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No margin, no mission? How emergency medical service crews attend to competing financial and social goals on 9-1-1 calls

Timothy Gubler[1] | **Haibo Liu**[2] | **Alexandru Roman**[3]

[1]Marriott School of Business, Brigham Young University, Provo, Utah, USA

[2]Keck Graduate Institute, Claremont Colleges, Claremont, California, USA

[3]The Maine Business School, University of Maine, Orono, Maine, USA

Correspondence
Timothy Gubler, Marriott School of Business, Brigham Young University, Provo, UT, USA.
Email: timgub@byu.edu

Abstract

Research Summary: We study how autonomous Emergency Medical Service (EMS) teams prioritize competing financial and social goals during 9-1-1 calls. Prior research highlights organization-level solutions that enable single-goal pursuit, but it remains unclear how frontline professionals manage competing goals that are interdependent and inseparable during task execution. We argue EMS teams will dynamically prioritize goals across calls depending on contextual factors. Using quasi-random assignment of 9-1-1 patients to EMS crews in 31 US states, we find that crews prioritize the financial goal on private insurance calls but shift toward the social goal when agency financial need is low or call acuity is high. Surprisingly, these patterns are most pronounced in non-profit EMS agencies. Our study offers new insight into how professionals manage goal trade-offs in real time.

Managerial Summary: What happens when professionals must pursue competing goals—like financial performance and equitable service—but organizations cannot separate them across tasks? Using data from 31 US states, we examine how Emergency Medical Service (EMS) teams navigate this tension during 9-1-1 calls. We find that crews dynamically prioritize goals based on perceived risk and opportunity—even without managerial intervention or immediate incentives. Teams provide more services to privately insured

patients to increase revenue but shift toward equitable care when patient needs are more urgent or agency finances are stable. Surprisingly, these trade-offs are most pronounced in non-profit agencies. Our findings suggest that when goals collide within tasks, managers can shape frontline decision-making by influencing how professionals understand goal risk and opportunity.

KEYWORDS

behavioral strategy, goal conflict, healthcare management, hybrid organizations, multiple goals

1 | INTRODUCTION

Modern organizations often pursue competing financial and social goals central to the purpose of their organization (e.g., Audia & Greve, 2021; Battilana et al., 2022; Ethiraj & Levinthal, 2009; Gaba & Greve, 2019; Hu & Bettis, 2018; Kim, 2024; Obloj & Sengul, 2020). For instance, healthcare organizations may seek to maintain profitability while also providing equitable and efficient care for all patients (Berwick et al., 2008; Roth et al., 2019). Airlines, automobile manufacturers, and public utilities may pursue safety and reliability while simultaneously striving to minimize financial costs (Gaba & Greve, 2019; Hu & Bettis, 2018; Kim, 2024). Microfinance lenders may strive for business model sustainability and growth while also working to alleviate poverty (Armendáriz & Morduch, 2010; Morduch, 1999; Wry & Zhao, 2018). In the past decade, companies have faced growing expectations to concurrently pursue various social goals alongside financial objectives (Battilana et al., 2022; Deloitte, 2019; Mudaliar & Dithrich, 2019).[1]

Prior work has found that pursuing multiple competing goals imposes performance challenges on organizations. Concurrent pursuit of competing goals can lead to confusion and loss of focus as decision-makers seek to maximize on multiple dimensions, but feedback mechanisms provide limited direction on competing goals (Audia & Greve, 2021; Hu & Bettis, 2018; Jensen, 2002) and actions taken to advance one goal may inadvertently undermine another (Ethiraj & Levinthal, 2009; Pache & Santos, 2013; Simon, 1972). Empirical work has illuminated this challenge, showing that performance on a dimension increases when pursued as a goal, but that overall performance decreases with the number of goals being pursued (Obloj & Sengul, 2020). In response, scholars have proposed several organization-level solutions including goal myopia (Jensen, 2002), temporal goal separation (Cyert & March, 1963; Ethiraj &

[1]The multiple goals literature has focused on tensions arising from organizations pursuing multiple goals on any dimension. This might include multiple goals in the financial dimension, as in Obloj and Sengul's study of French manufacturing firms (Obloj & Sengul, 2020). It could also include tensions arising from for-profit firms adopting peripheral social goals, such as CSR, to buttress its core business or to address pressing stakeholder demands (e.g., Burbano, 2016; Burbano et al., 2024; Eccles et al., 2014; Elfenbein & McManus, 2010; Flammer, 2015; Gubler et al., 2018; Hawn et al., 2018; Margolis & Walsh, 2003). Our focus is on tensions arising from the simultaneous pursuit of interdependent but non-separable financial and social goals in key repeated tasks.

Levinthal, 2009; Joseph & Wilson, 2018; Pfeffer & Salancik, 1978), and spatial goal separation (Audia & Greve, 2021; Ethiraj & Levinthal, 2009; Gaba & Joseph, 2013). These approaches rely on the assumption that managers can intervene to structure tasks around a single, clearly defined goal.

However, in many real-world contexts, decision-makers confront tasks with interdependent and non-separable goals that violate this assumption. In this article, we focus on one such context: professional service firms. In this context, professionals often face competing organizational goals and are given autonomy on account of their expertise (Teece, 2003; Von Nordenflycht, 2010). For instance, doctors balance treatment efficacy, patient needs, and cost constraints; public defenders juggle legal defense with time and funding constraints; professors balance teaching excellence and research productivity; and air traffic controllers prioritize safety while minimizing operational delays. In this context, goals are negatively correlated in the short term, requiring autonomous professionals to assess trade-offs and dynamically prioritize goals during task execution. The organization-level solutions articulated above do not apply; consequently, existing research provides limited insight into how professionals manage such goals. This paper helps address this gap. We examine how professionals attend to and prioritize competing, inseparable goals in a workday.

Specifically, this paper investigates how professional Emergency Medical Service (EMS) teams in the United States dynamically prioritize competing social and financial goals in their daily decisions during 9-1-1 calls involving privately insured patients. The social goal of EMS involves providing services that are safe, efficient, effective, timely, patient-centered, and equitable for all patients (Institute of Medicine, 2000, 2001). Achieving this goal implies that service decisions should be driven by patient health conditions, meaning similar patients receive similar levels of service. However, chronic public underfunding in the United States introduces a short-term financial goal for agencies, as it compels agencies to rely on patient payments through insurance reimbursements to remain financially viable (CMS, 2019; Munjal et al., 2019; NEMSAC, 2016). To prioritize the financial goal, EMS teams should underprovide service to low-paying Medicaid patients and overprovide service to higher-paying private insurance patients. While legal requirements, ethical norms, medical protocols, and monitoring by medical directors prevent consistent underprovision to low-paying Medicaid patients to cut costs (Givot, 2015), high insurance reimbursements for private insurance patients create unique opportunities to overprovide services (i.e., medical procedures or time with patients) to increase revenues.[2] Overprovision allows for progress on the financial goal but at the expense of the social goal. Conversely, providing similar service to private insurance and Medicaid patients supports the social goal but foregoes progress on the financial goal. Crucially, these goals demand mutually exclusive actions on each call: prioritizing one inherently diminishes the other.

We argue that autonomous EMS teams will prioritize their agency's financial goal during private insurance 9-1-1 calls, resulting in a drift from the social goal on average. However, we argue contextual factors will reweight the perceived trade-offs between competing goals in real time for EMS crews, influencing the goal they prioritize on each call. Finally, we argue that agency profit orientation will further shape goal prioritization, with for-profit agencies placing a greater emphasis on the financial goal while non-profit agencies focus more on the social goal.

[2]Reimbursements to EMS agencies are typically highest for private insurance patients, followed by Medicare and then Medicaid patients (CMS, 2019; NEMSAC, 2016). Medicaid may vary across states but typically provides a flat reimbursement for transports that is below cost for EMS calls.

We examine these predictions using a multi-year (2012–2016) sample covering 31 US states from the National EMS Information System (NEMSIS). This dataset enables us to observe EMS teams' prioritization of goals across individual 9-1-1 calls. Importantly, we exploit the quasi-random assignment of goal multiplicity for each call based on the quasi-random assignment of patients (and their associated insurance types) to EMS teams. We find EMS teams allocate more time and perform more medical procedures for higher-paying private insurance patients compared with lower-paying Medicaid patients (5.1% and 5.9% differences, respectively). However, these differences increase with agency financial need and diminish when patients present with more acute health conditions. These findings indicate EMS teams balance financial and social goals dynamically in a workday at the call level, influenced by contextual factors that reweight the perceived importance of goals. Strikingly—and contrary to initial expectations—this dynamic goal prioritization to pursue the short-term financial goal appears most pronounced within non-profit EMS agencies.

These findings contribute to growing research on how organizations manage competing goals (e.g., Audia & Greve, 2021; Battilana & Lee, 2014; Ethiraj & Levinthal, 2009; Gaba & Greve, 2019; Hu & Bettis, 2018; Kim, 2024; Obloj & Sengul, 2020) by offering one of the first empirical investigations into how frontline professionals manage non-separable competing goals within tasks. While prior studies have largely focused on organizational-level mechanisms to establish single goal pursuit, we provide evidence that frontline professionals can dynamically navigate goal trade-offs at the task level—even without direct managerial oversight or immediate financial incentives. This suggests that organizations may be able to pursue negatively correlated goals over time without experiencing performance freezes (e.g., Ethiraj & Levinthal, 2009; Hu & Bettis, 2018; Jensen, 2002), providing new insights into the microfoundations of goal prioritization under competing demands.

Second, our study adds theoretical depth by identifying how contextual moderators shape professionals' goal prioritization. We find that contextual factors affecting professionals' perceptions of risk and opportunity act as dynamic feedback mechanisms (e.g., Audia & Greve, 2021; Hu & Bettis, 2018), enabling real-time adjustments in how goals are prioritized across tasks. Strikingly, these contextual factors are stronger predictors of goal prioritization than organizational profit orientation. This challenges the conventional assumption that profit motives set the baseline for goal prioritization and instead highlights the more nuanced effects of organizational type (i.e., non-profit vs. for-profit). Our results extend prior work that has surfaced similarly counterintuitive insights about how organizational form shapes goal pursuit (e.g., Pache & Santos, 2013; Wry & Zhao, 2018).

