Learning About the Binding Nature of the Law: Police Violence, Criminal Offending and Adolescent Legal Socialization

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Legal socialization—the process through which individuals develop an understanding of the law and its purpose—unfolds throughout the life course, but childhood and adolescence are particularly formative periods for shaping legal attitudes. This study examines adolescent legal socialization and assesses the extent to which exposure to different policing practices, including police officers assaulting members of the public, is associated with changes in beliefs about the legitimacy of the law and an increased propensity to criminally offend. We focus on adolescents aged 11 to 14 in São Paulo, Brazil, a city where authoritarian policing is well-documented. Drawing on data from the São Paulo Legal Socialization Study—a cohort-based, four-wave longitudinal survey of 800 adolescents fielded between 2016 and 2019—we estimate contemporaneous and cumulative effects of exposure to different policing practices on legal legitimacy beliefs and crime involvement during adolescence. We find a robust association between exposure to police violence and (a) weakened beliefs about the legitimacy of the law and (b) an increased propensity to engage in offending behavior over time. Results also suggest that decreased perceptions of legal legitimacy may mediate the effects of exposure to police violence on self-reported offending behavior. We conclude that secondary exposure to police brutality can undermine the development of legitimacy beliefs among adolescents undergoing legal socialization in a city where violent and aggressive policing strategies are common. As legitimacy beliefs erode, internal constraints against rule-breaking may loosen, increasing adolescents' propensity to engage in criminal behavior.

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Violence pervades the lives of children and adolescents in disadvantaged communities worldwide. Some experience it directly as victims, others witness it in their surroundings and many feel its weight simply by living in its shadow. Even those not personally targeted can suffer enduring emotional and behavioral consequences. Reviewing the literature on exposure to violence, Sharkey (2018) highlights a wide range of detrimental effects, from impaired mental health to disruptions in education and social relationships. Research suggests that repeated exposure can shape adolescent cognitive development, fostering sensation-seeking tendencies, weakening impulse control and potentially increasing the likelihood of antisocial behavior and delinquency (Wojciechowski, 2022). Over time, these effects may accumulate, compromising educational and occupational prospects and reinforcing cycles of social disadvantage (Oppenheim et al., 2024).

This study focuses on adolescent exposure to police violence. Applying a legal socialization framework, we examine whether adolescents' exposure to police use of force erodes perceptions of legal legitimacy and, in turn, increases their risk of offending. Our study site is São Paulo—a city where authoritarian policing is well-documented, particularly in communities that are poor, Black and located in the urban periphery (González, 2021; Oliveira, 2025). Drawing on longitudinal data from the São Paulo Legal Socialization Study (SPLSS)—a four-wave, cohort-based survey tracking a cohort of students born in 2005 from 2016 to 2019—we assess whether exposure to police violence influences the development of legal beliefs and, ultimately, behavioral outcomes.

Legal socialization refers to the process through which individuals develop an understanding of the law, its purpose and the institutions responsible for its enforcement (Tyler & Trinkner, 2017). While this process unfolds throughout the life course, childhood and adolescence are particularly formative periods for shaping legal attitudes (Fagan & Tyler, 2005). During these years, young people encounter legal authority in various forms—through parental guidance, school discipline and interactions with or observations of the police (Trinkner & Reisig, 2021). The accumulation of these experiences help shape their perceptions of legal legitimacy, including beliefs about the fairness of the law, the obligations it imposes and the role of legal authorities in upholding justice.

A central question in this process is whether adolescents come to view the law as morally binding in their daily lives—whether they internalize legal norms and, in doing so, refrain from offending. In São Paulo, where many young people are repeatedly exposed to police violence (Oliveira, 2025), the accumulation of exposure to law enforcement may foster perceptions of the police as a coercive rather than protective force—one that asserts authority through physical force rather than fostering mutual obligation. In an environment with a historical legacy of police abuse (Nagin & Telep, 2020), adolescents may begin to question whether the law applies equally to all, whether legal authorities genuinely serve to protect them and whether they themselves should feel morally bound to obey the law (Sampson & Bartusch, 1998). As legitimacy beliefs weaken, internal behavioral constraints against rule-breaking may loosen, increasing their propensity to engage in criminal behavior in specific situations (Fagan & Piquero, 2007; Fagan & Tyler, 2005).

Our aim is to test the key implications of this hypothesized pathway, in which exposure to police violence undermines adolescents' development of beliefs in the legitimacy of the law, ultimately increasing their risk of criminal offending. The paper is structured as follows. First, we review research on the life-course consequences of exposure to violence, including police violence. In the 'Legal Socialization and Experience with the Police' section, we examine the relationship between exposure to police behavior and legal socialization, with a focus on how police violence may erode perceptions of legal authority. In the 'Legal Socialization and Criminal Offending' section, we consider the link between legal socialization and criminal offending, drawing on evidence that weakened legitimacy beliefs may contribute to delinquent behavior. In the 'Repeated Exposure to Policing as Cumulative Disadvantage' section, we introduce the SPLSS and discuss the contextual relevance of our study. We then outline our data, measures and analytical approach before presenting our findings and discussing their broader implications.

Exposure to Violence

Exposure to violence has been widely studied across criminology, sociology and community psychology (Sharkey, 2018). Defined as direct victimization, witnessing violence or hearing about real-world violent events (Buka et al., 2001), such exposure has been consistently linked to adverse developmental outcomes. Research has shown associations between exposure to violence and higher rates of post-traumatic stress disorder (Giaconia et al., 1995), increased criminal behavior (Petrich, 2024), heightened aggression (Miller et al., 1999), lower educational attainment (Burdick-Will, 2013; Sharkey et al., 2016) and a greater likelihood of engaging in problematic behaviors (Kilpatrick et al., 2000; Lynch & Cicchetti, 1998). While much of this research has focused on community violence, growing attention has been given to the developmental and psychological consequences of police violence.

Several studies document the harmful effects of police violence on young people. DeVylder et al. (2020) found that direct experiences of police violence were associated with negative mental health outcomes, while Ang (2021) reported that proximity to a police killing was linked to lower educational attainment among Black and Hispanic students in California. Aggressive policing has also been linked to symptoms of trauma and anxiety in young men aged 18–26 (Geller et al., 2014), and studies measuring physiological responses suggest that exposure to police-related deaths can heighten stress levels in Black adolescents (Browning et al., 2021; cf. Smith Lee & Robinson, 2019). Beyond its immediate psychological effects, police violence can shape broader developmental outcomes, affecting educational aspirations, institutional trust and overall well-being. Research has shown that exposure to aggressive policing is associated with declines in academic performance (Legewie & Cricco, 2022; Legewie & Fagan, 2019), while repeated experiences of unjust or coercive police stops have been linked to anticipatory stress and lower educational expectations (Jackson et al., 2022a; Webb et al., 2022).

Encounters with police perceived as hostile or illegitimate may also weaken adolescents' trust in legal institutions. Repeated experiences of police violence can

reinforce perceptions of systemic injustice, fostering legal cynicism and deepening distrust in law enforcement (Nivette et al., 2019). Studies suggest that young people exposed to aggressive policing develop a sense of alienation from legal institutions, which can heighten stress responses, contribute to academic disengagement and restrict perceptions of future opportunity (Duarte et al., 2020; Jackson et al., 2019). At the community level, persistent police violence can fuel widespread skepticism toward legal and social institutions, exacerbating social marginalization and limiting pathways to social mobility (Fine et al., 2025; Motley et al., 2024; Zare et al., 2025). These cumulative effects highlight the broader social costs of aggressive policing and underscore the need to evaluate police violence within a public health framework that accounts for its long-term developmental consequences.

Taken together, these studies suggest that exposure to violence—whether in the community or through interactions with law enforcement—shapes not only young people's psychological well-being and educational trajectories but also their perceptions of justice and authority. Repeated encounters with police violence may foster a sense of disenfranchisement, influencing how adolescents understand, internalize and relate to the law.

