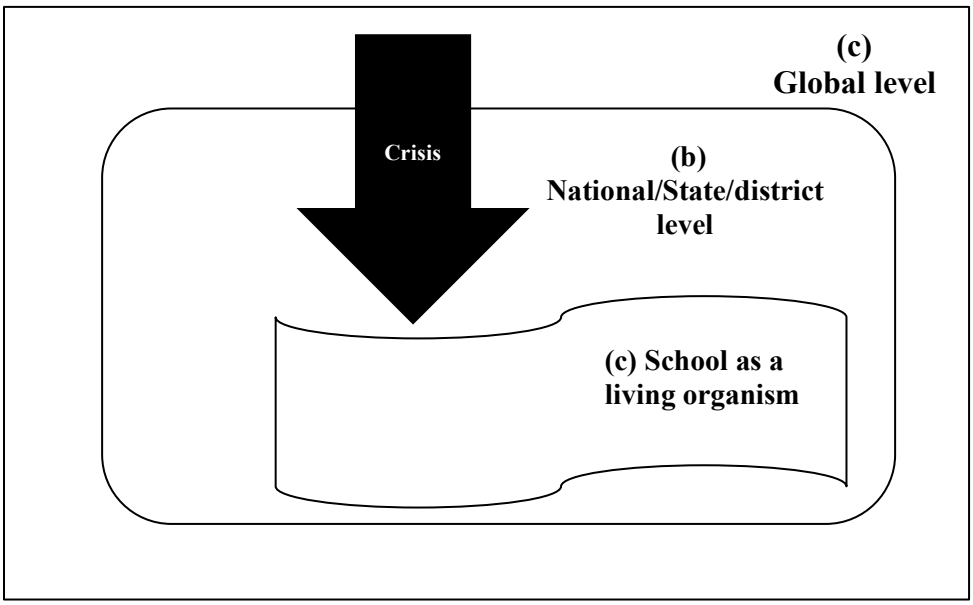



**Figure 1.** Theoretical framework of Complex Adaptive System Theory

This means that when a school faces a challenge, it may interpret that challenge as a stimulus to which the organization must respond in order to preserve organizational function. Then a school may take action to ensure its survival amidst the updated stimulus information. In particular, when the crisis is urgent, conventional ways of addressing crises often fail because those strategies attempt to reduce the degree of complexity. Instead, schools might turn to strategies that help them classify the level of uncertainty, control for all possible factors, and determine causes and effects (Keene, 2000; Robert & Lajtha, 2002). Such actions might include revising school policies, exploring new funding sources, engaging in professional development activities, and altering the school climate or even leadership. Indeed, school crises, declining performance, or similar challenges may significantly influence leadership appointments, as schools seek leaders who can navigate these complexities and address the underlying issues effectively. Figure 1 depicts an organization (a) that has to respond dynamically to a crisis that

permeates both its distal, global environment (c) as well as its more proximal national, state, or district-level contexts (b).

CAST also emphasizes that diversity among an organization's elements is crucial for its survival (Zimmerman et al., 1993). Diversity can be an outcome of adaptation and also a catalyst for potential adaptation (Holland, 1995). This suggests that schools aiming to adapt successfully to any challenges might benefit from leaders with diverse backgrounds. According to research, leaders of different genders (e.g., Eagly et al., 1992; 2003; Hallinger et al., 2016) and races (e.g., Keese et al., 2020) can bring to an organization varied leadership practices and insights. Thus, schools seeking fresh perspectives—and strategies for negotiating crises—might appoint leaders from minoritized groups. However, some scholars have noted that a woman assumes a leadership role during a time of crisis to 'clean up the mess,' as men are often perceived to step away from responsibilities deemed likely to result in failure (Belknap et al., 2020). Haslam, Ryan, and colleagues (2007; 2008) further noted that due to gender and racial stereotypes, women and people of color are typically appointed during crises and replaced once the crisis is resolved. Therefore, whether for better or worse, schools undergoing significant changes might take drastic measures by looking to minoritized leaders. In this context, we hypothesize that external changes, such as the COVID-19 pandemic, and internal changes within school components, such as human resources, student economic status, and enrollment rates, could influence leadership appointments.

# Data and Methods

## *Context and Data Source*

There are about 35,000 independent schools in the United States, which comprise non-sectarian and sectarian non-public schools. Altogether, these schools educate about 5.7 million P12 students or about 10% of the U.S. student population[1]. More than a third of all independent schools are Catholic and about one-fifth are nonsectarian. The National Association for Independent Schools (NAIS) is a nonprofit membership organization designed to support and foster collaboration among independent schools and it currently has about 2000 member schools. NAIS houses a data collection effort called Data and Analysis for School Leadership[2] (DASL). This study represents a collaboration with NAIS, which provided access to DASL in service of the research questions. In particular, we used 9 years of the DASL dataset—from the school year 2014-2015 to 2022-2023.

DASL is a database comprised of self-reported data that tracks school improvement and forecast trends among independent schools. This tool allows member schools to develop dashboards, identify peer school comparison groups, examine geographic mobility and income trends, and administer student engagement surveys and independent school health checks. For the 2024–2025 data cycle, 1,936 schools participated in DASL Data Entry, with a median completion rate of 99% and an average completion rate of 75%. However, because DASL does

[1] https://nais.org/parents/learn/what-are-independent-private-schools/
[2] https://www.nais.org/analyze/data-and-analysis-for-school-leadership-(dasl)/about-dasl/

not differentiate between NAIS member and non-member respondent schools, it is not possible to determine the precise response rate for each subgroup. Given that NAIS has approximately 2,000 member schools, and nearly 1,900 schools participate in DASL annually, the dataset provides a substantial representation of NAIS membership. After adjusting for non-reporting and missing data, approximately 9,600 observations were incorporated into the analyses, comprising nine years of data from approximately 1,900 independent schools (see Table 1).

The outcome variable in this study uses the demographic characteristics of HoS in independent schools. Due to the lack of unique identifiers for HoS in DASL, the analysis is limited to yearly data on the race or ethnicity and gender of each school's HoS in each year. We are unable to determine whether a single individual retained the position in subsequent years but instead only whether the gender and race of the HoS remained the same. As a result, turnover or retention of HoS is not the scope of this study. Furthermore, while we recognize the conceptual distinction between the terms "woman" (a social attribute) and "female" (a biological attribute), we use "female" (or "male") in the context of data analysis and findings to align with the terminology of the dataset variables.