Finally, our findings imply that managers overseeing organizations with competing goals should carefully consider how autonomous decision-makers perceive organizational goals, risks, and goal trade-offs. Rather than relying solely on formal controls or policies, managers should explicitly frame and communicate organizational priorities, shaping employee perceptions to align autonomous decision-making with long-term organizational objectives. This insight aligns with recent conversations on the importance of managers creating space for discussion on competing goals (Battilana et al., 2015; Kim, 2024; Obloj & Sengul, 2020).

2 | THEORETICAL DEVELOPMENT

2.1 | Organizational challenges of pursuing multiple goals

While defining organizational goals and fostering coordination among employees to achieve these goals is a hallmark of organizations (Barnard, 1938; Coase, 1937; Cyert & March, 1963;

Gartenberg & Zenger, 2023; Gibbons, 2005; Jensen & Meckling, 1976), empirical work (Obloj & Sengul, 2020) and simulations (Ethiraj & Levinthal, 2009) have found that pursuing multiple competing goals can lead to performance-eroding challenges. Jensen (2002, p. 237) argues that "purposeful behavior requires the existence of a single-valued objective function," and that it is not logically possible for firms to simultaneously maximize on multiple competing dimensions. This is in part because of incentive design and multitasking issues that blur the link between rewards and performance (Ethiraj & Levinthal, 2009; Holmström & Milgrom, 1991; Kerr, 1975), but also because boundedly rational decision-makers find it difficult to assess tradeoffs among multiple competing goals (Ethiraj & Levinthal, 2009; Jensen, 2002; Simon, 1955). Concurrently pursuing competing goals may consequently lead to confusion and "performance freezes" (Ethiraj & Levinthal, 2009; Hu & Bettis, 2018; Jensen, 2002; Pache & Santos, 2013), or the emphasis on one primary goal at the expense of the other goal (e.g., Grimes et al., 2019; Pache et al., 2019).

The literature to date has proposed two primary organization-level solutions, rooted in the idea of establishing single goal pursuit. The first solution is to temporally separate goals by focusing on a single goal over an extended period—usually many years (e.g., Cyert & March, 1963; Ethiraj & Levinthal, 2009; Greve, 2003; Joseph & Wilson, 2018; Nickerson & Zenger, 2002; Pfeffer & Salancik, 1978). This allows for single goal pursuit by decision-making employees for a fixed period but provides a sequential path to pursue multiple goals over an extended time horizon by pivoting between goals. The second solution is to spatially separate goals (Ethiraj & Levinthal, 2009; Obloj & Sengul, 2020). This allows subsets of employees to pursue a single goal, with support from organization-level coordination mechanisms (Battilana & Lee, 2014; Obloj & Sengul, 2020).

While the above solutions are promising in many cases, they fail to apply when decision-makers encounter interdependent goals that are non-separable in key tasks. In such cases, temporal or spatial separation is untenable, as the task requires concurrent consideration of both goals. Healthcare provides a relevant example. In this setting, medical professionals seek to deliver high-quality care to all patients (the social goal of healthcare, Institute of Medicine, 2000, 2001) while concurrently balancing financial considerations (Berwick et al., 2008; Cooper & Chown, 2022; Roth et al., 2019). In key tasks, a doctor's treatment decisions affect both goals, but the goals are negatively correlated. It is not reasonable to separate these goals temporally (e.g., focus for 1 year on profitability and the next year on the social goal) or spatially (e.g., one specialty focuses on profitability while another focuses on the social goal) or for the organization to dictate tradeoff policies that delineate how doctors should approach conflicting goals for all treatment plans. It remains unclear how front-line decision-makers attend to competing goals in such contexts. In this article, we focus on understanding these tensions in one important professionalized setting: Emergency Medical Services (EMS).

2.2 | EMS agencies under competing organizational goals

EMS provides pre-hospital care in the US healthcare system, and crews respond to health emergencies from 9-1-1 calls. They assess, stabilize, and deliver patients to healthcare facilities. Of the 22 million nationwide 9-1-1 calls in 2016, 14.6 million US patients were transported to hospitals by EMS units (Munjal et al., 2019). EMS agencies are state regulated and typically operate multiple EMS units (e.g., ambulances and crews). Agencies usually serve a stable and predefined geographic area and are dispatched to patients based on availability by a central call dispatch center following 9-1-1 calls.

Once on scene, and patient condition is assessed, EMS crews make transport decisions independently (i.e., when a patient is incapacitated) or in conjunction with patients and supporting parties. Before the transport decision is made, federal law prohibits EMS crews from collecting patient insurance information. However, once decided, EMS crews may consider insurance information when determining hospital destination. Our field interviews and ride-along observations with EMS crews revealed that patients often would offer up insurance information even before the transport decision was made. EMS personnel sometimes could also infer patient ability to pay based on contextual factors, such as the patient's age and neighborhood. While en route to a hospital, EMS personnel perform medical procedures such as administering oxygen or starting IVs.

The social goal of the US healthcare system entails maintaining a system that provides safe, efficient, effective, equitable, timely, and patient-centered care to *all* patients (Institute of Medicine, 2000, 2001). These are succinctly defined as follows: (1) safe—avoiding injuries, (2) efficient—avoiding waste, (3) effective—avoiding overuse and underuse, (4) equitable—providing care that does not vary in quality because of personal characteristics, including socioeconomic status, (5) timely—reducing waits and delays for both those who receive and those who give, and (6) patient-centered—patient values guide clinical decisions (Institute of Medicine, 2001). Importantly, this system-focused social goal for all patients may run counter to an individual patient's health goal, where a patient may request every service that could possibly improve health outcomes.

This social goal of healthcare applies to pre-hospital care by EMS agencies, and these agencies have a legal duty to act, assess, treat, and transport patients to medical facilities (CMS, 2020; Givot, 2015).[3] Achieving the social goal requires EMS crews to provide similar services to similar patients. As professionals, EMS crews are given autonomy in the service they provide for patients on calls.

This social goal exists apart from the short-term financial goal of EMS agencies, which is to generate agency revenue and minimize costs. Chronic government underfunding in the United States compels most EMS agencies—regardless of agency type—to rely on self-generated revenues from insurance reimbursements (NEMSAC, 2016).[4] While private insurance typically covers more than the full cost of care, Medicare and Medicaid usually reimburse below cost and often do not reimburse for procedures (GAO, 2007, 2012; NEMSAC, 2016). For instance, a 2011 estimate from the California Ambulance Association found that the average California ambulance trip cost was $630. However, the average insurance reimbursements were $150 for Medicaid patients, $426 for Medicare patients, and $1529 for private insurance patients, including a patient copayment of 20% (California Healthline, 2011). Consequently, it is common for EMS

[3]Per Givot (2015), the duty to act entails, "... responding to calls in an expeditious, but safe, manner; performing a thorough assessment of both the patient and the situation; providing the appropriate treatment; and transporting to an appropriate receiving facility when transport is warranted." The duty to assess includes providing a thorough assessment and acting on the findings of that assessment. Finally, the duty to treat entails, "... if a treatment is indicated based on the thorough assessment, and providing the indicated treatment is reasonable under the circumstances, the provider has an absolute duty to provide—or attempt to provide—such treatment."

[4]EMS agency types include community/charity, governmental (non-fire), hospital-affiliated, private (non-hospital), and integrated fire departments. Some of these agencies are public and non-profits while others are private and for-profits. EMS agencies are only reimbursed for patient transports and for procedures given during transports. A challenge to EMS financial viability stems from cases where crews respond and treat patients at the scene (which incurs cost to the unit), but the unit does not transport the patient. In such cases EMS agencies often receive no reimbursement (NEMSAC, 2016).

agencies to generate revenues primarily from private insurance patients (copayments and through insurers) and cross-subsidize public insurance patients.

Medical procedures and miles driven are primary determinants of final bill amounts (NEMSAC, 2016). Interviews with EMS providers revealed that they typically understand agency financial challenges, the differing reimbursement rates between insurance types, and even rough reimbursement levels for specific procedures depending on insurance type. For parsimony, we focus in this paper on the comparison between private insurance and Medicaid patients.[5]

2.3 | Service differences between private and Medicaid patients show goal prioritization

When EMS crews respond to calls involving Medicaid patients, they do not face a clear tension between competing goals. While Medicaid typically reimburses below the cost of service and consequently may provide an incentive for crews to underprovide service to minimize costs, legal requirements, ethical norms, medical protocols, and oversight by medical directors should prevent consistent service under-provision (Givot, 2015). Additionally, there is no financial benefit in overprovision because additional services or longer transport distances do not increase Medicaid reimbursements. Thus, service provided to Medicaid patients on average represents the legally and ethically determined floor of baseline service that approaches the social goal of EMS. We leverage this baseline for this article.[6]

In contrast to Medicaid calls, calls with privately insured patients introduce a unique opportunity for EMS crews to increase prioritization of the agency's financial goal. Private insurance usually reimburses above cost, with total payments often increasing based on procedures performed and miles driven. This creates an opportunity for crews to overprovide service—relative to Medicaid calls—to boost revenues. While this supports the agency's financial goal, it detracts from the social goal.

Our setting thus allows us to infer EMS crew goal prioritization across a workday by comparing service decisions on private insurance calls to those on Medicaid calls, holding patient condition and other observables constant. Greater service provided on private insurance calls indicates increased prioritization of the agency's financial goal; similar service suggests stronger relative prioritization of the social goal. Because these goals require mutually exclusive actions, movement toward one necessarily comes at the expense of the other.

2.4 | EMS crews prioritize the Agency's financial goal on private insurance calls

Because of the importance of the social goal to the EMS profession and each agency, this goal may be exclusively prioritized by EMS crews. Like other healthcare organizations, EMS

[5]The results for calls from Medicare patients fall in-between the private and Medicaid patient results and are consistent with our theory. For parsimony and ease of exposition, we focus our paper on Medicaid versus private insurance. However, we present the models with the Medicare results in Tables A2–A6 of the Appendix S1.

[6]We acknowledge that some might argue that the Medicaid baseline represents an insufficient level of EMS service. While this discussion is beyond the scope of our paper, we emphasize that the social goal requires maintaining a system that efficiently provides sufficient pre-hospital service to all patients. Empirically, Medicaid represents a baseline level of service because of the lack of opportunity to achieve the financial goal.

professionals pride themselves on being "first responders" to health emergencies and on helping patients in need. Our interviews revealed that "helping patients" was a primary motivator in choosing EMS as a profession. Legal requirements for a standard of service, the possibility of legal action, and medical and ethical norms all suggest a strong focus on the social goal. EMS crews also have no immediate financial incentives associated with call revenues, which might lead them to disregard agency financial goals.