Legal Socialization and Experience with the Police

A critical question, then, is how exposure to police violence shapes legal socialization. Legal socialization refers to the process through which individuals develop their understanding of laws, legal institutions and social norms, with legitimacy serving as a central component (Trinkner et al., 2018; Tyler, 2006). While young people may recognize certain behaviors as wrong and refrain from engaging in them, a key issue is whether they perceive the law as a binding source of presumptive obligation (Sampson & Bartusch, 1998; Tyler, 2006). Internalizing the principle that laws should be followed because they are laws marks an important developmental milestone[1]—one that is shaped, in part, by experiences with legal authorities (Nivette et al., 2015; Tyler & Trinkner, 2017). Whether direct or vicarious,

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[1] The extent to which individuals see the law as a binding force in their daily lives has been theorized from two complementary perspectives: legitimacy and legal cynicism (Oliveira & Jackson, 2021). From the legitimacy perspective, compliance is partly driven by an internalized moral duty to obey the law because it represents legitimate authority (Tyler, 2006). When people perceive legal institutions as moral, just and appropriate, they develop a sense of obligation to obey the law, even in the absence of coercion or the risk of sanction (Tyler & Jackson, 2014). This sense of legitimacy is shaped, in part, by whether people believe that laws are enforced through consensual rather than coercive means (Bradford & Jackson, 2024). By contrast, legal cynicism focuses on how legal norms lose their binding force, particularly in communities where legal institutions are seen as unresponsive, biased or unjust (Kirk & Papachristos, 2011; Sampson & Bartusch, 1998). Rather than simply reflecting a lack of legitimacy, cynicism about legal norms represents a deeper disillusionment with the law's ability to maintain social order. This can lead to estrangement from legal norms at both the individual and community levels (Bell, 2017), prompting some individuals to resort to violent or rule-breaking behaviors to settle grievances under the assumption that the law and legal institutions cannot ensure their protection (Oliveira, 2025).

encounters with policing serve as 'teachable moments' (Tyler et al., 2014), either strengthening trust in legal institutions or deepening disillusionment.[2]

The impact of these experiences is particularly evident in high-profile incidents of police brutality, which have been shown to erode public perceptions of legal legitimacy and decrease crime reporting (Desmond et al., 2016; Fine et al., 2025). Among young people, exposure to negative policing experiences—whether through firsthand encounters, peer accounts or viral videos of excessive force—can foster legal cynicism and weaken beliefs in the legitimacy of legal authority (McLean et al., 2019). In some cases, growing disillusionment with the justice system may push young people to seek alternative forms of justice outside formal legal institutions (Baz-Cores & Fernández-Molina, 2022). By contrast, when police officers engage in fair and respectful treatment, they can reinforce a psychologically binding sense of legal legitimacy, strengthening voluntary compliance and law-abiding behavior (Trinkner & Cohn, 2014).

Despite growing interest in how exposure to violence influences legal socialization, few studies have examined these processes among adolescents. One exception is Fagan and Tyler's (2005) cross-sectional study, which surveyed over 200 young people aged 10 to 16 in two New York City neighborhoods. Using the My Exposure to Violence scale (Selner-O'Hagan et al., 1998)—which measures exposure to sexual assault, shootings, gunfire, personal threats and home break-ins—the study provided key insights into how adolescents develop perceptions of legal authority. However, it did not examine exposure to police violence, nor did it track changes in legitimacy beliefs over time. Longitudinal research in settings where violent policing is prevalent, such as São Paulo, is needed to offer a more comprehensive understanding of these dynamics.

Although a substantial body of research has examined how adults' direct and indirect experiences with the police shape legal attitudes (e.g. Skogan, 2006; Bradford et al., 2009; Oliveira et al., 2021; Fine et al., 2025), fewer studies have explored legal socialization among young people (e.g. Fagan & Tyler, 2005; Geller & Fagan, 2019; Nivette et al., 2015). Even rarer are longitudinal studies that track how legitimacy beliefs evolve over the course of adolescence. Much of the existing research on youth legal socialization is based in the United States, particularly from the Pathways to Desistance study, which focuses on youth offenders. Piquero et al. (2005), for instance, used group-based trajectory models to examine how contact with legal authorities predicts declining legitimacy beliefs over time. McLean et al. (2019) applied latent growth curve modelling to track changes in trust in legal authority

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[2] Research consistently shows that both direct and indirect encounters with the police shape perceptions of procedural justice—the perceived fairness of police treatment—and police legitimacy, the belief that law enforcement holds rightful authority (Tyler, 2006). Positive interactions, where individuals feel treated fairly and with respect, are linked to higher levels of trust and legitimacy. However, the asymmetry thesis suggests that negative encounters have a far greater impact than positive ones—those who perceive unfair or coercive treatment are significantly more likely to distrust the police than those treated fairly are to develop trust (Oliveira et al., 2021; Skogan, 2006). Beyond direct experiences, indirect exposure—particularly to aggressive policing or discriminatory practices—can further weaken trust and legitimacy at both individual and community levels (Desmond et al., 2016; see also Fine et al., 2025).

among youth offenders aged 20–26, while Kaiser and Reisig (2019) used autoregressive models to assess the relationship between police-citizen encounters, police legitimacy, legal cynicism and criminal offending.

Beyond the US context, Nivette et al. (2019) conducted a study in Zurich, Switzerland, using a population-representative sample rather than focusing solely on offenders. Their research mapped the developmental trajectories of moral cynicism and perceptions of police performance, providing a broader perspective on legal socialization beyond high-risk groups. However, there remains a critical need for longitudinal research in contexts where police violence is pervasive, particularly in Latin America. Understanding how adolescents in São Paulo develop legal attitudes in response to violent policing offers a unique opportunity to extend legal socialization theory to settings where law enforcement is widely viewed as coercive rather than protective.

Studying the Link Between Adolescent Exposure to Police Violence and Legitimacy Beliefs

These studies underscore the role of early encounters with legal institutions in shaping legal attitudes. But critical gaps remain. For one thing, the extent to which repeated exposure to police violence erodes legal socialization is not well understood. To date, no longitudinal study has examined how adolescents' beliefs about the legitimacy of the law evolve in contexts where police violence is deeply embedded in the social fabric of certain neighborhoods. We first examine whether secondary exposure to different forms of police behavior is associated with adolescents' beliefs in the legitimacy of the law. We focus on three key types of exposure:

1. Witnessing a police stop—a routine law enforcement action that, while legally sanctioned, may be perceived as intrusive or aggressive in the São Paulo context.
2. Witnessing a police arrest—a lawful police intervention that involves a higher degree of force, such as handcuffing and physical restraint.
3. Witnessing an episode of police violence—the primary focus of this study, where an officer assaults a member of the public, representing an explicit abuse of power.

While police stops and arrests reflect standard policing procedures, their perceived legitimacy may vary, particularly in São Paulo, where law enforcement practices have often been described as confrontational and coercive (Oliveira, 2024). The third category—witnessing police violence—differs in that it represents an unambiguous abuse of power. We hypothesize that this form of exposure may have the strongest association with declines in legal legitimacy beliefs, though we remain cautious in interpreting the nature of this relationship.

- **Hypothesis 1.1:** Witnessing police officers stopping and questioning a suspect is associated with negative changes in the development of beliefs about the legitimacy of the law.

- **Hypothesis 1.2:** Witnessing police officers arresting a suspect with handcuffs is associated with negative changes in the development of beliefs about the legitimacy of the law.
- **Hypothesis 1.3:** Witnessing police officers assaulting a suspect is associated with negative changes in the development of beliefs about the legitimacy of the law.