Because DASL relies on self-reported information from HoS who submit their school's data on a voluntary basis, there is missingness in the DASL database, which could lead to bias in the estimates. We imputed continuous missing values with means, and this method might have affected the accuracy of our estimates. Mean imputation is one such method in which the mean of the observed values for each region (i.e., city) is computed, and the missing values for those

variables are imputed by this mean. This will allow us to keep the summary statistics the same but handle missing data in our dataset.

## *Empirical Strategy*

We examined the association between the likelihood of a minoritized individual (female, person of color, or female of color) holding a HoS position in a specific school year and binary outcomes (e.g., in a HoS position or not) using logistic regression. While both the linear probability model (LPM) and logistic regression are commonly used for binary dependent variables, we chose logistic regression due to its ability to address key statistical and interpretive limitations inherent in an LPM. First, the LPM, which relies on ordinary least squares (OLS), directly predicts probabilities that can exceed the bounds of 0 and 1, violating the fundamental definition of probabilities. Logistic regression, in contrast, models the log-odds of the dependent variable, which allows us to represent the true probability distribution and avoid extrapolation beyond logical limits. Second, the LPM assumes constant error variance, yet its error variance is heteroskedastic due to the nature of binary outcomes. This violation can lead to inefficient estimates and unreliable statistical inferences. Logistic regression addresses this issue by employing maximum likelihood estimation (MLE), which does not depend on the assumption of constant error variance, thereby yielding more robust and efficient parameter estimates. Third, given that our study focuses on the likelihood of minoritized individuals attaining leadership positions in independent schools compared to non-minorities, the use of log odds—and their transformation into odds ratios—facilitates interpretation within the context of relative likelihoods. This makes logistic regression particularly suitable for capturing and communicating

the patterns of interest in our analysis. For these reasons, logistic regression was employed as the primary modeling approach to estimate the likelihood of minoritized leaders in each independent school in each year. To ensure the robustness of our findings, we also conducted analyses using the LPM, the results of which are included in the Appendices Tables 1 and 3 for comparison.

In this study, we employed a lagged-outcome model, which means there is a delay in the dependent variables (i.e., demographics of HoS) by one year relative to the other independent variables in the analysis. This approach reflects the practical sequence in which leadership appointments occur among the independent school members of NAIS because the selection of a leader often relies on evaluations of the prior year's school performance. Specifically, the demographic characteristics of appointed leaders are likely influenced by school crisis-related factors from the preceding year. Consequently, we modeled the leader's race and gender as outcomes observed one year after the crisis-related variables. For robustness, we tested contemporaneous (same-year) models to examine the immediate effects of COVID-19 on HoS demographics and the relationship between school crisis-related variables and leader demographics within the same school year, which allowed another robustness check.

## Single Group Interrupted Times Series Model

In order to estimate the likelihood of minoritized leader—including female HoS, HoS of color, and female HoS of color—after the COVID-19 pandemic, we utilized a single-group interrupted times series analysis (ITSA) model using *xttisa* (Linden, 2015; 2024). Our ITSA model is based on the following assumptions: first, we assume a single treatment period and no comparison group that was not influenced by the pandemic since we imagine that all schools and

their leaders were in some way influenced by the COVID-19 pandemic. Secondly, we assume that any time-varying unmeasured confounder, such as demographic shift or school policy changes, is relatively slowly changing so that it would be distinguishable from the sudden onset of the COVID-19 pandemic indicator.

The 2019–2020 academic year is designated as the starting point for the COVID-19 pandemic's impact on schools, marking the onset of significant disruptions to school function. Referring again to complex adaptive systems theory, the 2019–2020 school year marks the start of when organizations had to respond to crisis stimuli and adapt in order to survive. The Centers for Disease Control and Prevention (CDC) issued warnings of widespread outbreaks across the United States beginning in early 2020[3], coinciding with the latter half of the 2019–2020 academic year. Although independent schools reported lower closure rates compared to traditional public schools, some were nevertheless temporarily closed during 2020, according to the Cato Institute (McCluskey, 2021). Beyond closures, the pandemic had a lasting impact on independent schools. For example, Scafidi et al. (2023) documented an enrollment shift from public to independent schools during the 2020–2021 academic year as families sought alternatives to public school closures. This enrollment increase highlights broader disruptions that persisted in independent schools into 2021 and later. To operationalize the timing of the crisis, this study identifies the 2019–2020 academic year as the starting point for examining how COVID-19 influenced the demographics of HoS in independent schools both immediately and over subsequent years.

[3] https://www.cdc.gov/museum/timeline/covid19.html

In addition, as mentioned earlier, we assumed that the HoS demographics would have directly been influenced starting from the year following the onset of COVID-19 (that is, 2020-2021) rather than the year it occurred. Thus, the binary outcome is valued at one if a specific school has a minoritized HoS in year t+1. The logistic regression model takes the form:

(1) $Y_{it+1} = ln\ (\pi_{it+1} / 1 - \pi_{it+1})$

(2) $Y_{it+1} = \beta_0 + \beta_1 PreCovid_t + \beta_2 ImmediateEffect_t + \beta_3 PostCovid_t + X_i + Z_{it} + \epsilon_{it}$

$\pi_{it+1}$ is the probability of a minoritized person (female, person of color, or female of color) in the HoS position at school *i* year *t+1*. This probability is recalculated in the log odds format, which is the logarithmic value of the ratio of the probability that a minoritized leader will be appointed to that of the reference group. $\beta_0$ is in the intercept, which represents the baseline value of the outcome variable when all other variables are zero. $\beta_1$ captures the linear yearly trend of the outcome variable until COVID-19. $\beta_2$ measures the immediate change in the intercept during SY2020-21. $\beta_3$ captures the yearly trend in the outcome variable after the pandemic onset (e.g., SY 2021-2022). We also adjust for other characteristics of independent schools, including time-constant variables ($X_i$ ) and time-varying variables ($Z_{it}$). $X_i$ is a host of additional covariates controlling for the individual and school characteristics, including gender, race, school type (e.g., boarding or day), school size (e.g., small, medium, and large), time since school establishment, school level (e.g., elementary, secondary, and comprehensive K12), religious affiliation, and student gender (e.g., boys, girls, coed). The time-variant characteristics ($Z_{it}$) include the number of instructional staff, the number of student financial aid applications, the amount of financial aid distributed to students, and the yield rate (the percentage of students

who accept an offer of admission and choose to enroll at that particular school), and the composition of boards of trustees in terms of the proportions of women or people of color.

Despite our assumptions, there remain limitations to the ITSA model. Firstly, the ITSA model does not incorporate a parallel counterfactual trend, implying that it assumes all schools were impacted by the pandemic, which prevents comparisons with schools that may have been unaffected. Additionally, the ITSA model does not account for historical bias—confounding due to unanticipated events occurring alongside the pandemic—which undermines the validity of the design and limits causal inference (Degli Esposti et al., 2021; Linden, 2017). Therefore, caution is warranted when interpreting the results.