However, we argue EMS crews will prioritize the organization's financial goal on calls with private insurance patients, resulting in service provision differences between Medicaid and private insurance calls. We expect this for a few reasons. First, EMS agencies on average face short-term funding challenges that threaten agency viability. The requirement by law to serve all patients in need, including patients that reimburse below costs, creates financial strain on agencies. We expect EMS professionals to internalize and respond to this strain, given their role as autonomous frontline professional decision-makers. A large literature on goal prioritization has shown individuals tend to prioritize goals they perceive as being at risk of attainment (e.g., Locke & Latham, 2006; Schmidt & DeShon, 2007).

Second, while the social and financial goals are negatively correlated in the short term (i.e., on a 9-1-1 call), EMS crews understand that these goals are positively correlated over the long term (i.e., multiple months or years). EMS professionals may consequently view attending to the short-term financial goal as instrumentally aligned with the social mission: ensuring the agency's financial survival in the short term allows it to continue fulfilling its social mandate over the long term. This may include subsidizing future calls for low ability to pay patients. This reflects a logic of cross-subsidization common in hybrid organizations (Battilana & Dorado, 2010), where pursuing financial imperatives in the short run sustains mission-driven operations over time.

Finally, most EMS calls are for relatively non-acute health conditions. Jones (2020) found that only 3% of EMS calls were reported as urgent. When health outcomes are unlikely to be affected on the current or future calls, EMS crews may feel justified in shifting some level of prioritization to other organizational needs as they perceive less urgency on attaining or maintaining the social goal. Scholars have found that the decreased risk of achieving a critical goal increases space for prioritization of other goals (Gaba & Greve, 2019; March & Shapira, 1987; Simon, 1972). In this case, this means using their discretion to pursue revenue-enhancing actions with private insurance patients to support the financial goal. Thus, we expect EMS crews to prioritize the agency financial goal during 9-1-1 calls with private insurance patients, resulting in an overprovision of services to private insurance patients.

> **Hypothesis 1.** EMS crews will prioritize the short-term financial goal of their agency on 9-1-1 calls by providing more services to higher-paying private insurance patients than to lower-paying Medicaid patients.

2.5 | Contextual factors influence relative goal prioritization across calls

While we expect EMS crews to prioritize the financial goal on average during calls involving private insurance patients, we propose that goal prioritization will be dynamic and influenced by contextual factors. Specifically, we argue that crews will adjust the relative emphasis they

place on competing goals in response to contextual factors that affect the perceived relative importance of one goal over another on a call.

The first contextual factor—agency financial need—relates to the perceived importance of the agency's financial goal relative to the social goal on a call. When agency financial need is perceived to be high, we expect crews to increase prioritization of the financial goal compared with the social goal for private insurance patients. While the EMS industry broadly faces financial strain due to mandated service provision, public underfunding, and inadequate reimbursements (CMS, 2019; NEMSAC, 2016), agencies vary in their structural exposure to financial pressure. Those serving areas with a favorable patient payer mix (i.e., a larger proportion of privately insured patients) enjoy greater revenue stability and thus experience relatively less financial need. In such agencies, EMS crews may feel less compelled to pursue revenue-maximizing behaviors and focus more on the social goal. As mission-driven organizations, financial slack affords space to focus on the social mission (Battilana & Dorado, 2010; Cyert & March, 1963; Ebrahim et al., 2014; Wry & Zhao, 2018).

Beyond structural differences, we propose that EMS crews will dynamically adjust goal prioritization based on short-term signals of their agency's financial condition, continuously incorporating feedback from their recent experiences (e.g., Audia & Greve, 2021). Specifically, periods with fewer private insurance patients (i.e., dry spells) will heighten the perceived importance of the financial goal, leading crews to seize opportunities for revenue generation through increased service provision to private insurance patients. Conversely, when crews perceive less agency financial need in short-term signals, the social goal will be more prominent, narrowing service provision differences between Medicaid and private insurance patients. Our next hypothesis follows:

> **Hypothesis 2.** EMS service provision differences between higher-paying private and lower-paying Medicaid insurance patients will be negatively moderated by EMS agency financial need, such that service provision differences will be smaller when agencies have lower financial need.

The second contextual factor—call acuity—shapes relative goal importance by altering the perceived downside risk of failing to achieve the social goal. Prior work on risk-sensitive decision-making suggests that when the consequences of failure are high, organizations and managers attend to the goal most critical to avoiding loss (e.g., Gaba & Greve, 2019; March & Shapira, 1987). We extend this logic to frontline professional EMS crews, proposing that perceived downside risk from patient harm or poor outcomes on the social goal will trigger a shift in prioritization away from the financial goal.

On most calls this risk is low, as noted above. Most transports in the United States involve non-life-threatening conditions. However, in high-acuity cases (e.g., cardiac arrest or stroke), the potential cost of delay or suboptimal service could be lethal. Even small deviations from protocols can endanger patient survival and create professional or organizational liability (e.g., Brown et al., 2016; Gonzalez et al., 2009; Holmén et al., 2020; O'Keeffe et al., 2011; Pell et al., 2001). In these high-acuity scenarios, EMS crews are likely to reorient their priorities toward the social goal of EMS to minimize risk, focusing exclusively on delivering safe, efficient, effective, equitable, timely, and patient-centered care. This results in smaller service provision differences between private insurance and Medicaid calls.

Hypothesis 3. EMS service provision differences between higher-paying private and lower-paying Medicaid insurance patients will be negatively moderated by call acuity, such that service provision differences will be smaller when EMS calls are more acute.

2.6 | Organization type affects baseline prioritization of competing goals

Finally, organizational type may shape how EMS agencies routinely prioritize non-separable but competing financial and social goals. While all EMS agencies must navigate financial constraints and the social goal of EMS, the relative prioritization of these goals may vary depending on the agency's identity as a non-profit or for-profit organization (Albert & Whetten, 1985; Gioia et al., 2000; Pache & Santos, 2013). This distinction may be consequential for several reasons.

First, resource environments may differ. Non-profit EMS agencies often receive more public funding and may experience less direct pressure to maximize call-level revenue (NEMSAC, 2016). In contrast, for-profit agencies typically rely more heavily on self-generated income and face stronger incentives to grow revenue and minimize inefficiencies. These structural realities may shape perceived relative goal prioritization as they affect how professionals interpret their agency's needs.

Second, organizational type may influence the values, norms, and role expectations that guide EMS crew behavior. In non-profit agencies, identity is frequently tied to mission-driven service, public stewardship, and care for underserved populations (Denhardt & Denhardt, 2015; Santos et al., 2015). In contrast, for-profit agencies may adopt a business-centered logic that emphasizes responsiveness, efficiency, and financial sustainability. These differences should influence how EMS crews interpret their roles: non-profit crews may see patients as beneficiaries of a public good, while for-profit crews may view them as paying customers within a financially constrained service model.

Finally, the different agency types may operate within distinct stakeholder environments that reinforce these identities and associated goal orientations. Non-profits are often accountable to boards, donors, community members, and regulators who prioritize social impact and equity. For-profits are accountable to owners, shareholders, and financial partners who may prioritize revenue performance and growth. These differing expectations may shape managerial communication and culture, which influence how frontline decision-makers prioritize competing goals (Besharov & Smith, 2014; Pache & Santos, 2013). Additionally, EMS professionals may self-select into these organizations based on value alignment—those with stronger public service motivation may be more likely to work in non-profit EMS agencies (Moynihan & Pandey, 2007; Perry, 1997).

Together, this suggests that EMS organization type should influence how competing goals are interpreted and prioritized by EMS professionals. We expect that non-profit EMS agencies will exhibit a stronger and more consistent emphasis on the social goal, leading crews to provide more similar care to Medicaid and private insurance patients, while for-profit agencies will emphasize the financial goal, leading to larger service provision differences between Medicaid and private insurance patients.

Hypothesis 4. EMS service provision differences between higher-paying private and lower-paying Medicaid insurance patients will be smaller on average in non-profit EMS agencies than in for-profit EMS agencies.

3 | DATA AND METHODOLOGY

3.1 | Quasi-random assignment of goal multiplicity

The ideal experiment to address our research question would randomly assign ability to pay via insurance type to EMS patients; and then randomly assign patients in each service area to EMS units (and their corresponding assigned crews) throughout each day. We could then observe how EMS crews change their on-the-call behavior based on goal multiplicity while avoiding potentially confounding factors stemming from differences in incident location, patient health condition, patient preferences, time of day, and other patient or call-level characteristics.

While this experimental ideal is not feasible, our empirical setting approaches this ideal. EMS units correspond to a physical EMS vehicle (i.e., an ambulance) that is nested within EMS agencies and which services emergency calls in a stable pre-assigned geographic area. Units are typically staffed by two crew members per shift, and EMS calls are assigned to agencies by 9-1-1 dispatchers. While unit availability and service agreements may influence this assignment, dispatch follows a well-defined protocol, and dispatchers do not have information about patient insurance when making dispatch decisions. Once alerted, agencies dispatch an available EMS unit to respond to a call. When on scene, EMS crews decide on a treatment and transport plan, depending on patient condition and needs. Because such encounters are typically rare for patients, and patients lack the necessary knowledge to diagnose and treat their health condition, patients regularly accept the advice and recommendations of EMS personnel.

Our identification strategy exploits quasi-random assignment of patients (and their corresponding ability to pay) to EMS units to investigate how crews alter their on-the-call service provision behavior. We then examine how agency financial need and call acuity moderate this main effect and how the main effect varies by organization type. While this identification strategy approaches the experimental ideal, we acknowledge that important empirical challenges remain. Insurance type is not randomly assigned to patients; consequently, patients with certain insurance types could live or work in different places, have different health conditions, request different care, or utilize emergency services at different points in the day or on different days of the week. Detailed standardized call-level variables allow us to control for many of these factors in our main models, and the richness of our data allows us to run a large battery of robustness checks. We also supplement our archival approach with first-hand experience "riding along" with multiple EMS crews and from interviewing 16 EMS professionals. This approach allows us to approach causality and the experimental ideal.