Legal Socialization and Criminal Offending

The second part of the study focuses on the link between weakened legitimacy beliefs and a propensity to engage in offending behavior. Criminological research has long established that criminal behavior tends to peak in late adolescence, before declining in early adulthood (Sampson et al., 2005). A range of factors—including inadequate guardianship (Nagin, 2013) and low self-control (Gottfredson & Hirschi, 1990)—have been identified as key contributors to delinquency. Some scholars of legal socialization suggest that perceptions of legal legitimacy may also play a crucial role in shaping law-abiding behavior (Fagan & Piquero, 2007). From this perspective, Tyler (2006, p. 4) argues that individuals who view legal authorities as legitimate are less likely to break laws—not merely because they fear punishment but because they believe they ought to comply, independent of deterrence. This aligns with legal socialization theories, which propose that adolescents who do not internalize the belief that the law is morally binding may be more prone to delinquency (Tyler & Trinkner, 2017). In particular, Fagan and Piquero (2007) proposed an integrated, developmental model of criminality which emphasizes the interaction of two developmental processes occurring in adolescence: the internalization of legal rules and norms and the development of rationality to frame behavioral choices and decisions.

Cross-sectional research has consistently identified positive associations between legitimacy beliefs and self-reported compliance with the law (Jackson et al., 2012; Tyler, 2006; Tyler & Jackson, 2014). In the Brazilian context, Oliveira et al. (2020) and Jackson et al., (2022b) reported that public perceptions of legitimacy were positively associated with self-reported compliance among adults in São Paulo. While these studies highlight important patterns, however, it remains unclear whether legitimacy beliefs directly influence behavior or whether both are shaped by broader structural or psychological factors. Beyond individual survey-based findings, neighborhood-level research provides additional context. Kirk and Papachristos (2011) found that Chicago neighborhoods with high levels of legal cynicism also exhibited higher homicide rates, reinforcing earlier findings by Sampson and Bartusch (1998). A recent meta-analysis by Walters and Bolger (2019), synthesizing findings from 64 studies (95 samples) conducted primarily in Western countries between 1990 and 2018, found a significant positive relationship between legitimacy beliefs and legal compliance, including longitudinal studies.

Studying the Links Between Adolescent Exposure to Police Violence, Legitimacy Beliefs and Offending Behavior

If witnessing police violence is linked to weakened legitimacy beliefs, and if legitimacy beliefs in turn are associated with lower levels of offending, then we might also expect to observe a direct association between exposure to violent policing and self-reported criminal behavior.

- **Hypothesis 2.1:** Witnessing police officers stopping and questioning a suspect is positively associated with adolescents' propensity to engage in criminal offending.
- **Hypothesis 2.2:** Witnessing police officers arresting a suspect with handcuffs is positively associated with adolescents' propensity to engage in criminal offending.
- **Hypothesis 2.3:** Witnessing police officers assaulting a suspect is positively associated with adolescents' propensity to engage in criminal offending.

We also explore the potential relationship between adolescents' beliefs about the legitimacy of the law and their self-reported offending behavior. We examine whether weaker legitimacy beliefs are associated with a diminished commitment to rule-following, acknowledging that this relationship is likely influenced by a range of social, psychological and environmental factors. If adolescents perceive the law as lacking legitimacy, they may be less inclined to internalize legal norms, potentially shaping their behavioral choices over time.

- **Hypothesis 3:** Adolescents' beliefs about the legitimacy of the law are negatively associated with their propensity to engage in criminal offending.

Finally, we assess whether adolescents' beliefs about legal legitimacy may play a role in linking exposure to policing practices with offending behavior. In particular, we consider the possibility that witnessing police officers abuse their power—such as through the violent assault of a suspect—could shape how young people view the law's authority and, in turn, their own orientation toward legal rules. The logic follows that if those in power are perceived as failing to follow the rules, young people may begin to question whether they, too, should feel bound by them.

- **Hypothesis 4.1:** Undermined beliefs about the legitimacy of the law mediate the potential effects of witnessing police officers stopping and questioning a suspect on adolescents' propensity to engage in criminal offending.
- **Hypothesis 4.2:** Undermined beliefs about the legitimacy of the law mediate the potential effects of witnessing police officers arresting a suspect with handcuffs on adolescents' propensity to engage in criminal offending.
- **Hypothesis 4.3:** Undermined beliefs about the legitimacy of the law mediate the potential effects of witnessing police officers assaulting a suspect on adolescents' propensity to engage in criminal offending.

Repeated Exposure to Policing as Cumulative Disadvantage

While the present study does not formally test whether repeated exposure to police violence constitutes a developmental turning point or initiates a trajectory of cumulative disadvantage, it does contribute to a broader literature that conceptualises policing as a dynamic and socially consequential feature of the adolescent life course (Oliveira & Jackson, 2021). Legal socialization has often been treated as the product of discrete encounters with legal authorities but growing research highlights how legitimacy beliefs may evolve through sustained and repeated exposure—particularly during adolescence, a period widely understood to be formative for the development of civic identity and moral judgement (Tyler & Trinkner, 2017).

This developmental perspective aligns with life-course criminology, and in particular with Sampson and Laub's (1997) theory of cumulative disadvantage. Their framework emphasises that early institutional contacts—especially those that are coercive, stigmatising or exclusionary—can alter developmental trajectories, not necessarily through dramatic turning points, but via repeated experiences that gradually redirect an individual's pathway. Just as contact with the criminal justice system can derail educational or occupational prospects, recurrent exposure to coercive policing may slowly erode adolescents' perception that the law is fair, impartial and morally binding. These effects may unfold non-linearly, building over time through direct or vicarious encounters, historical context, sustained ambient exposure or growing awareness that state authority is exercised unequally and often violently in certain communities (Kirk & Papachristos, 2011; Nagin & Telep, 2020).

Emerging studies reinforce this cumulative view of coercive policing, demonstrating lasting impacts on educational attainment, psychological well-being and civic trust (Geller et al., 2014; Legewie & Cricco, 2022). In settings where police presence is aggressive and disproportionately concentrated in already marginalised communities, such exposures can engender legal cynicism and institutional disillusionment (Bell, 2017; Oliveira, 2025). Increasingly, scholars have framed over-policing not merely as a series of episodic harms, but as a form of cumulative injustice—wherein the repeated and unequal imposition of state power reshapes how young people understand their place in the social and legal order.

Relatedly, some encounters—particularly those involving physical violence—may function as developmental turning points, precipitating abrupt shifts in legal attitudes or behavioral trajectories (Hirschfield, 2009; Kyprianides et al., 2025; Sampson & Laub, 1993). These insights also resonate with legal socialization theory, which views adolescence as a critical period during which perceptions of legal legitimacy are shaped through repeated interactions with authority figures (Fagan & Tyler, 2005; Tyler & Trinkner, 2017). Whether through cumulative exposure or acute disruption, coercive policing may erode a normative belief that the law is just, binding and deserving of compliance.

Our study contributes to this literature by estimating both contemporaneous and cumulative associations between secondary exposure to police violence and

adolescents' beliefs about the legitimacy of the law. Drawing on four waves of longitudinal data from the São Paulo Legal Socialization Study, we estimate short-term effects (immediately following exposure) and cumulative effects (up to two years post-exposure) of witnessing police stops, arrests and assaults. While our primary focus is not on cumulative processes per se, our analytic strategy enables us to explore whether legitimacy beliefs change in ways consistent with a cumulative framework.

This approach resonates with Sampson and Laub's (1997) emphasis on how early coercive encounters—especially when perceived as discriminatory or unjust—can initiate a broader process of disadvantage. In this view, aggressive or intrusive police stops may serve as critical moments in a teenager's life, fostering feelings of marginalisation, institutional mistrust and social exclusion (Kirk & Sampson, 2013; Hirschfield, 2009; Kyprianides et al., 2025). These disruptions can compound over time, reducing educational engagement, constraining opportunity and ultimately increasing the risk of criminal involvement (Legewie & Cricco, 2022). Legal cynicism theory further complements this account by suggesting that repeated exposure to unjust policing fosters a normative orientation in which the legal system is seen as illegitimate, unresponsive or actively hostile (Kirk & Papachristos, 2011; Oliveira, 2025).