## Two-way Fixed Effect Model

To estimate the relationship between school time-varying characteristics and the gender and racial demographics of HoS, we conducted logistic regression analyses with year and school fixed effects. The independent variables included crisis-related factors such as the number of human resources, student financial hardship, school yield rate (a measure of school attractiveness), and board representation. Including both school fixed effects and year fixed effects allows us to control for time-invariant school characteristics (e.g., location or socioeconomic context) and common shocks or trends across all schools in specific years (e.g., pandemic or racial justice movement). This combination ensures the model focuses on within-school, over-time variation while accounting for broader temporal effects.

As addressed above in equation (1), we used a binary outcome variable to represent the probability of having a minoritized leader in a HoS position and recalculated the result into log odds format. The logistic regression model with fixed effects takes the form:

(3) $Y_{it+1} = \beta_1 S_{it} + \beta_2 T_{it} + \beta_3 B_{it} + a_i + \gamma_t + \epsilon_{it}$

We model the log odds that the HoS *i* in school year *t+1* is a minoritized individual as a function of fixed characteristics of the school ($a_i$) in addition to time-varying variables, including school characteristics ($S_{it}$), teacher/staff size ($T_{it}$), and board demographics ($B_{it}$), and an indicator for the school year ($\gamma_t$) to control for year-specific shocks, such as COVID-19. Three parameters of interest, $\beta_1$, $\beta_1$, and $\beta_3$, indicate change in the log odds of having a minoritized HoS in an independent school in each time-varying variable after accounting for year- and school-fixed effects and other covariates.

# Findings

## *Descriptive Statistics*

Tables 1 and 2 display the descriptive statistics of our variables. The characteristics of the sample (see Table 1) indicate that most schools are day schools rather than boarding schools (87.25%), encompass both elementary and secondary levels (45.59%), and serve both male and female students (88.77%). The distribution of school sizes is evenly distributed from small to large, with the majority of schools (69.03%) lacking religious affiliation. The schools have been established for an average of 84.3 years as of 2025 and have a history of at least 4 years and up to 397 years. The average number of financial aid applicants is 161 students, but there is

significant variation among schools (SD = 181.02). The financial aid received by students is represented as 14.01 in natural logarithm, approximately equating to $1,214,690, with considerable variation. On average, over 100 students applied for or received financial aid, with the number of applicants exceeding that of recipients due to constrained school budgets for student funds. The average yield percentage is 69.7%, with a wide range from 0 to 100 percent. The average number of teachers is 56.72, the average number of instructional staff is 20.61, and the average number of administrative staff is 20.88 per school. Finally, the average proportion of female board members is 46.30%, while the average proportion of board members of color is 16.66%.

**Table 1. Summary Statistics**

| Variable | Freq. / Obs | Percent | Mean | S.D. | Min | Max |
|---|---|---|---|---|---|---|
| **Head of School Gender** | | | | | | |
| Female | 3,761 | 38.76 | | | | |
| Male | 5,943 | 61.24 | | | | |
| **Head of School Race** | | | | | | |
| White | 8,809 | 90.78 | | | | |
| Person of color | 895 | 9.22 | | | | |
| **School type** | | | | | | |
| Day | 8,467 | 87.25 | | | | |
| Board | 108 | 1.11 | | | | |
| Board-day | 544 | 5.61 | | | | |
| Day-Board | 585 | 6.03 | | | | |
| **School class** | | | | | | |
| Elementary | 3,969 | 40.90 | | | | |
| Secondary | 1,311 | 13.51 | | | | |
| Both (Elementary & Secondary) | 4,424 | 45.59 | | | | |
| **School size (Enrollment in number of students)** | | | | | | |
| Small (1- 300) | 3,634 | 37.46 | | | | |
| Middle (300 - 500) | 2,635 | 27.16 | | | | |
| Large (501 and above) | 3,432 | 35.38 | | | | |
| **School gender (girls)** | | | | | | |
| Girls | 663 | 6.83 | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Boys | 427 | 4.40 | | | | |
| Coed | 8,614 | 88.77 | | | | |
| **Religion** | | | | | | |
| No religious affiliation | 6,646 | 69.03 | | | | |
| Episcopal | 1,193 | 12.39 | | | | |
| Catholic | 616 | 6.4 | | | | |
| Friends | 359 | 3.73 | | | | |
| Non-Denominational | 303 | 3.15 | | | | |
| Jewish | 269 | 2.79 | | | | |
| Presbyterian | 68 | 0.71 | | | | |
| Christian | 48 | 0.5 | | | | |
| Others | 126 | 1.31 | | | | |
| **School establishment period** | 9,689 | | 84.30 | 53.06 | 4 | 397 |
| **Financial Aid applicants** | 9,627 | | 161.36 | 181.02 | 0 | 4599 |
| **Amount financial aid received (log)** | 9,622 | | 14.01 | 1.16 | 1.10 | 16.93 |
| **Students received Financial Aid** | 9,635 | | 115.10 | 133.33 | 0 | 7683 |
| **Yield (%)** | 9,660 | | 69.72 | 15.00 | 1.10 | 100 |
| **Number of teachers** | 9,666 | | 56.62 | 39.57 | 3 | 464 |
| **Number of Instructional staff** | 9,664 | | 20.61 | 28.33 | 0 | 748 |
| **Number of administrative staff** | 9,667 | | 20.88 | 15.88 | 0 | 242 |
| **Percentage of Female Board** | 9,651 | | 46.30 | 14.84 | 0 | 100 |
| **Percentage of Board of color** | 9,614 | | 16.66 | 16.55 | 0 | 100 |

***Note:** Persons of color include individuals who identify as Black/African American, Latino/a, Asian, Middle Eastern, Native American, or Multiracial. Yield rate = the number of enrolled students / the number of admitted students. Other religions include Seventh-day Adventist, United Church, Buddhist, Congregational, Christian Science, Baptist, Moravian, Methodist, Muslim, and Interfaith. Religion is later recorded as religious affiliation (1) and no religious affiliation (0).

We then explored the racial and gender composition of HoS over time (see Table 2). Although leaders from minoritized groups are still markedly underrepresented relative to their non-minoritized counterparts, both their proportion and absolute numbers have steadily risen over the past nine years. In the 2015-2016 academic year, representation in independent schools was especially low, with women making up 34.67% of all HoS, people of color making up 6.93% of HoS, and women of color only 3.47%. However, their representation increased gradually, with female heads of schools comprising 44.71% of all heads of school in the 2022-

2023 academic year. Moreover, the representation of both heads of school of color and female heads of state of color nearly doubled within a decade.