3.2 | Data

Our dataset originates from the National Emergency Medical Services Information System (NEMSIS). NEMSIS is a US national database of EMS call-level data. NEMSIS provides a universal standard for classifying and collecting EMS data and has been adopted by most agencies throughout the United States, although some states and territories only report partial data

during our observation window. Our sample includes EMS agencies in 31 states or territories from 2012 to 2016 that report all or nearly all EMS calls.[7] We omit from consideration 18 states or territories from the database because of partial reporting, and 6 state-years from the 31-state subset for the same reason. To arrive at our final sample, we first retained observations only for 9-1-1 calls for which an EMS transport unit was dispatched and for which a patient transport occurred. This allows us to measure crew behaviors in terms of time with patient and procedures performed. It also removes calls and transports that do not fit our research question, including calls that were canceled, inter-hospital transfers, or calls transferring deceased patients from the hospital to the morgue. Restricting to transport-only also drops non-transporting units such as fire trucks or battalion chiefs. Second, we drop observations without unit or agency identifiers, where the call time reported was zero, or calls without a recorded primary method of payment. Primary method of payment was provided in 34.5% of cases.[8] Third, we drop observations for very small agencies, defined as having fewer than five calls per year, and for units with less than one call per year on average across all years in our sample. Finally, we drop one outlier agency with significantly higher daily call volumes than the next largest agency, as it appears infeasible for the units to respond to the number of calls reported by this agency. Our final sample consists of 7,064,893 emergency transport observations from 4638 agencies and 38,126 units (if including Medicare, our final sample is 12,710,203 observations from 4831 agencies and 41,237 units).[9]

While we believe the above restrictions create a conservative sample for our study, to ensure that our results are not simply an artifact of these restrictions, we reran our main models on various alternative samples. This includes the full non-restricted dataset (see Tables A21 and A22), our final dataset with additional data collected from the partial reporting states and years (Table A23), and a single state that reports patient insurance for 76% of calls (Table A24). In all cases, our results replicate, and the estimates are qualitatively similar, suggesting that sampling choices are not driving our results.

3.3 | Variables

3.3.1 | Dependent variables

Our two main dependent variables are total *number of procedures performed* (*procedures*) and EMS *time spent with patient* (*time*). We measure the number of procedures by counting the unit reported medical procedures performed by EMS personnel, from initial contact until final drop-off. Time with patient is measured as the total time (in minutes) EMS personnel spent with a patient during a call. These variables measure key dimensions of EMS service provision that are associated with patient billable charges and agency financial performance. Importantly, these

[7]Many of these states claim 100% reporting of EMS calls, and others report near full reporting. We investigated claims of full reporting using the observed counts of total calls across years for each state. These counts showed only limited variation in the total number of calls reported across years for the states and years in our final sample, validating the states' claims of near full reporting.

[8]Method of payment includes self-pay (∼16% of observations), workers compensation (∼0.5%), uncommon types of government-provided insurance (∼1%), and non-billed calls (∼1.7%). In this paper we focus on Medicaid (18.03%) and private insurance (27.73%) calls. Medicare (34.93%) results are included in the Tables A2–A6. If individuals have multiple insurance types, private insurance is listed before public, and Medicare is listed before Medicaid.

[9]We report sample t-test results comparing our final sample to the sample lacking insurance information in Table A1b.

variables do not indicate final patient health outcomes (and we are indeed agnostic to patient outcomes in this study). Instead, these variables give insight into service provision differences and consequently goal prioritization across calls, as explained earlier in the paper.

We winsorize both variables at the 99th percentile to mitigate effects from outliers and use a natural log transformation ($\log(x + 1)$). Our results are similar when using only winsorization or only the log transformation (see Tables A7–A16 in the Appendix S1).

3.3.2 | Independent and moderating variables

The NEMSIS data include the primary payment method billed. Our primary independent variable is a dummy for *Private insurance*. Additional analyses in Tables A2–A6 in the Appendix S1 show results including Medicare patients. As mentioned in Section 2.3, EMS crews only collect patient insurance information after the transport decision has been made. However, time with the patient and the number of procedures performed are significantly influenced by the decisions made by EMS crews en route to the hospital.

For the moderating variables, we define call acuity using *lights and sirens*, which is a dummy variable equal to 1 if lights and sirens are used leaving the scene en route to a hospital and 0 otherwise. To measure agency financial need, we calculate the ratio of private insurance calls to all calls. A higher ratio implies lower agency financial need. To measure long-term agency financial need, we construct a dummy variable called *high revenue agency* (*long-term*), which takes the value of 1 if an agency has a private call ratio above the median of all agencies in our sample. Because each agency services a stable pre-assigned geographic area, this variable captures long-term financial pressures based on the observed patient payment mix in each service area. To capture short-term financial need for each agency, we define a variable called *high revenue agency* (*short-term*). This short-term measure uses the percentage of private insurance calls from a moving lagged 3-month window.

Finally, to test Hypothesis 4, we use EMS agency types provided by NEMSIS. These classification types include fire departments, private (non-hospital), community (non-profits), governmental (non-fire), and hospitals. We classify fire departments, community agencies, and governmental agencies as *non-profits*. Private (non-hospital) agencies are classified as for-profits. We classify hospital-affiliated EMS units in multiple ways in our analyses (which we discuss below). This is because hospitals cannot be classified cleanly as either non-profits or for-profits. US hospital profit orientations are generally unclear,[10] and we do not have detailed data on individual hospital profit orientations.

3.3.3 | Control variables

We use three categories of control variables: time controls, patient controls, and call-specific controls. These controls reduce concerns from omitted variable bias, as patient payment method may not be random to patient conditions, locations, demographics, or treatment preferences. For time controls, we include dummies for *hour of day*, *day of week*, *month of year*, and *year*. This helps account for seasonal effects, weather differences, traffic patterns, weekday

[10]The American Hospital Association (2022) statistics found that 48.6% of US hospitals were non-profits, 15.6% were owned by state or local governments, and 20% are for-profit investor owned (2022).

vs. weekend differences, and general patient tendencies for utilizing 9-1-1 at different times. At the patient level, we control for patient *age*, *race*, *gender*, and *primary health impression*. This last variable, primary health impression, is a NEMSIS code assigned by EMS crews from 27 distinct possibilities based on the crew's impression of the patient's primary health problem (e.g., cardiac arrest, stroke, trauma, etc.). These variables help account for subconscious biases as well as for patient health conditions, including conditions related to gender or age. At the call level, we control for (1) the logged time taken by EMS personnel to reach the scene (*response time*), which helps control for distance and traffic at time of call; (2) the logged time taken by EMS personnel at the scene to reach the patient (*time to patient*), which helps control for issues encountered at the scene; (3) the (log $(x+1)$) number of *total care barriers* encountered (e.g., language, scene safety, obesity, uncooperative patient, emotional distress) to control for call complications; and (4) the *reason for choosing a drop-off destination* (e.g., patient choice, closest destination, diversion) to control for hospital decisions and patient preferences in care requests.

3.3.4 | Specifications

Our model estimates the within-EMS unit (i.e., ambulance) change in service given to a patient based on the patient's ability to pay through insurance. We use the following fixed-effects model:

$$\mathrm{Log}(Y_{ijt}) = \alpha_0 + \beta_1 Private_{ijt} + \beta_2 Moderator_{ijt} + \beta_3 Moderator_{ijt}{}^{*}\, Private_{ijt} + \beta_4 X_{ijt} + \eta_j + \gamma_t + \varepsilon_{ijt}, \quad (1)$$

where Y_{ijt} is our dependent variable, either patient *procedures* or patient *time*, for EMS call i performed by unit j at time t. $Private_{ijt}$ is a dummy variable that is equal to 1 when a patient has private insurance (Medicaid is the omitted baseline) for call i. X_{ijt} are patient and call-level control variables, η_j are EMS unit fixed effects, γ_t are time controls as described above, and ε_{ijt} the error term. For Hypothesis 1, β_1 is the coefficient of interest, as the moderator variables are not included (i.e., $\beta_2 Moderator_{ijt} + \beta_3 Moderator_{ijt} * Private_{ijt}$). For Hypotheses 2 and 3, the moderator variables *lights and sirens*, *high revenue agency* (*long-term*), and *high revenue agency* (*short-term*) are included. Thus, the primary coefficients of interest for these specifications are the β_3 coefficients for each moderator. We estimate these models using OLS with errors clustered at the agency level.[11] Because unit fixed effects η_j are included, the effects are interpreted as the within-EMS unit change in service for a private insurance patient relative to a Medicaid patient, controlling for observables. The unit fixed effects address unobserved time-invariant characteristics that might influence the analyses.

For the organization type hypothesis (Hypothesis 4), we use the following specification:

$$\mathrm{Log}(Y_{ist}) = \alpha_1 + \beta_5 Private_{ist} + \beta_6 Non-profit_{ist} + \beta_7 Non-profit_{ist}{}^{*}\, Private_{ist} + \beta_8 X_{ist} + \lambda_s + \gamma_t + \varepsilon_{ist}, \quad (2)$$

where Y_{ist} is our dependent variable, either patient *procedures* or patient *time*, for EMS call i performed in state s at time t. $Private_{ist}$ is a dummy variable indicating private insurance

[11]Table A17 (Appendix S1) presents results for our main model (Equation (1)) using Poisson regression.

(Medicaid is the omitted baseline) for call i. X_{ist} are patient and call-level control variables, λ_s are state fixed effects, γ_t are time controls as described above, and ε_{ist} the error term. For Hypothesis 4, β_7 is the coefficient of interest. These models are estimated using OLS with errors clustered at the agency level.

While patient payment method should be quasi-randomly assigned within units across calls, it may not be entirely exogenous to patient or call characteristics. Figures A1–A3 (Appendix S1) suggest that calls may not be randomly assigned throughout the day or throughout the week within our sample based on patient ability to pay and that patient conditions may not be randomly distributed among different insurance types. Unit fixed effects, in conjunction with our many control variables described earlier, should reduce these concerns. To rule out this and other alternative explanations, and to provide evidence for our proposed mechanism, we perform and present many robustness checks.

4 | RESULTS

4.1 | Patient ability to pay results in service provision differences

Table 1 provides sample descriptive statistics for our main variables broken out by primary insurance type (see Table A1a for descriptive statistics including Medicare). Table 2 presents a correlation matrix. Figure 1 shows the dependent variable sample distributions using the raw data. In both figures, these distributions are shifted to the right for private insurance calls, suggesting preliminary evidence for service provision differences based on patient ability to pay.