The São Paulo Context

São Paulo, a megacity of over 20 million people, has seen declining homicide rates in recent decades, though research suggests this may be linked to the growing influence of organized crime rather than improved public security (Biderman et al., 2014; Lessing & Willis, 2019). The city's militarized police force, the Polícia Militar do Estado de São Paulo, employs aggressive tactics, often using coercion—even in routine stops and arrests (Oliveira, 2024; Pinc, 2011). Cases of excessive and lethal force are well-documented, with police killings accounting for nearly 10% of all violent deaths in 2020 (González, 2021). This has fueled public perceptions of the police as more feared than trusted (Jackson et al., 2022b).

São Paulo is a city where aggressive policing practices are widespread, and violence—including police violence—shapes everyday life (González, 2021; Oliveira, 2025). Policing practices may play a critical role in shaping legal socialization, particularly among adolescents. Studies using longitudinal SPLSS data suggest that repeated exposure to coercive policing, including involuntary stops, appears to reinforce distrust in legal institutions (Komatsu et al., 2020; Piccirillo et al., 2021). However, voluntary interactions, such as seeking police assistance, can have the opposite effect—strengthening perceptions of legitimacy when officers engage in procedurally just behavior (Piccirillo et al., 2021).[3]

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[3] Among adults, similar patterns emerge. Aggressive policing—particularly stops at gunpoint—is linked to lower perceptions of procedural fairness and police legitimacy (Oliveira, 2024). In some neighborhoods, police violence is simultaneously feared and tolerated, seen as both a threat and a necessary response to crime (Jackson et al., 2022b; Oliveira, 2025). This ambivalence highlights the complexity of legitimacy perceptions, where concerns about crime and insecurity intersect with concerns about excessive policing (Trinkner et al., 2020).

The long-term consequences of exposure to police violence remain an open question. Longitudinal SPLSS studies suggest that adolescents who witness aggressive policing are more likely to question the fairness and impartiality of the law (Komatsu et al., 2020; Trinkner et al., 2020). However, whether these shifts in legal attitudes persist into adulthood, or whether they are shaped by broader experiences such as family, school and political engagement, remains uncertain. Further research is needed to disentangle the causal mechanisms underlying these relationships and to assess whether declining legitimacy beliefs translate into behavioral changes, such as reduced compliance with the law.

Current Study

This study contributes to the field by analyzing data from the SPLSS (see Komatsu et al., 2020; Piccirillo et al., 2021; Trinkner et al., 2020), a four-wave, cohort-based annual survey tracking 800 adolescents aged 11 to 14 in São Paulo, Brazil. Conducted annually from 2016 to 2019, the study followed a cohort of 800 students born in 2005 ($n_1 = 800; n_2 = 750; n_3 = 724; n_4 = 702$), producing a sample broadly representative of 11- to 14-year-olds in São Paulo.

Developed by the Center for the Study of Violence at the University of São Paulo (NEV-USP), the SPLSS offers a rare longitudinal perspective on legal socialization in a Global South metropolis, enabling an assessment of how young people's legal attitudes evolve over time in the context of exposure to police actions.[4] Designed to track how adolescents develop values, attitudes and behaviors toward laws and authority, the study unfolds against a backdrop of structural inequality, exposure to crime and police violence—a context where organized crime often challenges the state's monopoly on force and where law enforcement practices have long been a source of contention.

Data and Methods

Adding to a literature overly reliant on US data, mostly from the *Pathways to Desistance* study (e.g. Augustyn, 2016; Fine & Cauffman, 2015; Fine et al., 2016, 2017; Kaiser & Reisig, 2019; Schubert et al., 2016), we draw on data from the SPLSS. SPLSS's sampling procedures involved the selection of 112 public or private schools across all districts in São Paulo based on a Probability Proportional to Size approach, which avoided the overrepresentation of adolescents from any district of the city. Consent and assent forms were then delivered to all eligible students from each school, and a random sample of 800 respondents was selected among those who returned assent and consent forms.[5] Pencil-based responses were self-recorded at school, as coordinated by a private polling company; from the second wave onwards, participants who had since moved to another school responded to the survey from home, and statistical tests have found no significant association

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[4] More details are available at their website: https://nev.prp.usp.br/en/pesquisa/sao-paulo-legal-socializat ion-study/.

[5] The survey instrument was approved by the National Ethics Committee.

between place of interview and variables of substantive interest. Every participant received a gift card equivalent to $12. For more information about the study design, see Thomas et al. (2018) and Trinkner et al. (2020).

The sample was broadly representative of the population of 2005-born students living in São Paulo. Some 50% of the sample are males and 59% study at a public school, in line with population data according the 2010 National Population Census. Overall, 45% are White, 31% are of Mixed Race, 11% are Black, 3% are Asian-descendant and 3% are Indigenous—these are the five racial groups used by the National Institute of Geography and Statistics (IBGE). Demographic data are consistent across the four waves, despite slight variations.

All questions were fielded in Portuguese and translated into English for this paper by the first author. Measures used in this study were collected at every wave with identical wording, although first-wave questions were measured as binary indicators (1 = 'yes', 0 = 'no'), while in the remaining waves they were measured based on a 4-point Likert scale. In order to ensure measurement equivalence, we dichotomized all T2, T3 and T4 measures (≥ 2) so that we have repeated measures.[6]

Measures

Judgements about the Legitimacy of the Law

We define judgements about the legitimacy of the law as a felt moral duty to obey the law that is rooted in the sense that the rule of law applies to all. To measure whether people believed that the law was entitled to be obeyed (i.e. (i) duty to obey), adolescents were asked to agree or disagree with 'laws should be obeyed even when people do not agree with them' and 'some laws can be disobeyed' (reverse coded). To measure whether people believed that the law applies equally to everyone in society (i.e. (ii) rule of law), adolescents were asked whether 'laws are the same for everyone', 'there are people who are above the law' (reverse coded) and 'laws are meant to protect people'. Respondents rated each item with a 4-point Likert scale (from 1 = 'strongly disagree' to 4 = 'strongly agree'), except for responses collected in the first wave which were measured as a binary scale (0 = 'no', 1 = 'yes'). To ensure longitudinal consistency, all items were dichotomized: the first two points of the Likert scale were coded as 0 whereas the last two points were coded as 1.[7]

We adopt a reflective approach on measurement. We assume that an unobserved, latent construct of legal legitimacy causes the association between these five survey

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[6] While dichotomizing continuous variables has serious consequences for loss of data and analysis (Royston et al., 2006), our approach only involves dichotomizing categorical variables measured on a 4-point Likert scale. This results in logically structured indicators, where responses such as "strongly disagree" and "disagree" are grouped together, as well as "agree" and "strongly agree". While any form of grouping entails some loss of information, we consider this approach to be the most methodologically sound alternative, as the only other option would be discarding all data collected in wave 1.

[7] Because the five indicators might reflect two distinct sub-constructs—i.e. duty to obey and rule of law—confirmatory factor analysis models for binary indicators using pairwise likelihood estimation were fitted to assess whether a one- or a two-factor solution had a better model fit. Eight CFA models were fitted, contrasting the two solutions using data from each wave. At each point in time, the one-factor solu-

indicators (for discussion, see Jackson & Kuha, 2016). Pooling observations from all four waves of data, we estimate a one-factor confirmatory factor analysis (CFA) using the pairwise likelihood method to handle binary indicators and missing data (Katsikatsou et al. 2012).[8] In this model, each survey indicator is simultaneously regressed on the estimated latent construct using a binomial logistic link function (i.e. equivalent to item response theory). Fitting a single CFA model using pooled observations from all four waves ensures measurement equivalence across waves (see, e.g. Fine et al., 2025). We then extract factor scores for each observation representing their scores of beliefs in the legitimacy of the law—the overall mean is 0, and the scale ranges from approximately -2.1 to 0.5. Standardized factor loadings suggest that this latent variable is mostly reflecting the first duty to obey item ($\lambda_1 = 0.66$) and the last rule of law item ($\lambda_5 = 0.66$). CFA models were estimated using the R package *lavaan* (Rosseel, 2012).