**Table 2. The demographic characteristics of Head of School**

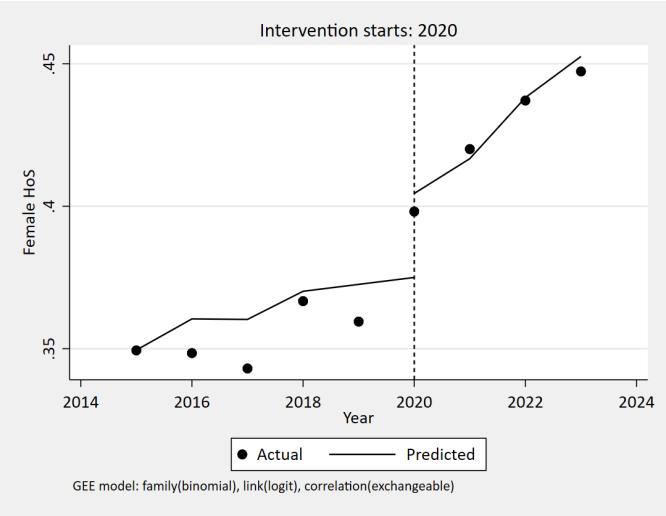
| Academic Year | Female HoS | HoS of Color | Female HoS of Color | All (100%) |
|---|---|---|---|---|
| **2015-2016** | 383 (34.75) | 76 (6.90) | 40 (3.63) | 1,102 |
| **2016-2017** | 373 (34.35) | 83 (7.64) | 42 (3.87) | 1,086 |
| **2017-2018** | 408 (37.16) | 84 (7.65) | 48 (4.37) | 1,098 |
| **2018-2019** | 401 (36.19) | 92 (8.30) | 54 (4.87) | 1,108 |
| **2019-2020** | 441 (40.27) | 103 (9.41) | 59 (5.39) | 1,095 |
| **2020-2021** | 458 (42.30) | 116 (10.71) | 75 (6.93) | 1,083 |
| **2021-2022** | 482 (43.74) | 129 (11.71) | 78 (7.08) | 1,102 |
| **2022-2023** | 485 (44.71) | 146 (13.54) | 89 (8.26) | 1,078 |

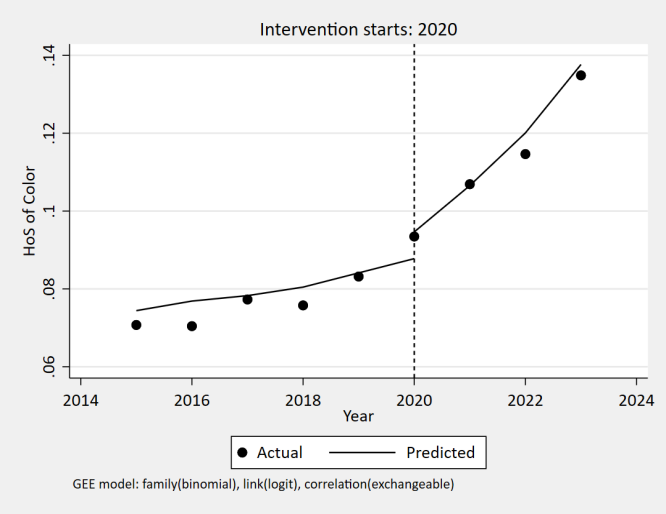
* Percentage is in the parenthesis.

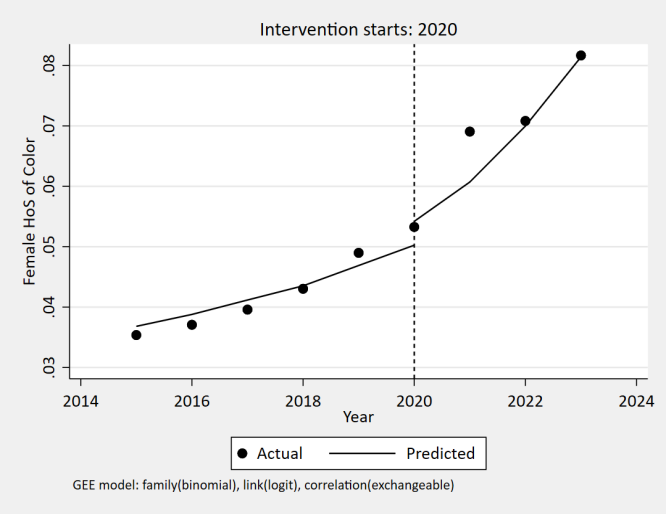
## *Single-group interrupted time series model*

We confirmed that the likelihood of a HoS being a member of a minoritized group increased to a statistically significant level one year after the onset of COVID-19. Figure 2 illustrates the estimates derived from an ITSA model. These estimates capture (1) the annual trend until the onset of COVID-19, (2) the immediate change in the intercept during the year following the onset of COVID-19, and (3) the annual trend in the outcome variable after the onset of COVID-19. The model accounts for a one-year delay in the outcome variable and includes control variables such as school characteristics (see Figure 2).

**Figure 2. Lagged Logistic Regression for Interrupted Time Series analysis**


Intervention starts: 2020
Female HoS
.35
.4
.45
2014
2016
2018
2020
2022
2024
Year
Actual
Predicted
GEE model: family(binomial), link(logit), correlation(exchangeable)


Intervention starts: 2020
HoS of Color
.06
.08
.1
.12
.14
2014
2016
2018
2020
2022
2024
Year
Actual
Predicted
GEE model: family(binomial), link(logit), correlation(exchangeable)


Intervention starts: 2020
Female HoS of Color
.03
.04
.05
.06
.07
.08
2014
2016
2018
2020
2022
2024
Year
Actual
Predicted
GEE model: family(binomial), link(logit), correlation(exchangeable)

*Note: The outcome variable is 1-year lagged. Standard error is adjusted for clustering at the school level. The model uses a binomial family with a logit link. Academic years are labeled by the concluding calendar year (e.g., 2019–2020 is represented as 2020). Both time-constant and time-varying variables are controlled, such as the period of school establishment (year since foundation), school type, school level, school size, student gender, religion affiliation, the number of financial aid (FA) applicants, the amount of FA awarded (natural log), the number of FA recipients, the student yield rate (the ratio of students enrolled to students who admitted), the number of administrative and instructional staff, the number of teachers, the ratio of female trustees (board members), and the ratio of trustees of color.