Our main model results are found in Table 3, with progressively added controls. These model results show that after controlling for patient and call characteristics, patients with private insurance receive between 5.9% and 10% more procedures (baseline of 1.65 procedures performed per call) and have between 5.1% and 8.9% longer call times (baseline of 28.77 min spent with patients per call) than patients with Medicaid, the omitted baseline. For time with patients, this translates into 1.47–2.56 additional minutes spent with private insurance patients. Because Medicaid represents an ethically and medically established baseline of service, these results imply an overprovision of service for private insurance patients, which supports Hypothesis 1. This overprovision generates larger agency revenues and supports the agency financial goal at the cost of the social goal of EMS.

Our interviews with EMS professionals provided additional insights. EMS professionals revealed that agency financial pressure is generally common knowledge, and that longer transport distances and more procedures performed are known to increase reimbursements for private insurance patients. Providers also noted that, "Different insurances have different reimbursement rates," and some professionals were able to provide examples of reimbursement differences based on mileage or procedures performed. One paramedic said "Medicaid and Medicare reimbursements are typically below what it actually costs us to run the procedure. That is why it is important that we get it (i.e., patient insurance) right the first time." Another EMS professional said, "In all honesty, I do [administer procedures based on insurance] a lot. If I know the patient can pay for it—I will provide a bunch of stuff." Another said, "over-billing of private insurance [patients] is endemic."

Figure A4 visualizes the distribution of EMS procedures by insurance type across 122 procedures (y-axis) and 27 major health conditions based on EMS crew primary impression (x-axis). Panel 1 shows procedures provided during Medicaid calls, indicating that Medicaid patients

TABLE 1 Sample descriptive statistics broken out by patient insurance type.

Variable	Count	Mean	SD	Min	Max
Medicaid					
Time with Patient	2,657,225	27.403	13.611	1	76
Total Number of Procedures	2,884,262	1.466	1.572	0	8
Hour of Day	2,884,357	12.826	6.599	0	23
Day of Week	2,884,357	2.988	1.970	0	6
Month of Year	2,884,357	6.544	3.412	1	12
Year	2,884,357	2014	1.348	2012	2016
Female	2,878,912	0.571	0.495	0	1
Minority	2,256,778	0.463	0.499	0	1
Age	2,879,608	42.697	21.256	0	120
Total Number of Barriers	2,884,357	0.039	0.211	0	6
Response Time	2,881,133	8.676	6.105	0	36
Time to Reach Scene	2,876,297	7.577	5.633	0	31
Lights and Sirens (Transport)	2,832,275	0.156	0.363	0	1
Hospital	2,884,357	0.211	0.408	0	1
Fire Department	2,884,357	0.241	0.428	0	1
Community EMS	2,884,357	0.105	0.307	0	1
Governmental EMS	2,884,357	0.236	0.424	0	1
Private EMS	2,884,357	0.207	0.405	0	1
Nonprofit EMS	2,884,357	0.582	0.493	0	1
High Revenue Agency (Short-term)	2,884,357	0.253	0.149	0	1
High Revenue Agency (Long-term)	2,851,393	0.246	0.431	0	1
Private					
Time with Patient	3,768,909	29.730	13.891	1	76
Total Number of Procedures	4,180,380	1.773	1.830	0	8
Hour of Day	4,180,536	12.879	6.364	0	23
Day of Week	4,180,536	3.003	1.964	0	6
Month of Year	4,180,536	6.449	3.434	1	12
Year	4,180,536	2014	1.386	2012	2016
Female	4,168,088	0.548	0.498	0	1
Minority	3,506,988	0.257	0.437	0	1
Age	4,171,882	53.844	23.346	0	120
Total Number of Barriers	4,180,536	0.042	0.213	0	8
Response Time	4,174,155	8.761	6.220	0	36
Time to Reach Scene	4,167,341	7.388	5.602	0	31
Lights and Sirens (Transport)	4,060,414	0.211	0.408	0	1
Hospital	4,180,536	0.106	0.308	0	1
Fire Department	4,180,536	0.253	0.435	0	1

TABLE 1 (Continued)

Variable	Count	Mean	SD	Min	Max
Community EMS	4,180,536	0.197	0.398	0	1
Governmental EMS	4,180,536	0.230	0.421	0	1
Private EMS	4,180,536	0.214	0.410	0	1
Nonprofit EMS	4,180,536	0.680	0.467	0	1
High Revenue Agency (Short-term)	4,180,535	0.448	0.226	0	1
High Revenue Agency (Long-term)	4,076,452	0.661	0.473	0	1

receive the standard procedures for each condition, along with additional interventions based on EMS crews' assessments of individual patient needs. Panel 2 displays procedures for privately insured patients and reveals a pattern consistent with Medicaid, supporting the interpretation that Medicaid patients receive care aligned with medically and ethically appropriate standards. However, Panel 3 highlights key differences: private insurance patients are more likely to receive both the standard procedures (indicating greater intensity of care) and a wider array of additional, less common procedures (indicating greater extensiveness of care). This panel shows that, across many treatment conditions, privately insured patients receive more resource-intensive protocols, including starting IVs (procedure 110), blood draws (procedure 105), spinal immobilization (procedure 97), and administering ECGs (procedure 1). Together with the findings above, this pattern offers strong support for Hypothesis 1.

It is difficult to quantify the precise financial impact of our main effect on agencies, given opaque EMS billing data and varying insurance reimbursement rates. The Medicare mileage rate in 2025 is $9.15 per mile (CMS, 2025). It is commonly reported that private insurance charges 3–5 times the Medicare rate, so we can assume an additional mile driven for a private insurance patient would lead to a billing increase of between $9 and $45 on a private insurance call. For procedures, providing a very simple procedure like oxygen could lead to an additional charge of $35 (see code A0422 at PayerPrice.com), although providing this procedure could also upgrade other billing codes from basic life support care (A0429) to advanced life support care (code A0427), resulting in an additional increase of around $100 (see PayerPrice.com). While speculative, our effect sizes thus imply that just one additional mile driven and one additional procedure performed can increase agency call revenues by $100–$200. As a conservative estimate, given the mean agency number of yearly calls in 2016 (1530), assuming 27% of calls being for private insurance patients, one additional mile traveled for private insurance patients, and one additional procedure provided per 10 calls, our main effects would lead to an agency yearly revenue effect of ~$34,425–$89,505.

4.2 | Lower agency financial need results in reduced service overprovision

Tables 4 and 5 provide results including interaction variables for agency financial pressure. First, we explore chronic agency financial pressures from the long-term patient mix. These results are shown in Table 4. As described above, the variable *high revenue agency* (*long-term*) is a time-invariant dummy that identifies agencies that serve proportionately more high-paying

TABLE 2 Correlation matrix ($N = 7{,}064{,}893$).

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1 Medicaid	1.00																					
2 Private Insurance	−1.00	1.00																				
3 Time with Patient	−0.08	0.08	1.00																			
4 Total Number of Procedures	−0.09	0.09	0.17	1.00																		
5 Hour of Day	0.00	0.00	0.03	0.00	1.00																	
6 Day of Week	0.00	0.00	0.01	0.00	0.01	1.00																
7 Month of Year	0.01	−0.01	−0.01	0.01	0.00	0.00	1.00															
8 Year	0.04	−0.04	0.00	0.06	0.00	0.00	−0.03	1.00														
9 Female	0.02	−0.02	0.00	−0.03	0.00	0.00	0.00	−0.02	1.00													
10 Minority	0.21	−0.21	−0.12	−0.08	−0.03	0.00	0.02	0.03	0.02	1.00												
11 Age	−0.24	0.24	0.11	0.08	0.00	0.00	−0.01	−0.01	0.03	−0.19	1.00											
12 Total Number of Barriers	−0.01	0.01	0.03	0.03	0.00	0.00	0.00	0.00	−0.02	−0.01	0.03	1.00										
13 Response Time	−0.01	0.01	0.27	−0.01	−0.01	0.00	0.00	−0.01	0.00	−0.05	0.05	0.00	1.00									
14 Time to Reach Scene	0.02	−0.02	0.25	−0.01	0.01	0.00	0.00	0.01	0.00	−0.03	0.04	0.00	0.93	1.00								
15 Lights and Sirens (Transport)	−0.07	0.07	−0.05	0.05	0.00	0.00	−0.01	−0.06	−0.02	0.00	0.02	0.03	−0.03	−0.05	1.00							
16 Hospital	0.14	−0.14	0.00	−0.06	−0.02	0.00	0.00	0.13	−0.02	0.09	−0.07	−0.04	−0.06	−0.03	−0.07	1.00						
17 Fire Department	−0.01	0.01	−0.16	−0.03	−0.01	0.00	0.02	−0.01	0.00	0.07	−0.02	−0.03	−0.12	−0.13	0.14	−0.24	1.00					
18 Community EMS	−0.12	0.12	0.07	0.05	0.01	0.00	−0.03	−0.06	0.00	−0.12	0.05	0.01	0.02	−0.01	−0.03	−0.18	−0.25	1.00				
19 Governmental EMS	0.01	−0.01	0.07	−0.03	0.00	0.00	0.00	−0.03	0.02	0.00	−0.01	0.05	0.03	0.04	−0.03	−0.23	−0.32	−0.24	1.00			
20 Private EMS	−0.01	0.01	0.04	0.08	0.02	0.00	0.00	−0.02	0.00	−0.03	0.03	0.01	0.13	0.14	−0.03	−0.22	−0.30	−0.23	−0.28	1.00		
21 Nonprofit EMS	−0.10	0.10	−0.03	−0.02	0.00	0.00	0.00	−0.08	0.02	−0.03	0.02	0.02	−0.06	−0.10	0.08	−0.56	0.43	0.33	0.41	−0.69	1.00	

TABLE 2 (Continued)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
22 High Revenue Agency (Short-term)	−0.44	0.44	0.01	0.01	0.02	0.00	−0.01	−0.03	0.00	−0.13	0.18	0.02	−0.01	−0.04	0.09	−0.17	0.03	0.23	−0.12	0.04	0.09	1.00
23 High Revenue Agency (Long-term)	−0.41	0.41	0.01	0.03	0.02	0.00	−0.02	−0.06	0.00	−0.16	0.13	0.03	−0.04	−0.06	0.09	−0.17	0.10	0.19	−0.05	−0.07	0.19	0.66

Note: All correlations >0.0007 are significant at $p < .01$.