Exposure to Police Behavior

Most direct police-citizen encounters in São Paulo, and probably in most places, involve people older than 14 years old. In this study, only 12% of respondents across all waves were directly stopped by police officers once or more. Vicarious exposure to policing, on the other hand, was more common—e.g. 80% of respondents across all four waves witnessed an officer stopping and questioning a suspect. We focus on exposure to three types of police behavior. First, respondents were asked whether they had, in the previous year, seen police officers 'stopping someone one the street' (henceforth referred to as exposure to police stops) and 'arresting someone using handcuffs' (henceforth referred to as exposure to a police arrest), two routine and lawful prerogatives of police work (although even routine police stops tend to be substantively more aggressive in São Paulo than elsewhere—see Oliveira, 2024, 2025). Second, respondents were asked whether they had, in the previous year, seen police officers 'beating someone up' (henceforth referred to as exposure to police violence), a scenario that refers to case of outright violence. All questions were measured as a binary scale (0 = 'no'; 1 = 'yes').

Self-Reported Offending Behavior

To measure respondents' self-reported offending behavior, we asked four questions asking whether they had, in the previous year, engaged in theft (i.e. taken something from a store or from someone without paying), disorder (i.e. broken or destroyed something at school or on the street, such as bins, or illegal graffiti), drug offences (i.e. tried or used some drug) or violent behavior (i.e. hit on someone with intent to

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Footnote 7 (continued)

tion outperformed the two-factor solution, indicating that all five indicators load onto a single construct. The correlation between the two factors was always estimated at $r_t \geq 0.75$ (for $t = 1, \dots, 4$).

[8] We also estimated CFA models using (a) diagonally weighted least squares to handle binary indicators and (b) maximum likelihood with robust (Huber-White) standard errors (treating indicators as continuous, i.e. assuming a linear probability function link). The pairwise maximum likelihood method had the best model fit. Still, factor scores derived using any of the three methods are nearly identical: two-by-two correlations of extracted factor scores were $r = 0.964$, $r = 0.967$ and $r = 1.000$.

hurt).[9] All questions were measured as a binary scale (0 = 'no'; 1 = 'yes'). Details of our scaling strategy are discussed as follows.

Control Variables: Time-Varying

Models estimating the association between exposure to police behavior and legitimacy beliefs and offending behavior adjust for a series of time-varying control variables, including exposure to neighborhood violence and disorder, personal victimization, family victimization, offending behavior among peers, bullying behavior and bullying victimization. To measure exposure to neighborhood violence and disorder, adolescents were asked whether they had witnessed a series of events happening in their neighborhood, including seeing or hearing about people selling drugs on the streets, people being robbed, people other than police officers carrying guns and listening to gunshots. To measure personal victimization, adolescents were asked whether they had witnessed fights and discussions or been assaulted by an adult (e.g. been slapped, punched, kicked, had an object thrown at). To measure family victimization, respondents were asked whether some of their relatives or friends had been robbed, murdered or imprisoned.[10] To measure offending behavior among peers, respondents were asked whether their friends or siblings had taken something from a store or from someone without paying, broken or destroyed something at school or on the street, tried or used some drug or hit on someone with intent to hurt.

Each one of these questions was measured as a binary scale (0 = 'no'; 1 = 'yes'); at T1, measures refer to life-course experiences prior to that moment, while at T2, T3 and T4 they refer to experiences in the past year (i.e. between waves). We treat each one of these questions as a separate control variable. For example, rather than creating a construct tapping into 'exposure to neighborhood violence and disorder', we include exposure to all four incidents (i.e. drug selling, robberies, gun carrying and gunshots) as four separate control variables. The same applies for each individual indicator of personal victimization, family victimization and offending behavior among peers.

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[9] In the SPLSS, six questions were asked to measure respondents' rule-breaking behavior. Aside from the four items we use in this study—theft, disorder, drug offences and violent behavior—the questionnaire also asked respondents whether they had recently (i) copied coursework from a classmate or cheated in an exam and (ii) bought counterfeit goods, such as DVDs, games, or clothes. We only use four items because we are interested in measuring respondents' self-reported offending behavior; the two items removed, while reflecting rule-breaking behavior, do not necessarily reflect propensity to criminally offend. In robustness checks, we include all six items of the scale and results remain virtually unaltered.

[10] Having relatives or friends imprisoned does not (conceptually or empirically) overlap with exposure to police arrests. Some confusion stems from translation: the Portuguese expression 'ser preso/a' primarily indicates imprisonment, but it can also indicate arrests. The exposure to police arrests question explicitly asks about 'witnessing an officer handcuffing and arresting someone' (i.e. 'viu a polícia algemando e prendendo alguém')—clearly referencing a police arrest—whereas the family victimization question asks whether 'some relative or friend has been imprisoned' (i.e. 'algum parente ou amigo seu foi preso'), implying imprisonment. Empirically, among those respondents who had a relative or friend being recently imprisoned, 33% did not report witnessing a police arrest; and among those who did not have a relative or friend being recently imprisoned, 42% reported witnessing a police arrest.

To measure bullying behavior, respondents were asked whether they had (i) verbally abused someone; (ii) purposely excluded someone from a group of friends; (iii) mocked someone; (iv) spread lies about someone, either in person or online; and (v) shared someone's photos or videos to shame them—these five items were added to together to form a summative index ranging from 0 to 5. To measure bullying victimization, respondents were asked whether they had (i) been verbally abused by someone; (ii) been purposely excluded from a group of friends; (iii) been mocked by someone; (iv) had lies spread about them, either in person or online; and (v) had their photos or videos shared with intent of being ashamed—these five items were added to together to form a summative index ranging from 0 to 5. At T1, measures refer to life-course experiences prior to that moment, while at T2, T3 and T4 they refer to experiences in the past year (i.e. between waves).

Control Variables: Time-Invariant

Models also adjust for a series of time-constant control variables that could influence the legal socialization of urban adolescents and their propensity to offend. These variables include respondent's gender (1 = 'male'), race (1 = 'White') and type of school they are attending (1 = private schools)—type of school works as a proxy for socioeconomic status, as kids and adolescents from a disadvantaged background tend to attend state rather than private schools. Descriptive statistics for all variables can be found in Table 1.

Analytic Strategy

From a *theoretical* perspective, we hypothesize that cumulative exposure to police violence during adolescence has an impact on the development of beliefs about the legitimacy of the law, which in turn shapes adolescents' propensity to criminally offend. At a theoretical level, those are premised to be causal relationships forming an assumed treatment-mediator-outcome chain. Our goal in this study is to empirically examine all testable implications of this sequence. However, while our research questions are clearly causal, we cannot necessarily empirically identify all the effects defined theoretically. We are dealing with observational, self-reported data and a mediator that consists of a psychological construct, which means that identifying unbiased effects remains inherently challenging.[11] Nonetheless, rather

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[11] Despite the extensive research documenting an association between legal legitimacy and compliance, some scholars urge caution in drawing causal conclusions. Nagin and Telep (2017; 2020) argue that the evidence for a direct causal link remains limited, as both legitimacy beliefs and offending behavior could be influenced by unmeasured third variables, such as self-control, peer influences, or broader socioeconomic conditions. While the meta-analytic findings of Walters and Bolger (2019) lend credibility to the association—particularly results from longitudinal studies—the risk of confounding bias remains. Nagin and Telep's (2017; 2020) critiques underscore the need for rigorous methodological approaches in assessing causal relationships (see, e.g. Pósch, 2021; Oliveira, 2024; Wood et al., 2020). Since legitimacy theory posits an explicitly causal claim—that greater recognition of legal legitimacy promotes compliance—criminologists must carefully evaluate alternative explanations for observed patterns. Causal inference frameworks, such as the potential outcomes framework and directed acyclic graphs (Morgan & Winship, 2015), offer valuable tools for clarifying identification assumptions underlying conclusions drawn from observational data.