We observed a significant increase in the intercept for the likelihood of heads being minoritized individuals one year after the onset of COVID-19 among female leaders (β =.153), leaders of color (β =.185), and female leaders of color (β =.291). These coefficients correspond to a 16.5% increase in the odds of becoming a female HoS, a 20.3% increase in the odds for HoS of color, and a 33.8% increase for female HoS of color. Additionally, the annual post-pandemic coefficient for the HoS of color model (β = .111) indicates an 11.7% yearly increase in the likelihood of a HoS being a person of color following COVID-19, which stands in sharp contrast to the pre-COVID-19 trend, which showed no significant increase.

**Table 3. Lagged Logistic Regression for Interrupted Time Series analysis**

| | Female HoS, lagged | HoS of Color, lagged | Female HoS of Color, lagged |
|---|---|---|---|
| Pre-Covid19 trend | 0.023 | 0.027 | 0.004 |
| | (0.019) | (0.031) | (0.037) |
| Lagged intercept change during Covid-19 onset | 0.153** | 0.185* | 0.291* |
| | (0.050) | (0.091) | (0.116) |
| Post-Covid19 trend | 0.049 | 0.111* | 0.096 |
| | (0.032) | (0.053) | (0.060) |
| School establishment period | -0.002+ | 0.002 | 0.000 |
| | (0.001) | (0.002) | (0.003) |

| | | | |
|---|---|---|---|
| School Type (not day) | -0.448$^{+}$ | -0.723$^{*}$ | -0.687 |
| | (0.231) | (0.336) | (0.434) |
| Boys' School | -1.554$^{***}$ | -1.298$^{*}$ | -1.330 |
| | (0.404) | (0.627) | (1.036) |
| Girls' School | 3.119$^{***}$ | 0.364 | 1.069$^{**}$ |
| | (0.358) | (0.333) | (0.369) |
| Elementary (Lower) School | 0.319$^{*}$ | 0.422$^{+}$ | 0.483 |
| | (0.142) | (0.226) | (0.302) |
| Secondary School | -0.374$^{+}$ | -0.323 | -0.908$^{*}$ |
| | (0.226) | (0.334) | (0.459) |
| Middle-Sized School | -0.384$^{**}$ | -0.182 | -0.241 |
| | (0.139) | (0.207) | (0.255) |
| Large-Sized School | -0.764$^{***}$ | -0.556$^{+}$ | -1.100$^{**}$ |
| | (0.197) | (0.305) | (0.395) |
| Religious affiliation | 0.015 | 0.228 | 0.349 |
| | (0.122) | (0.172) | (0.223) |
| FinAid application | 0.001$^{**}$ | 0.000 | 0.000$^{*}$ |
| | (0.000) | (0.000) | (0.000) |
| FinAid awarded (log) | -0.043 | 0.041 | 0.037 |
| | (0.036) | (0.054) | (0.070) |
| FinAid received students | 0.000 | 0.000 | 0.000 |
| | (0.000) | (0.000) | (0.000) |
| Yield rate (%) | -0.004$^{+}$ | -0.004 | -0.007$^{+}$ |
| | (0.002) | (0.003) | (0.004) |
| Admin. Staff | 0.001 | 0.003 | 0.007 |
| | (0.005) | (0.005) | (0.008) |
| Inst. Staff | 0.001 | -0.001 | 0.002 |
| | (0.002) | (0.003) | (0.003) |

| | | | |
|---|---|---|---|
| Number of Teachers | -0.006** | 0.003 | -0.001 |
| | (0.002) | (0.003) | (0.005) |
| Female board (%) | 0.007** | 0.002 | 0.008 |
| | (0.003) | (0.004) | (0.005) |
| Board of Color (%) | -0.002 | 0.009*** | 0.012*** |
| | (0.002) | (0.002) | (0.002) |
| Intercept | 0.525 | -3.318*** | -3.829*** |
| | (0.538) | (0.811) | (1.115) |

*Note. Standard errors in parentheses $^{+}$ $p < 0.10$, $^{*}$ $p < 0.05$, $^{**}$ $p < 0.01$, $^{***}$ $p < 0.001$. FinAid represents financial aid, Admin signifies administrative tasks, and Inst signifies instructional tasks. The observations that were used are 7571. Coed (both boys and girls), comprehensive K-12 (both elementary and secondary), and small-sized schools are the reference group.

We also confirmed that various school characteristics were associated with the likelihood of a HoS being a minoritized (see Table 3). For example, schools that were recently established, day schools, girls' schools, elementary schools, smaller schools, schools with a higher percentage of students applying for financial aid, and schools with a higher ratio of minoritized board members were more likely to have a female HoS. In contrast, boys' schools, secondary schools, middle- and large-sized schools, schools with lower yield rates (e.g., more attractive *and* more selective), and schools with fewer teachers were less likely to have female HoS. These patterns were consistent across three groups, including for HoS of color and female HoS of color.

For robustness checks, we conducted additional analyses. First, we employed a lagged linear probability model using Ordinary Least Squares (OLS) regression instead of logistic regression and confirmed consistent results, including an immediate increase in the intercept one year after COVID-19 in all HoS of minority groups and positive annual growth in the likelihood of a HoS being a person of color (see Appendix Table 1). Second, we ran the contemporaneous

(same-year) model and the immediate change in intercept and annual trend for diverse HoS representation without considering time delays as we did in our main model (see Appendix Table 2). Both models indicate that the pandemic had a clear and sustained impact on the demography of HoS, particularly in terms of increased representation of females and people of color, starting one year after the onset of COVID-19.

## *Lagged Logistic regression with Year and School Fixed Effects*

In Table 4, we present the results from a lagged logistic regression model with year and school fixed effects to examine how changes in school characteristics related to the crisis are associated with the lagged likelihood of a HoS being from a minority. We found that within a given school, a decrease by one in the number of teachers is associated with a 0.022 increase in the log odds of having a female leader, holding other factors constant. This indicates that teacher attrition, which may be construed as a school crisis (need citation here), can influence female representation in HoS positions. On the other hand, the increase in female representation among HoS was associated with the increase in the percentage of female members on the board ($\beta$ = .016). However, the increase in the representation of people of color on boards ($\beta$ = -.011) was negatively associated with the female HoS representation of the following year. On the other hand, the number of teachers ($\beta$ = .024) was positively associated with the change in the likelihood of HoS being a person of color and the representation of people of color on the board ($\beta$ = .016) was positively related to the likelihood of HoS being a female of color in the following year.