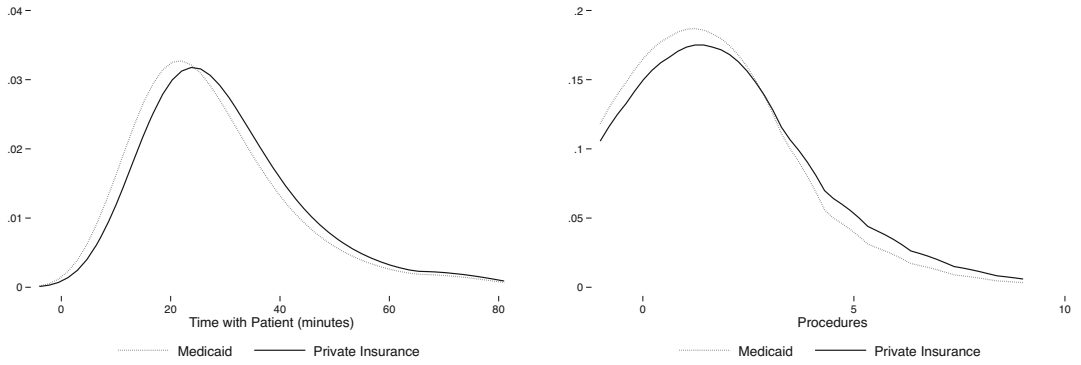

FIGURE 1 Kernel density plots of dependent variables by insurance type.

patients in their service areas. The results in Table 4 suggest that high revenue agencies have smaller differences between private and Medicaid calls on procedures (27% drop) and time with patients (40% drop). This suggests crews in agencies with low long-term financial pressures prioritize the social goal relatively more.

The second set of analyses, shown in Table 5, focuses on shorter-term agency financial pressures (*high revenue agency* (*short-term*)). The results for these models suggest that as the agency ratio of private insurance calls for the prior 3 months increases, service provision differences based on patient insurance decrease. Together, these results show that EMS crews prioritize the financial goal relatively less when agency financial need is low. This provides support for Hypothesis 2.

4.3 | Higher call acuity reduces service overprovision

Table 6 provides results for interaction models with patient acuity. In these models, a dummy variable for lights and sirens transport from the scene proxies for call acuity. The base results, shown in Columns 1 and 2, suggest that the average number of procedures increases by 14.2% and time with the patient decreases by 1.3% for urgent calls. These results are expected because more critical patient conditions may require additional procedures and quicker transports. Columns 3 and 4 include the interaction with private insurance. The results in Column 3 show that private insurance patients generally receive more procedures than Medicaid patients, but the interaction result suggests no difference in procedures provided for private insurance patients when lights and sirens are used. This fails to provide support for Hypothesis 3. However, the Column 4 results show that private insurance patients receive about 5.7% more time from EMS teams for non-acute calls, but for critical calls, this is reduced by about 2.9%, a reduction of about 50%.

Subsample models on the 15 most common patient conditions (covering 96% of all cases in our sample) provide further insights. These results are presented in Figure 2a,b. The horizontal axis lists patient conditions. These results suggest that time with patient and number of procedures converge across private insurance and Medicaid for more urgent conditions (e.g., cardiac events or strokes) but diverge as urgency decreases. When divergence occurs, patients with private insurance receive more procedures and longer call times. These results imply that EMS personnel respond to the organization's financial objective less when calls are urgent, reducing service provision differences.

TABLE 3 Main effects regressing time spent with patient and number of procedures performed on patient insurance type.

	(1) Log (procedures)	(2) Log (time)	(3) Log (procedures)	(4) Log (time)	(5) Log (procedures)	(6) Log (time)	(7) Log (procedures)	(8) Log (time)
Private Insurance	0.100	0.089	0.099	0.088	0.080	0.067	0.059	0.051
	(0.005)	(0.003)	(0.005)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)
	[.000]	[.000]	[.000]	[.000]	[.000]	[.000]	[.000]	[.000]
Constant	0.724	3.238	0.623	3.205	0.588	3.163	0.606	2.938
	(0.003)	(0.002)	(0.015)	(0.007)	(0.016)	(0.010)	(0.022)	(0.015)
	[.000]	[.000]	[.000]	[.000]	[.000]	[.000]	[.000]	[.000]
Unit Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Time Controls			Y	Y	Y	Y	Y	Y
Patient Controls					Y	Y	Y	Y
Call Controls							Y	Y
N	7,064,642	6,426,134	7,064,642	6,426,134	5,743,713	5,181,765	3,391,906	3,143,295
Adj. *R*-sq.	0.008	0.009	0.014	0.011	0.023	0.021	0.119	0.090

Note: Robust standard errors in parentheses are clustered by agencies. *P*-values presented in square brackets. Time controls include dummies for hour of day, day of week, month, and year. Patient controls include a continuous variable for patient age and dummies for race and gender. Call controls include a continuous variable for the number of barriers encountered, the logged call response time, and dummies for reason for choosing destination and provider impression (for type of patient health condition).

TABLE 4 Lower chronic financial pressure at agencies is associated with reduced service provision differences.

	(1) Log (procedures)	(2) Log (time)
Private Insurance	0.066	0.062
	(0.005)	(0.003)
	[.000]	[.000]
Private Insurance × High Revenue Agency (Long-term)	−0.018	−0.025
	(0.007)	(0.005)
	[.013]	[.000]
Constant	0.606	2.936
	(0.023)	(0.015)
	[.000]	[.000]
Unit Fixed Effects	Y	Y
Time Controls	Y	Y
Patient Controls	Y	Y
Call Controls	Y	Y
N	3,317,433	3,073,946
Adj. *R*-sq	0.120	0.090

Note: Robust standard errors in parentheses are clustered by agencies. *P*-values are presented in square brackets. Time controls include dummies for hour of day, day of week, month, and year. Patient controls include a continuous variable for patient age and dummies for race and gender. Call controls include a continuous variable for the number of barriers encountered, the logged call response time, and dummies for reason for choosing destination and provider impression (for type of patient health condition). High Revenue Agency (long-term) is a dummy variable that takes on the value 1 if the agency's ratio of private insurance calls to Medicaid and private insurance calls is above the sample median and 0 otherwise.

Interviews with EMS personnel corroborate these findings. EMS personnel commonly expressed that the social goal was central to their decision to enter and persist in this career. They likewise noted the importance of patient health in making on-the-call treatment decisions. One paramedic said, "I really like taking care of people and helping people feel better. I think that's the underlying thing—the underlying desire to care for others and care for the community. It's making a difference in people's lives." EMS personnel often shared stories about the actions they had taken previously on critical calls to save a patient in need—actions that notably did not show evidence of them considering the financial goal. For example, one paramedic said, "The most stressful (calls) for paramedics are cardiac arrests. We try to make sure that we're doing the right thing for patients and that the patients know that we're doing as much as we possibly can." In sum, these results suggest that when patient health conditions are urgent, EMS crews shift their prioritization toward the social goal. This supports Hypothesis 3.

4.4 | Results by organization type

Finally, we examine whether our main results vary by organization profit orientation and, more generally, by organization type. First, we examine the prevalence of service provision

TABLE 5 Lower short-term financial need at agencies is associated with reduced service provision differences.

	(1) Log (procedures)	(2) Log (time)	(3) Log (procedures)	(3) Log (time)
High Revenue Agency (Short-term)	−0.004	−0.012	0.052	0.059
	(0.067)	(0.011)	(0.068)	(0.014)
	[.947]	[.274]	[.445]	[.000]
Private Insurance	0.059	0.051	0.083	0.080
	(0.002)	(0.002)	(0.008)	(0.005)
	[.000]	[.000]	[.000]	[.000]
Private Insurance × High Revenue Agency (Short-term)			−0.076	−0.093
			(0.022)	(0.012)
			[.000]	[.000]
Constant	0.607	2.942	0.604	2.889
	(0.034)	(0.016)	(0.034)	(0.016)
	[.000]	[.000]	[.000]	[.000]
Unit Fixed Effects	Y	Y	Y	Y
Time Controls	Y	Y	Y	Y
Patient Controls	Y	Y	Y	Y
Call Controls	Y	Y	Y	Y
N	3,391,906	3,143,295	3,396,454	3,144,118
Adj. *R*-sq.	0.119	0.090	0.119	0.091

Note: Robust standard errors in parentheses are clustered by agencies. *P*-values presented in square brackets. Time controls include dummies for hour of day, day of week, month, and year. Patient controls include a continuous variable for patient age and dummies for race and gender. Call controls include a continuous variable for the number of barriers encountered, the logged call response time, and dummies for reason for choosing destination and provider impression (for type of patient health condition). High Revenue Agency (short-term) is defined as the mean ratio of private to Medicaid and private insurance calls over the past 3 months for each agency.

differences across all EMS agencies in our sample using the raw data. This is shown in Figure A5a,b (Appendix S1). These figures suggest our main effects manifest in about 75% of agencies in our sample, signifying dynamic goal prioritization is likely widely prevalent across all EMS agencies in the United States.

Hypothesis 4 argued for smaller service provision differences and less dynamic prioritization of competing goals on private insurance calls for non-profit EMS agencies (i.e., community, government, and fire) compared with for-profit agencies. To test this hypothesis, we interact our main independent variable *Private Insurance* with a dummy variable for *non-profit* agencies. Agency fixed effects are no longer appropriate for this analysis as we aim to explore between-agency variation. Instead, we include agency-level control variables and state fixed effects. These control variables include (1) *Agency Private Call Ratio*, which is the ratio of private calls to all calls for each agency and that controls for long-term agency financial pressure, (2) *Agency Total Number of Units* (*log*), which is the logged count of agency units and accounts for agency size, and (3) *Agency Total Number of Calls* (*log*), which is the logged sum of all calls answered by an agency and accounts for agency experience.

TABLE 6 Call acuity is associated with reduced service provision differences.