Table 1 Measures and descriptive statistics

Survey items	Proportion T1	Proportion T2	Proportion T3	Proportion T4	Factor loading*
Exposure to police stops	0.86	0.84	0.80	0.80	–
Exposure to police arrests	0.53	0.44	0.43	0.42	–
Exposure to police violence	0.12	0.13	0.14	0.18	–
Legitimacy of the law: Laws should be obeyed even when people do not agree	0.94	0.88	0.91	0.88	0.66
Legitimacy of the law: Some laws can be disobeyed (reverse coded)	0.62	0.64	0.69	0.68	0.31
Legitimacy of the law: Laws are the same for everyone	0.80	0.90	0.85	0.75	0.53
Legitimacy of the law: There are people who are above the law (reverse coded)	0.36	0.48	0.46	0.41	0.22
Legitimacy of the law: Laws are meant to protect people	0.97	0.94	0.91	0.84	0.66
Offending behavior: Took something from a store or from someone without paying (in the past year)	0.01	0.02	0.02	0.02	–
Offending behavior: Broke or destroyed something at school or on the street (in the past year)	0.03	0.04	0.03	0.05	–
Offending behavior: Tried or used some drug (in the past year)	0.00	0.01	0.02	0.04	–
Offending behavior: Hit on someone with intent to hurt (in the past year)	0.06	0.06	0.08	0.08	–
Exposure to neighborhood violence: Seen or heard of people selling drugs on the streets	0.74	0.25	0.34	0.38	–
Exposure to neighborhood violence: Seen or heard of people being robbed	0.67	0.21	0.30	0.30	–
Exposure to neighborhood violence: Seen or heard of people other than police officers carrying guns	0.85	0.09	0.15	0.15	–
Exposure to neighborhood violence: Listened to gunshots	0.67	0.20	0.30	0.29	–
Personal victimization: assaulted by an adult	0.52	0.44	0.50	0.55	–
Personal victimization: exposure to fights	0.05	0.04	0.05	0.06	–
Family victimization: relatives or friends were robbed	0.56	0.51	0.51	0.51	–
Family victimization: relatives or friends were murdered	0.05	0.06	0.08	0.06	–
Family victimization: relatives or friends were imprisoned	0.15	0.11	0.13	0.16	–
Offending behavior among peers: thefts	0.04	0.08	0.12	0.12	–

Table 1 (continued)

Survey items	Proportion T1	Proportion T2	Proportion T3	Proportion T4	Factor loading*
Offending behavior among peers: disorder	0.11	0.17	0.21	0.24	–
Offending behavior among peers: drugs	0.11	0.16	0.16	0.16	–
Offending behavior among peers: violent assault	0.04	0.07	0.13	0.19	–
Bullying behavior (mean of a scale ranging 0—5)	0.74	0.88	1.00	1.02	–
Bullying victimization (mean of a scale ranging 0—5)	1.26	1.29	1.34	1.29	–
Gender: male	0.50	0.50	0.51	0.51	–
Race: White	0.47	0.47	0.47	0.47	–
Type of school: private	0.41	0.40	0.42	0.41	–

*Confirmatory factor analysis using pooled observations estimated using the pairwise likelihood method to handle binary indicators and missing data. Unlike in traditional CFA models where indicators are treated as continuous, factor loadings should be examined considering that indicators were treated as binary, with each indicator being simultaneously regressed on the estimated latent construct using a binomial logistic link function. All factor loadings are statistically different from zero ($p < 0.001$)

than pretending that our hypothesized mechanisms are not causal, we adopt the potential outcomes framework as a methodological tool to assess the plausibility of different explanations. Specifically, we explicitly define our target quantities of interest (e.g. causal estimands), discuss the assumptions that need to be made to estimate them, address all threats that we can address, and critically reflect upon the untestable assumptions that would need to be made to interpret any estimates causally. While our findings contribute to the broader literature on legal socialization, we remain cautious about making definitive causal claims, recognizing the complexity of adolescent development and the multiple influences that shape legal attitudes and behaviors over time.

Our analytical strategy proceeds as follows:

1. We examine the treatment-mediator link by testing hypotheses 1.1 through 1.3, assessing whether exposure to different forms of police behavior is associated with changes in adolescents' legal legitimacy beliefs.
2. We evaluate the treatment-outcome and mediator-outcome links by testing hypotheses 2.1 through 3, exploring whether exposure to police behavior and variations in legal legitimacy beliefs are associated with changes in self-reported offending behavior.

We do not conduct a formal causal mediation analysis to test hypotheses 4.1 through 4.3. Estimating indirect effects, in this observational context, would necessitate assumptions that we cannot fully satisfy. Instead, we adopt a comparative model approach, where we assess the plausibility of mediation by comparing models with and without the mediator variable in tests of hypotheses 2.1 through 3. This approach allows us to explore potential mediation effects while maintaining transparency about the study's methodological limitations (Cinelli et al., 2024).

Estimating the Effects of Exposure to Police Behavior on Legitimacy

We start testing hypotheses 1.1 through 1.3 to examine the extent to which exposure to different types of police behavior (i.e. police stops, arrests and assault) is associated with changes in public beliefs about the legitimacy of the law. We rely on recently developed matching methods for longitudinal data using a difference-in-differences estimator (Imai et al., 2023). This is a flexible, non-parametric approach that leverages panel data (i.e. four waves of data) to estimate the effects of a binary treatment that can switch status over time (i.e. whether respondents have witnessed some type of police behavior in the past year) on a continuous outcome (i.e. scores reflecting legitimacy judgements). This method matches treated and control observations based on treatment history, then further refines the matched sets based on a list of control variables, and then finally applies the difference-in-differences estimator. In summary, this strategy involves finding pairs of

respondents and comparing their change scores in the legitimacy scale across any two periods. Crucially, we find pairs of respondents with similar legitimacy scores at an initial state, who are very similar across all other control variables, neither of whom were exposed to police behavior at one point in time, but only one of whom was exposed to such treatment at the following period. The logic underneath this method is an attempt to compare change scores of pairs of respondents whose *only* difference is the recent exposure to policing.

Crucially, we draw on this analytic strategy to estimate two different quantities of interest related to the effects of exposure to police behavior on changes in legal legitimacy beliefs: effects of a recent exposure immediately after the exposure, which we call *contemporaneous effects* (or short-term effects; see Quintana, 2024); and effects of one or more exposures up to two years after the exposure, which we call *cumulative effects*.

Details about estimation procedures can be found in the Appendix. Models only use variation from within-respondent change over time, so any potential unobserved confounder that is constant in time is automatically adjusted for (Imai & Kim, 2019). Time-varying heterogeneity is a more crucial threat, as any contemporaneous and cumulative effects are only identified under the assumption that our model controls for all time-varying confounders (i.e. a conditional parallel trends; Imai et al., 2023). To handle that, models rely on matched sets created based on observations with identical treatment history (e.g. lagged by one period) and similar scores across all control variables, including legitimacy beliefs in the previous period, exposure to neighborhood violence and disorder (including gun shots, gun carrying, robberies and drug trafficking), personal victimization (including assault by an adult and exposure to fights), family victimization (including relatives or friends being robbed, murdered or imprisoned), offending behavior among peers (including friends or siblings engaging in theft, disorder, drug use or violent assault), bullying behavior, bullying victimization, gender, race and type of school. This essentially implies that we are comparing change scores of legal legitimacy between any two observations that have approximately the same levels across all these variables, only differing on whether they have (recently or up to two years prior) witnessed some type of police behavior.

We fit six separate models. For each treatment variable (i.e. exposure to police stops, arrests and violence), we estimate contemporaneous and cumulative effects on changes in legal legitimacy scores. This comprehensive set of control variables offers some credibility to our estimates. Yet, there could still be other observed or unobserved time-varying confounders not included in our models. Our estimates of contemporaneous and cumulative effects can only be treated as unbiased estimates of such effects under the strong assumption of no time-varying confounding bias. Therefore, we take a cautious approach and interpret them as partial associations, with no strong causal claims.