**Table 4. Lagged Logistic Regression with Year and School Fixed effects**

| | (1)<br>Female HoS, lagged | (2)<br>HoS of Color, lagged | (3)<br>Female HoS of Color, lagged |
|---|---|---|---|
| FinAid application | 0.001 | 0.000 | -0.001 |
| | (0.001) | (0.001) | (0.002) |
| FinAid awarded (log) | -0.275 | -0.159 | -0.214 |
| | (0.168) | (0.245) | (0.325) |
| FinAid received students | 0.002 | 0.003 | 0.008 |
| | (0.003) | (0.003) | (0.006) |
| Yield rate (%) | -0.010 | -0.003 | -0.014 |
| | (0.006) | (0.010) | (0.013) |
| Admin. Staff | -0.004 | 0.001 | 0.021 |
| | (0.010) | (0.018) | (0.021) |
| Inst. Staff | 0.005 | -0.011 | 0.009 |
| | (0.006) | (0.007) | (0.010) |
| Number of Teachers | -0.022** | 0.024* | 0.011 |
| | (0.008) | (0.011) | (0.014) |
| Female board (%) | 0.016* | 0.003 | 0.010 |
| | (0.007) | (0.010) | (0.013) |
| Board of Color (%) | -0.011* | 0.008 | 0.016+ |
| | (0.005) | (0.007) | (0.009) |
| N | 2105 | 1086 | 594 |

*Note: Standard errors in parentheses + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001. FinAid represents financial aid, Admin signifies administrative tasks, and Inst signifies instructional tasks.

Additionally, we ran a contemporaneous logistic regression to examine the association between school characteristics and leadership demographics without any delay, while maintaining year- and school-fixed effects, as well as a lagged linear probability model instead

of logistic regression using reghdfe (Correia, 2016), with the results presented in Appendix Tables 3 and 4. The lagged LPM model with year and state fixed effects shows consistent results overall but additionally reveals a positive association between the number of financial aid applications and the likelihood of the HoS being female. It also shows that a higher percentage of people of color on the board is positively associated with the likelihood of the HoS being a person of color or a female of color. In the contemporaneous model, we consistently found that the number of teachers was positively associated with the likelihood of the HoS being female, and the percentage of people of color on boards was positively associated with the likelihood of the HoS being a woman of color. However, the number of teachers was no longer significant in the model predicting the likelihood of the HoS being a person of color.

## Discussion and Implication

In terms of absolute numbers and proportions, more females and people of color have been heads of independent schools since 2020-2021 than in the 5 years before. We also confirm that SY20-21 saw a significant increase in the likelihood of females being in headships. This result holds for people of color and females of color. Moreover, since the start of the pandemic, there has been significant annual growth in the likelihood of heads being people of color. In sum, our results suggest that individuals who are historically minoritized in leadership roles, including females, people of color, and females of color, do get appointed to headships. Moreover, while minoritized folks are appointed into headships, it is critical that we pay attention to what kinds of schools they are promoted into in terms of board composition, financial and human resource constraints, and school size and gender. Minoritized heads are more likely than men to lead in single-gender and lower-level schools; into schools with financial and human resource

constraints (e.g., lower yield rate, more students who applied for financial aid, and fewer teachers); and these appointments are more likely to happen when schools' boards of trustees are comprised of larger proportions of women or people of color. Within schools, higher teacher attrition and more women on boards were linked to more women in head roles the next year. Similarly, more board members of color were connected to having more women of color on boards. We turn now to the implications of these results for practice, policy, and future research.

## *Implications for Theory*

The findings from this study offer important empirical support for Complex Adaptive Systems Theory (CAST) within the context of educational leadership. Specifically, the study demonstrates that during periods of organizational turmoil, schools are more inclined to implement novel strategies to address unprecedented challenges. We found that external crises, such as the COVID-19 pandemic, significantly increased the likelihood of women in headships, and this trend was sustained annually over time. Additionally, internal challenges, such as high rates of teacher and staff attrition, financial constraints affecting students' ability to pay tuition, and reduced school appeal as evidenced by fewer applications, were shown to correlate with a greater propensity to appoint minoritized leaders in independent schools.

Further, as part of these adaptive measures, schools appeared more willing to appoint leaders from diverse backgrounds, including women, individuals from racial minorities, and women of color. While leaders from diverse backgrounds bring invaluable perspectives that can enhance resilience and innovation in times of crisis, they may also face higher risks of replacement once stability is restored (Haslam & Ryan, 2008). Although this study does not

extend to examining the potential demotions or layoffs of minoritized HoS following the resolution of crises, it provides an initial examination of how school crises influence leadership appointments in a K–12 context—a significant contribution as the first study of its kind to our knowledge.

Future research should address this limitation by exploring both the initial appointments of minoritized leaders and their potential turnover or demotion post-crisis. Using longitudinal and alternative data sources, such research could yield a fuller understanding of the glass cliff phenomenon in educational settings, including the systemic factors that drive both the rise and fall of minoritized leaders in response to school crises. In addition, current studies do not examine appointment practices after crises conclude, emphasizing the need for future research on how racial and gender representation in leadership shifts once minoritized leaders reach the precipice of the glass cliff.

## *Implications for Practice*

Our analysis reveals that women are in fact being appointed to independent school headships. In fact, 45% of headships in the SY 2022–23 went to women, which runs contrary to some of the prevailing rhetoric about headships still being a boys' club (e.g., Bush, 2021). The schools to which they are appointed, however, tend to have contextual challenges for leading and managing a successful school organization, such as financial and human resource deficits, which may disrupt the key tasks of a head of school. The schools headed by women and people of color tend to be elementary, middle, and single-gender schools rather than comprehensive K12 or co-ed schools, both of which tend to be better-resourced. This means that women and people of

color are heading schools, but they are likely getting some of the hardest headships. Two practical implications may be derived from this set of findings.

First, the narrative must shift. Organizations that collect and disseminate data among independent schools, as well as those that offer training and mentorship programs, can lead the effort to shift the story around women appointees to headships. Anecdotally, this may also serve to reduce some of the remaining competition that women express among each other for limited roles. If, as our data suggest, leadership opportunities are less limited than they were historically, perhaps collaboration among minoritized leaders can proliferate in independent school headships. Secondly, school and organizational leaders in crisis may benefit from tactical training, specifically in the areas of budgeting, board management and relationships, community engagement, and fundraising. Independent schools may not be connected to a centralized organization (e.g., a state education agency) in the same way that a public school might be, and therefore may not have access to a uniform set of professional learning and coaching resources. Therefore, independent school associations and service organizations may do well to take up this call for specific kinds of professional learning for women and people of color who lead schools in times of crisis or lead schools with constrained resources.