	(1) Log (procedures)	(2) Log (time)	(3) Log (procedures)	(4) Log (time)
Lights and Sirens Transport	0.142	−0.013	0.140	0.005
	(0.012)	(0.006)	(0.015)	(0.006)
	[.000]	[.033]	[.000]	[.418]
Private Insurance			0.057	0.057
			(0.003)	(0.003)
			[.000]	[.000]
Private Insurance × Lights and Sirens			0.001	−0.029
			(0.009)	(0.004)
			[.949]	[.000]
Constant	0.593	2.966	0.564	2.937
	(0.023)	(0.015)	(0.023)	(0.015)
	[.000]	[.000]	[.000]	[.000]
Unit Fixed Effects	Y	Y	Y	Y
Time Controls	Y	Y	Y	Y
Patient Controls	Y	Y	Y	Y
Call Controls	Y	Y	Y	Y
N	3,315,994	3,077,282	3,315,994	3,077,282
Adj. *R*-sq	0.125	0.087	0.127	0.090

Note: Robust standard errors in parentheses are clustered by agencies. P-values presented in square brackets. Time controls include dummies for hour of day, day of week, month, and year. Patient controls include a continuous variable for patient age and dummies for race and gender. Call controls include a continuous variable for the number of barriers encountered, the logged call response time, and dummies for reason for choosing destination and provider impression (for type of patient health condition). Lights and sirens take the value of 1 if lights and sirens are used transporting a patient from the scene to a healthcare facility.

The results are presented in Table 7, with private agencies as the omitted baseline group. For Hypothesis 4 to be supported we expect large and negative interaction coefficients for non-profit agencies and large and positive coefficients for the main effect *Private Insurance* variable. Surprisingly, however, and counter to our expectations, the coefficient on *Private Insurance* × *Non-profit Agency* is large, positive, and statistically significant while the main effect on *Private Insurance* is positive but relatively small. This suggests that dynamic prioritization of goals for private insurance patients is stronger in non-profits than for-profit agencies. These effects replicate across the alternative coding of for-profit agencies, shown at the top of the Table 7, but the effects are not statistically different for non-profits compared with for-profits in Columns 4 and 6, once hospitals are broken out.

The results for each agency type are graphically presented in Figure 3. They show that community, government, and fire agencies have similar effects while private and hospital agencies are more similar, which is consistent with our results in Table 7. Together, these results suggest that EMS crews in all types of agencies dynamically prioritize goals for private insurance calls.

However, the effects are most pronounced for non-profit agencies, instead of for-profit agencies. Thus, Hypothesis 4 is rejected.

5 | ROBUSTNESS AND ADDITIONAL ANALYSES

5.1 | Ruling out alternative explanations

While our main results hold across multiple specifications, we perform additional robustness checks to rule out alternative explanations. First, it is possible that Medicaid patients use EMS differently than private insurance patients, which influences call acuity. To address this concern, we conducted four subsample analyses, found in Table A18 (Appendix S1): (1) only patients who are eventually admitted to the hospital; (2) only lights and sirens calls; (3) only calls during the night from 10:00 PM to 6:00 AM; and (4) only calls between midnight and 1:00 AM. The first two subsamples should include patients with more similar health conditions across insurance types than those in our main sample. The last two subsamples should reflect calls that are "unplanned" and thus reduce unobserved differences in patient characteristics. The results for these subsample analyses are similar to our main models. We additionally reran our main models with more granular patient condition dummies, which are used for final billing.[12] While missing codes reduced our sample size, the results (Table A19) are again similar.

Second, we test if patient preferences and requests for care are driving our results. Private insurance patients could request additional procedures or transport to further hospitals. This would lead to service provision differences not from provider decisions, but because of patient requests. To address this concern, we reran our main models on (1) only calls where the "reason for choosing destination" clearly indicated a reason other than patient preferences, and (2) only calls where the patient was noted as incapacitated, and consequently less likely to make requests. These models, presented in Table A20 again show similar results.

Third, we test for selection issues in the determination of our final sample. To do this we reran our main models on alternative samples. This included adding back in the agency and unit outliers that were dropped (Table A21), adding back non-transport units and non-transport calls (Table A22), and adding in additional data from NEMSIS for states, territories, and years that had only partial reporting (Table A23). Additionally, we ran our models on a single state that had the highest level of non-missing insurance information (Table A24). All these results are similar to our main results.

Fourth, it could be that dual insurance (e.g., having both Medicare and private insurance) is influencing our results. To test this, we omit from our analysis patients over 65 who specified private insurance as their primary insurance. The results, shown in Table A25, are again similar.

Fifth, racial discrimination could be influencing our results (Hanchate et al., 2019; Nelson, 2002), particularly if race is correlated with insurance. While our models control for patient race, we reran models using a dummy for *Minority* status (White = 0, Minorities = 1). The results, shown in Table A26, suggest minorities receive fewer

[12]The main model *primary impression dummies* capture EMS unit impression of patient health condition. Patient condition codes provide an ex-post evaluation of the patient's condition.

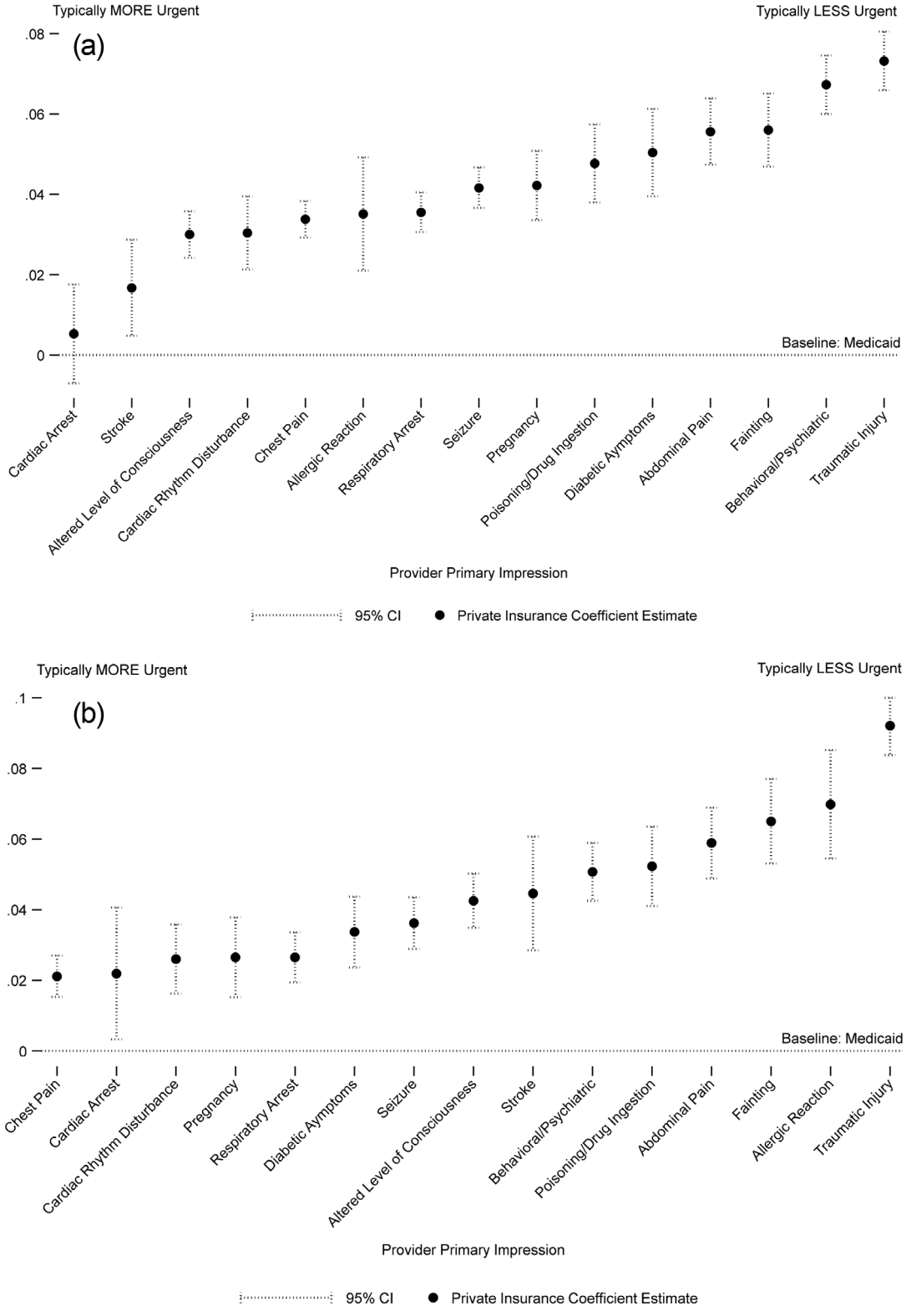

FIGURE 2 Legend on next page.

procedures and less EMS time. These results hold even after controlling for patient payment method. To rule out race effects completely, we reran our main models for White patients only in our sample. The results, found in Table A27, Columns 1 and 2, are again similar to our main results.

Finally, patient insurance may be systematically correlated with patient location, and consequently with distance from a hospital. Thus, Medicaid patients may be delivered quicker because they live closer. While our main models control for time to patient, to reduce this concern, we also reran models for calls where patients were not home at the time of a call. Columns 3 and 4 of Table A27 present results for white patients who were not home at the time of emergency. The location of these calls should be more random and consequently reduce concerns about the distance from hospital driving our results. These results are again similar to our main results.

5.2 | Limitations and future research

While the above analyses help rule out many alternative explanations, limitations remain. First, we do not have micro-level data for heterogeneity in exact reimbursement rates for different agencies or insurance or agency funding structures. While our fixed effects specifications should account for unobservable time-invariant differences within units and agencies (e.g., units service areas, funding structure, level of training, etc.), there could be additional unobservable time-variant factors that are influencing our results. Future studies could explore in more detail how specific funding and insurance differences influence EMS crew decisions given multiple competing goals.

Second, while our interviews and ride-along observations revealed that patients often disclose insurance information to EMS crews around the time of patient transport, in some cases insurance information was not revealed until arrival at the hospital. Similarly, while our interviews and observations suggested that EMS crews can sometimes make inferences about patient ability to pay based on available contextual information (i.e., location, house, car, or age), these judgments could be erroneous. Thus, in some cases patient insurance information may be absent or unclear to EMS crews during a call. Our models, however, assume that EMS personnel become aware of patient insurance information after contact with a patient, and that this influences decision-making in relation to competing goals. While we note that if crews do not have ready access to insurance information, this biases against us finding systematic effects; future studies could explore how the timing of insurance information revelation influences crew decision-making on calls.