Estimating the Effects of Exposure to Police Behavior and Legitimacy Beliefs on Self-reported Offending Behavior

Second, we model self-reported offending behavior to test hypotheses 2.1 through 3. Our goal is to assess the extent to which exposure to three types of police behavior (police stops, arrests and violence), as well as legal legitimacy scores, is associated with a higher propensity to criminally offend. Rather than separately modeling each of the four items measuring recent different behaviors (i.e. theft, disorder, drug use and violent behavior), we rely on the multivariate, multilevel Rasch approach developed by Raudenbush et al. (2003) specifically to model self-reported offending behavior based on an item-response framework (see also Sampson et al., 2005). This model captures the likelihood that a given respondent, at a given point in time, will commit a specific offending behavior, taking into account that some offenses are rarer than others and that adolescents change their propensity to offend as they get older.[12]

We combine information on 11,904 item responses to the four survey questions generated by 800 adolescents who were interviewed in at least one of the four waves of data between 2016 and 2019. Models are, essentially, multilevel logistic regressions in which item responses at each point in time are nested within individuals. To handle temporal dependency, we include random coefficients for age and age squared, essentially estimating a quadratic growth curve model on propensity to criminally offend (similar to Sampson et al., 2005). We also rely upon the 'within-between' (hybrid) framework that combines the desirable aspects of both fixed effects and random effects econometric models (Mundlak, 1978). In within-between models, the within-person component is equivalent to a fixed effects estimator and models change over time, whereas the between-person component models average differences between individuals (Allison, 2009). Technical details about our estimation procedures can be found in the Appendix.

Growth curve models (with random intercepts and coefficients representing trajectory parameters) are crucial to get the temporal ordering right with pooled data and very powerful at assessing differences between individuals. They are important because the multivariate Rasch approach relies on random effects to handle the nesting structure of the dataset. However, we are mostly interested in assessing within-unit change over time (e.g. the extent to which exposures to police behavior and legitimacy beliefs are associated with changes in propensity to criminal

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[12] Raudenbush et al. (2003) developed a multivariate, multilevel Rasch approach to model self-reported offending behavior specifically to handle low prevalence of specific survey items. Rather than creating an aggregate measure (e.g. 'any offending') which would involve some loss of information, this method explicitly takes into account the rarity of some survey items. As a robustness check, we also estimated a hybrid binomial logistic regression modeling criminal offending as measured by an 'any offending' indicator; results are consistent with the main models displayed here, with legitimacy beliefs being the strongest predictor of changes in propensity of criminal offending, but models fail to converge and yield larger standard errors as they draw on less information.

offense), which is usually assessed using some fixed effects specification (as discussed in the previous section; see Imai & Kim, 2019; 2021). Therefore, estimating within-between models is ideal in this scenario, as this specification allows for (i) correctly handling the nesting structure of the dataset, in which item responses are nested within individuals; (ii) specifying a growth curve model, thus getting the temporal ordering right; and (iii) assessing within-unit change over time, which is a more appropriate strategy to address the research question.[13]

Control variables are the same as the ones used in the previous section: exposure to neighborhood violence and disorder (including gunshots, gun carrying, drug use and robberies), personal victimization (including assault by an adult and exposure to fights), family victimization (including relatives or friends being robbed, murdered or imprisoned), offending behavior among peers (including friends or siblings engaging in theft, disorder, drug use or violent assault), bullying behavior, bullying victimization, gender, race and type of school.

Given that the three types of police behavior are inherently cumulative (i.e. it is likely that a respondent who has witnessed a police arrest has also witnessed a police stop, and that a respondent who has witnessed a police assault has also witnessed both a stop and an arrest), we estimate models including such variables one by one. That is, in the first model, we include exposure to police stops, in the second model we include exposure to both police stops and arrests, and in the third model we include exposures to all three types of police behavior. That way, our models capture the partial association of each vicarious contact—e.g. coefficients for exposure to police arrests represent the partial association of witnessing an arrest in relation to witnessing a police stop (as opposed to not witnessing any police behavior), whereas coefficients for exposure to police violence represent the partial association of witnessing an assault in relation to witnessing an arrest (as opposed to not witnessing any police behavior).

Finally, we include beliefs about the legitimacy of the law in a fourth model controlling for all three types of police behavior. This analytic strategy stems from our hypothesis that legitimacy beliefs mediate the effects of exposure police behavior (in particular, police violence) on propensity to criminal offending—individuals who are exposed to police forcible behavior would have their judgements about the legitimacy of the law undermined, which in turn contribute to their overall willingness to

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[13] The matching method combined with a difference-in-differences estimator developed by Imai et al. (2023) would still be the ideal analytic strategy to handle research hypotheses 2.1 through 4. However, it has some important limitations in this application. First, it requires a single (continuous) outcome variable—the sophisticated approach developed by Raudenbush et al. (2003) specifically to model self-reported offending behavior with low prevalence could not be applied here. Second, hypothesis 3 could not be assessed with Imai et al.'s approach—given that legitimacy scores are measured as factor scores following a normal distribution, the matching algorithm cannot be implemented unless this variable is dichotomized, which would involve severe loss of information. The estimand in this case (i.e. within effects of a hybrid, multivariate Rasch model) is the average effect among treated units over time (similar in spirit to a two-way fixed effects estimator); unfortunately, this model cannot distinguish between contemporaneous and cumulative effects. Yet, from a measurement point of view, the hybrid multivariate Rasch approach is preferable over the matching approach. As a robustness check, we also assessed hypotheses 2.1 through 2.3 using Imai et al.'s matching method on a summative index measuring the number of self-reported offenses; results are virtually unaltered.

engage in deviant behavior. While we do not formally derive indirect effects,[14] we would expect any effects of exposures to police behavior on criminal offending to drop (decreasing their effect sizes and potentially losing statistical significance) once legitimacy is included in the model (see Cinelli et al., 2024). Assessing the extent to which legitimacy beliefs 'control away' the effects of exposures to police behaviors on offending behavior could suggest the presence of mediation effects.

We therefore estimate four longitudinal, multivariate Rasch models with a hybrid specification. Together, these models allow us to assess evidence on (i) the association between exposure to police behavior and propensity to criminal offending, as per hypotheses 2.1 through 2.3; (ii) the association between beliefs about the legitimacy of the law and propensity to criminal offending, as per hypothesis 3; and (iii) the extent to which beliefs about the legitimacy of the law potentially mediate the effects of exposure to each type of police behavior on propensity to criminal offending, as per hypotheses 4.1 through 4.3.

Results

Descriptive Results: Exposure to Policing and Police Violence Among Adolescents in São Paulo

Figure 1 shows how young adolescents in São Paulo are very exposed to policing. Across all ages from 11 through 14, more than 80% of the respondents reported witnessing a police officer stopping and questioning a suspect in the past year, suggesting that adolescents in São Paulo are—at least vicariously—very exposed to proactive policing methods. Witnessing officers arresting a suspect using handcuffs is also common across all ages, with 40 to 50% of all respondents reporting witnessing this type of police behavior in the previous year. As described by previous research (e.g. Oliveira, 2025), policing is a constituent part of sociability among São Paulo residents.

Episodes of police violence are shockingly common in São Paulo. Among 11-year-olds, 12% reported witnessing a police officer assaulting a member of the public in the past year; this figure increases to 18% among 14-year-olds. Overall, a considerable proportion of adolescents in the city are socialized in a context characterized by a high prevalence of police brutality.