## *Implications for Policy*

At present, it is incumbent upon the candidate to determine their own readiness for application to a headship. However, minorities tend to view themselves as ready or qualified for leadership roles less often than do men or White people, and they may be more likely to think that they need to possess more qualification for the job at the time of application than do non-minorities. In the independent school landscape, a person may not consider themselves for a

headship without a tap from a trusted mentor or member of a professional network. Such a system tends to leave out women or people of color, and particularly women of color, from systemic access to headships. Some higher education organizations have found success diversifying leadership by employing an equity advocate in search processes. This person's role is to sit on a search committee and identify practices or perceptions that may be influenced by individual or systemic biases and may, in turn, have differential racialized or gendered effects on hiring (Cahn et al., 2022). A similar practice, exercised across both search firms and independent school boards, may be effective in increasing both racial and gender diversity of individuals who are identified for participation in searches and who are ultimately appointed to headships.

## *Implications for Future Research*

We propose several directions for future research. The first recommendation is that the DASL dataset track retention of individuals from year to year in order to understand not just the gender and race of a head in each year but whether a single individual was retained year over year. This would allow researchers to examine specific organizational contextual features and connect them empirically to retention, as well as to specific board, faculty, and student outcomes. From these data, the independent school community may be able to derive replicable actions or tools to navigate both challenging school conditions regarding financial and human resources as well as challenges related to the broader social landscape (e.g., racial justice reckonings, which also took place in 2020 and beyond).

Our quantitative analyses are also limited in what they communicate about the process, perceptions, and experiences of the individuals who shape the appointment process (e.g., search firms, boards of trustees) or the individual who pursues headships, whether or not they are

appointed. In particular, as indicated by the year and state fixed effect model, schools' working environment is likely to differentially influence heads based on their race, gender, and other, intersectional, domains of identity. We propose qualitative research to examine how minoritized leaders perceive and navigate challenges, including their experiences with turnover and retention, and the ways in which race and gender shape their leadership journeys. Such an approach would provide deeper insight into the nuanced ways these factors influence their experiences, offering a richer understanding of the complexities within the appointment and leadership processes.

# Conclusions

In this study, we analyzed eight years of data from the DASL dataset, spanning the 2015-2016 to 2022-2023 academic years, to explore the relationship between school crises and the appointment of minoritized leaders in independent schools, specifically focusing on female leaders, leaders of color, and female leaders of color. Using two distinct models, we found that various crises, including COVID-19 and teacher/staff attrition, were positively associated with an increased likelihood of appointing minoritized leaders on the following year. Our analysis revealed that—even absent the COVID-19 onset—these leaders are more likely to work in challenging conditions, such as schools with lower rates of application and a higher proportion of low SES students. Moreover, we confirmed that teacher attrition and an increase in the diversity of boards of trustees were associated with the likelihood of heads being women or people of color in the following year. These challenging conditions, coupled with the pressures of crisis management, may contribute to the turnover rates among minoritized leaders, shedding light on mechanisms behind their lower long-term representation in leadership roles. Our findings also

underscore the value of diverse board representation (Daly & Finnigan, 2010; Kossinets & Watts, 2006; McPherson et al., 2001), with greater gender and racial diversity among board members linked to more diverse school leadership. This suggests that diversifying boards can be an actionable strategy for fostering inclusive leadership in independent schools.

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# Appendix

**Table 1. Lagged Linear Probability Model for Interrupted Time Series**

| | (1)<br>Female HoS, lagged | (2)<br>HoS of Color, lagged | (3)<br>Female HoS of Color, lagged |
|---|---|---|---|
| Pre-Covid19 trend | 0.004 | 0.002 | 0.001 |
| | (0.004) | (0.003) | (0.002) |
| Lagged intercept change during Covid-19 onset | 0.030** | 0.015* | 0.014* |
| | (0.010) | (0.008) | (0.006) |
| Post-Covid19 trend | 0.010 | 0.011* | 0.005 |
| | (0.006) | (0.005) | (0.003) |
| School establishment period | -0.000 | 0.000 | 0.000 |
| | (0.000) | (0.000) | (0.000) |
| School Type (not day) | -0.097** | -0.046** | -0.013 |
| | (0.037) | (0.018) | (0.013) |
| Boys' School | -0.213*** | -0.063** | -0.029* |
| | (0.034) | (0.022) | (0.014) |
| Girls' School | 0.548*** | 0.049 | 0.092** |
| | (0.040) | (0.036) | (0.034) |
| Elementary (Lower) School | 0.080** | 0.049** | 0.038* |
| | (0.031) | (0.019) | (0.016) |
| Secondary School | -0.061+ | -0.006 | -0.019 |
| | (0.037) | (0.021) | (0.014) |
| Middle-Sized School | -0.091** | -0.024 | -0.016 |
| | (0.030) | (0.018) | (0.016) |
| Large-Sized School | -0.156*** | -0.046+ | -0.043* |
| | (0.038) | (0.026) | (0.018) |

| | | | |
|---|---|---|---|
| Religious affiliation | -0.005<br>(0.023) | 0.014<br>(0.015) | 0.013<br>(0.012) |
| FinAid application | 0.000***<br>(0.000) | 0.000<br>(0.000) | 0.000+<br>(0.000) |
| FinAid awarded (log) | -0.010<br>(0.007) | 0.001<br>(0.004) | -0.000<br>(0.003) |
| FinAid received students | 0.000<br>(0.000) | 0.000<br>(0.000) | 0.000<br>(0.000) |
| Yield rate (%) | -0.001+<br>(0.000) | -0.000<br>(0.000) | -0.000<br>(0.000) |
| Admin. Staff | 0.000<br>(0.001) | 0.000<br>(0.000) | 0.000<br>(0.000) |
| Inst. Staff | 0.000<br>(0.000) | -0.000<br>(0.000) | -0.000<br>(0.000) |
| Number of Teachers | -0.001**<br>(0.000) | 0.000<br>(0.000) | -0.000<br>(0.000) |
| Female board (%) | 0.001*<br>(0.001) | 0.000<br>(0.000) | 0.000<br>(0.000) |
| Board of Color (%) | -0.000<br>(0.000) | 0.001***<br>(0.000) | 0.001***<br>(0.000) |
| Intercept | 0.602***<br>(0.112) | 0.026<br>(0.063) | 0.036<br>(0.051) |

*Note: Standard errors in parentheses are clustered at the school level.+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. FinAid = financial aid, Admin = administrative, and Inst = instructional. The observations that were used are 7571. Coed (both boys and girls), comprehensive K-12 (both elementary and secondary), and small-sized schools are reference groups.