FIGURE 2 (a) Fully controlled coefficient estimates showing the difference in patient time for private insurance patients relative to Medicaid patients, broken out by medical conditions. (b) Fully controlled coefficient estimates showing the difference in procedures for private insurance patients relative to Medicaid patients, broken out by medical conditions. There are 27 unique impression condition codes used by EMS personnel to report patient condition. These codes capture the EMS personnel's impression of the patient's health problem and is consequently used to justify care decisions. Figure 2a,b reflects coefficient estimates for fully controlled subsample models for the top 15 most commonly reported impressions. This accounts for 96% of all calls in our sample. They are ranked in ascending order.

TABLE 7 Nonprofit agencies are associated with higher service provision differences.

	(1) Log (procedures)	(2) Log (time)	(3) Log (procedures)	(4) Log (time)	(5) Log (procedures)	(6) Log (time)
	Non-profit = Community, Fire, Governmental; Baseline = Hospitals and Private Agencies		***Non-profit = Community, Fire, Governmental; Baseline = Private Agencies; *Hospitals Dropped****		***Non-profit = Community, Fire, Governmental; Baseline = Private Agencies***	
Private Insurance	0.014	0.032	0.022	0.042	0.018	0.042
	(0.019)	(0.012)	(0.022)	(0.013)	(0.022)	(0.013)
	[.442]	[.008]	[.313]	[.001]	[.407]	[.002]
Non-profit Agency	−0.118	−0.021	−0.085	0.009	−0.084	0.008
	(0.038)	(0.020)	(0.044)	(0.023)	(0.045)	(0.023)
	[.002]	[.302]	[.053]	[.685]	[.058]	[.743]
Private Insurance × Non-profit Agency	0.091	0.032	0.088	0.025	0.088	0.024
	(0.028)	(0.015)	(0.029)	(0.016)	(0.030)	(0.016)
	[.001]	[.030]	[.003]	[.120]	[.003]	[.142]
Hospital					0.106	0.088
					(0.063)	(0.039)
					[.092]	[.024]
Private Insurance × Hospital					0.001	−0.021
					(0.042)	(0.021)
					[.976]	[.323]
Constant	0.468	2.742	0.466	2.741	0.458	2.730
	(0.100)	(0.047)	(0.098)	(0.044)	(0.096)	(0.045)
	[.000]	[.000]	[.000]	[.000]	[.000]	[.000]
State FE	Y	Y	Y	Y	Y	Y
Agency Controls	Y	Y	Y	Y	Y	Y
Time Controls	Y	Y	Y	Y	Y	Y
Patient Controls	Y	Y	Y	Y	Y	Y
Call Controls	Y	Y	Y	Y	Y	Y
N	3,391,906	3,143,295	3,063,124	2,823,606	3,391,906	3,143,295
Adj. *R*-sq	0.148	0.138	0.159	0.142	0.15	0.139

Note: Robust standard errors in parentheses are clustered by agencies. *P*-values presented in square brackets. Time controls include dummies for hour of day, day of week, month, and year. Patient controls include a continuous variable for patient age and dummies for race and gender. Call controls include a continuous variable for the number of barriers encountered, the logged call response time, dummies for reason for choosing destination, and provider impression (for type of patient health condition). Agency controls include the ratio of private calls to all calls, the logged total number of agency units, and the log of agency total number of calls.

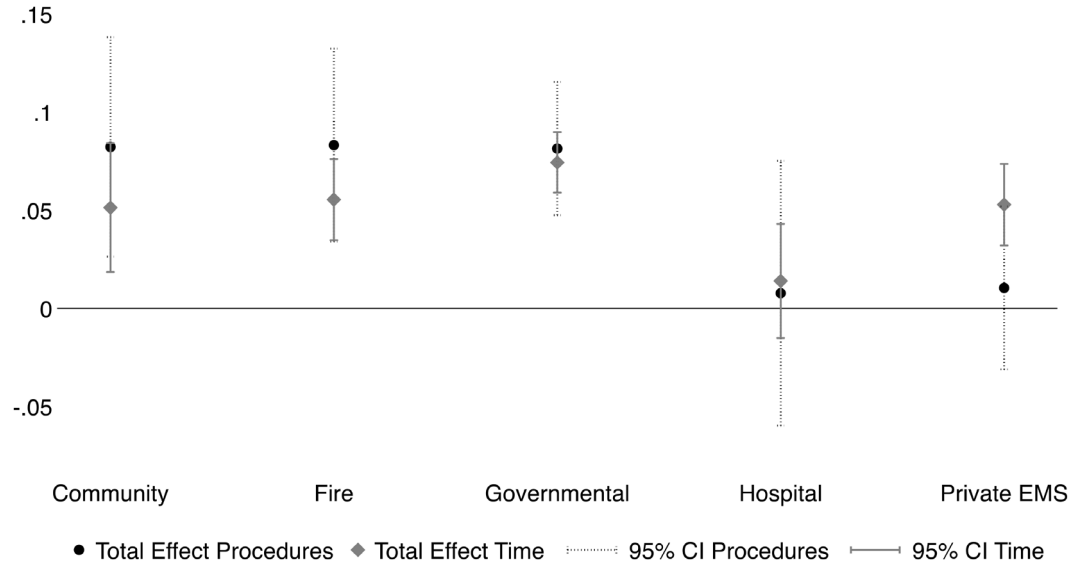

FIGURE 3 Total effects for private insurance patient calls compared with Medicaid calls by EMS agency type.

6 | DISCUSSION AND CONCLUSION

Recent work has documented challenges faced by organizations when pursuing multiple competing goals (Battilana & Lee, 2014; Battilana et al., 2015; Battilana et al., 2022; Doherty et al., 2014; Ethiraj & Levinthal, 2009; Gaba & Greve, 2019; Hu & Bettis, 2018; Kim, 2024; McCann & Vroom, 2014; Obloj & Sengul, 2020; Pache & Santos, 2013). In this article, we investigated how salaried EMS crews internalize and attend to competing organizational goals that are non-separable in key tasks. We proposed and found evidence of dynamic goal prioritization by EMS crews, which allows decision-making workers to concurrently attend to negatively correlated financial and social goals across calls. This goal prioritization is contingent on contextual factors, which affect employee risk perceptions toward goals. We found that agency financial pressures and call acuity affect relative goal prioritization within a workday and across time. Strikingly, we found that such factors appear to impact crew decision-making even more than the formal profit orientation of EMS agencies. This implies that organizations seeking to pursue multiple competing goals may need to attend to risk perceptions on goals more than simply changing organization-level structure or policies.

A long literature has documented positive individual performance effects from setting goals (for reviews see Locke & Latham, 2006, 2019). Specific, non-ambiguous, and difficult but attainable goals direct individual attention and efforts toward goal-achieving actions, which improve performance on the goal dimension (Locke & Latham, 2006). When conflicting goals are present, however, this can erode these performance benefits. A parallel literature in economics and management has exposed challenges that arise when individuals in organizations pursue and are rewarded for multiple conflicting goals, including effort distortion, employee confusion, gaming, and multitasking problems (e.g., Gubler et al., 2016; Holmström, 1979; Holmström & Milgrom, 1991; Kerr, 1975). Our study provides a new perspective by showing that decision-making employees internalize organization-level goals and can sometimes rely on contextual cues to concurrently pursue conflicting goals. Our results indicate decision-making employees may

learn to recognize and manage tradeoffs from multiple goals over time. This provides new managerial insights to organizations as they increasingly pursue social goals in addition to financial goals and grapple with the challenges and opportunities these multiple goals imply (e.g., Battilana et al., 2015; Burbano, 2016; Flammer, 2015; Hawn et al., 2018; Margolis & Walsh, 2003).

We have examined these challenges in a single context—professional services. In our context, decision-making employees are intrinsically motivated toward the social goal of the organization and have significant autonomy and expertise in carrying out key tasks. They also largely pursue goals that are negatively correlated in the short term but positively correlated in the long term. While the professional services context is important to study in its own right, generating 2.8 trillion in revenue in 2022 (U.S. Department of Commerce, 2025), and the healthcare industry accounts for over 17% of US GDP through health spending (Centers for Medicare & Medicaid Services, 2024), future work is needed to establish generalizability across different contexts and to push forward theory. However, given the general paucity of empirical work in this space relative to theoretical work, our paper makes a strong empirical contribution by showing how frontline professionals attend to competing goals in a single important context.

There is emerging attention among management scholars in addressing grand challenges, which include societal issues such as inequality and social impact (Ferraro et al., 2015; George et al., 2016; Olsen et al., 2016). Our article contributes to this discussion by highlighting key tensions decision-making employees experience when organizations seek to pursue both financial and social goals. The documented EMS service provision differences shown in this paper appear to be driven by system-wide underfunding, which cannot be resolved by EMS agencies alone. Thus, to address grand challenges, it may be important to have coordinated and collaborative efforts among many actors, including policymakers. Our results suggest managers and policymakers should carefully consider how organization-level financial goals and needs might influence decision-making employees in organizations tasked with pursuing social goals.

Finally, healthcare inequity is a critical challenge for the US healthcare system (e.g., Chetty et al., 2016; Gaffney & McCormick, 2017; Nelson, 2002; Schroeder, 2007). While scholars have uncovered provision differences driven by differential patient remuneration to financially motivated providers (Clemens & Gottlieb, 2014; Delgado et al., 2014; Gruber & Owings, 1994; Larkin et al., 2017; Venkatesh et al., 2019), it remains unclear whether and when linking healthcare workers' pay to performance resolves such inequities (Eijkenaar et al., 2013; Lindenauer et al., 2007; Petersen et al., 2006). Our article suggests that, absent direct incentives, patient insurance can still affect service provision in meaningful ways, and these differences are more pronounced in poorer areas. Resolving such disparities in pre-hospital care may require general changes to the funding structure. This is an intriguing area for future work.

In sum, our study highlights the pivotal role of managers in shaping how autonomous decision-makers navigate competing organizational goals. While formal controls remain important, they are insufficient on their own. Managers must actively engage in framing and communicating priorities to influence how employees interpret risks, tensions, and trade-offs. By doing so, they can better align frontline decision-making with broader organizational aims. These findings reinforce growing calls for more intentional dialogue and reflection around competing goals within organizations (Battilana et al., 2015; Kim, 2024; Obloj & Sengul, 2020).

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from NEMSIS. Restrictions apply to the availability of these data, which were used under license for this study. Data and code are available upon request and agreement from NEMSIS at NEMSIS.ORG.

ORCID

Timothy Gubler https://orcid.org/0000-0001-5145-8896
Haibo Liu https://orcid.org/0000-0002-5999-1385

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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