**Table 2. Logistic Regression for Interrupted Time Series with Contemporaneous Outcomes**

| | Female HoS | HoS of Color | Female HoS of Color |
|---|---|---|---|
| Pre-Covid19 trend | 0.018 | 0.027 | 0.049 |
| | (0.017) | (0.027) | (0.034) |
| Lagged intercept change during Covid-19 onset | 0.114* | 0.100 | 0.085 |
| | (0.047) | (0.088) | (0.109) |
| Post-Covid19 trend | 0.065* | 0.099* | 0.090+ |
| | (0.027) | (0.043) | (0.050) |
| School establishment period | -0.002* | 0.001 | -0.000 |
| | (0.001) | (0.002) | (0.002) |
| School Type (not day) | -0.367+ | -0.582+ | -0.529 |
| | (0.218) | (0.323) | (0.429) |
| Boys' School | -1.682*** | -0.790 | -1.374 |
| | (0.415) | (0.493) | (1.029) |
| Girls' School | 2.960*** | 0.376 | 1.092** |
| | (0.330) | (0.331) | (0.375) |
| Elementary (Lower) School | 0.291* | 0.355+ | 0.445 |
| | (0.131) | (0.209) | (0.281) |
| Secondary School | -0.297 | -0.468 | -0.825+ |
| | (0.207) | (0.324) | (0.458) |
| Middle-Sized School | -0.363** | -0.247 | -0.210 |
| | (0.131) | (0.198) | (0.253) |
| Large-Sized School | -0.594** | -0.557* | -0.981** |
| | (0.188) | (0.268) | (0.369) |
| Religious affiliation | 0.000 | 0.231 | 0.321 |
| | (0.113) | (0.162) | (0.217) |

| | | | |
|---|---|---|---|
| | 0.000* | 0.001* | 0.000* |
| FinAid application | (0.000) | (0.000) | (0.000) |
| | -0.056 | 0.094+ | 0.089 |
| FinAid awarded (log) | (0.035) | (0.053) | (0.071) |
| | 0.000 | -0.000 | 0.000 |
| FinAid received students | (0.000) | (0.000) | (0.000) |
| | -0.004* | -0.003 | -0.006+ |
| Yield rate (%) | (0.002) | (0.003) | (0.004) |
| | 0.001 | 0.001 | -0.002 |
| Admin. Staff | (0.004) | (0.005) | (0.007) |
| | -0.000 | -0.004 | -0.003 |
| Inst. Staff | (0.002) | (0.003) | (0.003) |
| | -0.007** | 0.002 | 0.001 |
| Number of Teachers | (0.002) | (0.003) | (0.004) |
| | 0.009*** | 0.000 | 0.004 |
| Female board (%) | (0.003) | (0.004) | (0.006) |
| | -0.001 | 0.010*** | 0.013*** |
| Board of Color (%) | (0.001) | (0.002) | (0.002) |
| | 0.630 | -3.904*** | -4.360*** |
| Intercept | (0.530) | (0.800) | (1.090) |

*Note. Standard errors in parentheses are clustered at the school level. $^{+}p < 0.10$, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$. FinAid = financial aid, Admin = administrative, and Inst = instructional. We used 7571 observations for this analysis. Coed (both boys and girls), comprehensive K-12 (both elementary and secondary), and small-sized schools are reference groups. N = 9, 477.

**Table 3. Lagged Linear Probability Model with Year and State Fixed Effect**

| | (1)<br>Female HoS, lagged | (2)<br>HoS of Color, lagged | (3)<br>Female HoS of color, lagged |
|---|---|---|---|
| FinAid application | 0.000* | 0.000 | 0.000 |
| | (0.000) | (0.000) | (0.000) |
| FinAid awarded (log) | -0.006 | -0.003 | -0.003 |
| | (0.007) | (0.004) | (0.003) |
| FinAid received students | 0.000 | 0.000 | 0.000 |
| | (0.000) | (0.000) | (0.000) |
| Yield rate (%) | -0.001 | -0.000 | -0.000 |
| | (0.000) | (0.000) | (0.000) |
| Admin. Staff | -0.000 | 0.000 | 0.000 |
| | (0.001) | (0.000) | (0.000) |
| Inst. Staff | -0.000 | -0.000 | -0.000 |
| | (0.000) | (0.000) | (0.000) |
| Number of Teachers | -0.001** | 0.001+ | -0.000 |
| | (0.000) | (0.000) | (0.000) |
| Female board (%) | 0.001* | -0.000 | 0.000 |
| | (0.000) | (0.000) | (0.000) |
| Board of Color (%) | -0.000+ | 0.000+ | 0.000* |
| | (0.000) | (0.000) | (0.000) |
| Constant | 0.534*** | 0.110+ | 0.094+ |
| | (0.106) | (0.065) | (0.049) |

*Note: Robust standard errors are in parentheses. + $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. FinAid = financial aid, Admin = administrative, and Inst = instructional. N = 7,543.

**Table 4. Contemporaneous Logistic Regression with Year and School Fixed effects**

| | (1)<br>Female HoS | (2)<br>Nonwhite HoS | (3)<br>Nonwhite Female HoS |
|---|---|---|---|
| FinAid application | 0.001 | 0.001$^{+}$ | 0.001 |
| | (0.001) | (0.000) | (0.001) |
| FinAid awarded (log) | -0.220$^{+}$ | 0.363$^{+}$ | 0.348 |
| | (0.116) | (0.209) | (0.290) |
| FinAid received students | 0.004$^{*}$ | -0.004$^{+}$ | 0.000 |
| | (0.002) | (0.002) | (0.004) |
| Yield rate (%) | -0.008$^{+}$ | 0.003 | -0.006 |
| | (0.005) | (0.007) | (0.009) |
| Admin. Staff | -0.005 | -0.004 | -0.008 |
| | (0.008) | (0.013) | (0.015) |
| Inst. Staff | -0.001 | -0.012$^{*}$ | -0.008 |
| | (0.004) | (0.006) | (0.009) |
| Number of Teachers | -0.020$^{**}$ | 0.009 | 0.008 |
| | (0.006) | (0.008) | (0.012) |
| Female board (%) | 0.021$^{***}$ | -0.003 | -0.004 |
| | (0.005) | (0.008) | (0.010) |
| Board of Color (%) | -0.005 | 0.017$^{**}$ | 0.022$^{**}$ |
| | (0.004) | (0.006) | (0.008) |
| Observations | 3072 | 1536 | 863 |

*Note: Standard errors in parentheses are clustered at the school level. + p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001. FinAid = financial aid, Admin = administrative, and Inst = instructional.