Police Violence and the Legal Socialization of Young Adolescents in São Paulo

Six models estimating effects of exposure to three types of police behavior on changes in beliefs about the legitimacy of the law were estimated with two model specifications: short-term, contemporaneous effects; and long-term, cumulative

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[14] Under a general causal mediation analysis framework (Imai et al., 2010), indirect effects can only be causally interpreted under a key sequential ignorability assumption, which states that (i) given the observed pretreatment confounders, the treatment assignment is assumed to be ignorable and (ii) the mediator is ignorable given the observed treatment and pretreatment confounders. Such assumptions are unrealistically strong in this application.
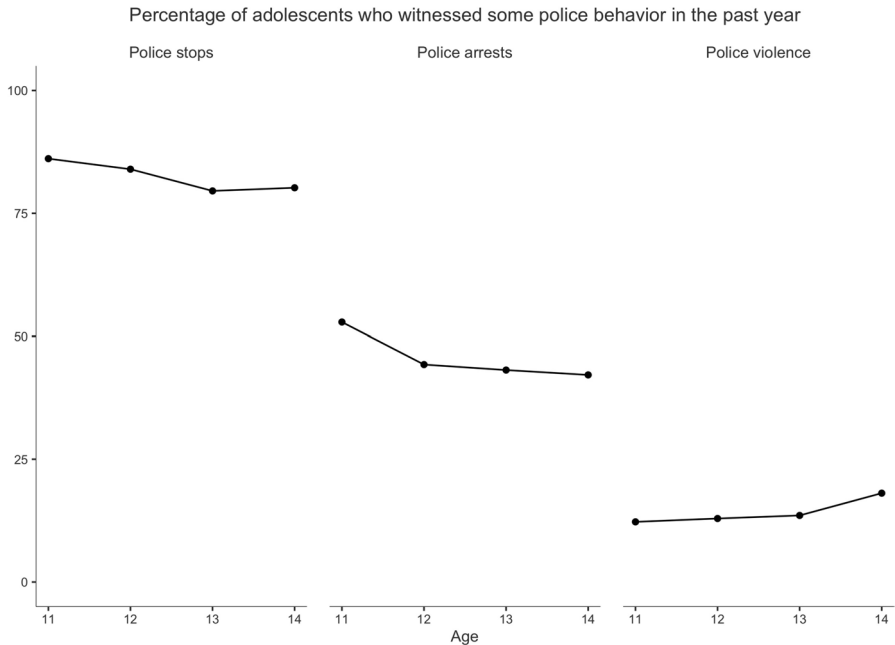
Percentage of adolescents who witnessed some police behavior in the past year

Fig. 1 Exposure to different types of police behavior among adolescents

effects. First, covariate balance was achieved. Treated and non-treated observation are nearly identical across all 16 control variables, with standardized differences never yielding values larger than 0.3 standard deviations across all six models (see covariate balance in the Appendix—Tables 2 though 7). Main results are displayed in Fig. 2. Point estimates and a 95% confidence interval (i.e. 2.5% and 97.5% quantiles of the bootstrapped estimates) are reported. Top (green) bars refer to contemporaneous effects, whereas bottom (orange) bars refer to cumulative effects. The same information is available in Table 2.

Results suggest little evidence that witnessing police officers stopping and questioning a suspect or even making an arrest using handcuffs lead to individual changes in beliefs about the legitimacy of the law among adolescents. Both in terms of contemporaneous and cumulative effects, point estimates reflecting the changes in legitimacy beliefs presumably caused by a recent exposure to police stops or arrests are nearly zero, with bootstrapped estimates yielding both positive and negative values (as evidenced by the confidence bar crossing zero). Using representative data from the SPLSS, this study demonstrates no evidence that witnessing officers stopping or arresting a suspect contributes to the legal socialization of young adolescents.

However, results are different for exposures to police violence. Adolescents who have witnessed a police officer assaulting a member of the public report substantively lower scores of legitimacy beliefs. Results in Fig. 1 suggest that a recent exposure to police violence is associated with a decrease of 0.18 points in legitimacy scores—and the interval obtained via bootstrapped estimates does not yield positive
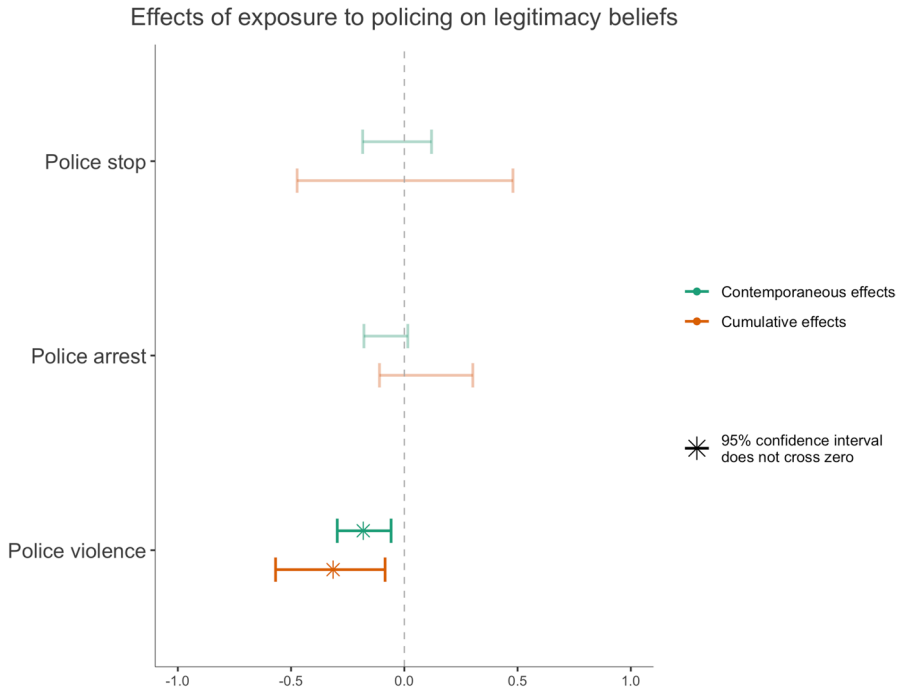
Fig. 2 Effects of exposure to police behavior on legal legitimacy beliefs. Note: Six separate models estimated assessing the effects of exposures to police stops, arrests and assault on beliefs in the legitimacy of the law. Short-term/contemporaneous effects are $ATT_{(F=0)}$, whereas long-term/cumulative effects are $ATT_{(F=2)}$. Standard errors were obtained with 1000 bootstrap iterations, and the 2.5% and 97.5% quantiles of the bootstrapped estimates are reported as confidence intervals. Mahalanobis distance was used to create matched sets with five closest control units. Covariate balance was achieved based on lagged scores of legitimacy beliefs, exposure to neighborhood violence and disorder (including gunshots, gun carrying, drug use and robberies), personal victimization (including assault by an adult and exposure to fights), family victimization (including relatives or friends being robbed, murdered or imprisoned), offending behavior among peers (including friends or siblings engaging in theft, disorder, drug use or violent assault), bullying behavior, bullying victimization, gender, race and type of school. Models were estimated using R's PanelMatch package (Imai et al., 2023)

Table 2 Effects of exposure to police behavior on legal legitimacy beliefs

	Point estimate	Standard error	2.5%—97.5% quantiles
Exposure to police stops			
Contemporaneous effects	−0.029	0.075	[−0.184; 0.120]
Cumulative effects	−0.0600	0.243	[−0.473; 0.480]
Exposure to police arrests			
Contemporaneous effects	−0.082	0.050	[−0.179; 0.015]
Cumulative effects	0.090	0.103	[−0.110; 0.302]
Exposure to police violence			
Contemporaneous effects	−0.181	0.060	[−0.030; −0.058]
Cumulative effects	−0.314	0.123	[−0.568; −0.085]

values. Crucially, when considering cumulative effects up to two years after the first exposure to an event involving police violence, effects are even stronger: a decrease of 0.31 points in the scale measuring legitimacy beliefs. Overall, results suggest that exposures to police violence can undermine the legal socialization of urban adolescents in São Paulo, consistently leading to negative changes in their beliefs about the legitimacy of the law.

Self-reported Offending Behavior Among Youths in São Paulo

Four longitudinal, multivariate Rasch models with a hybrid specification estimating the association between exposure to three types of police behavior, as well as beliefs about the legitimacy of the law, and self-reported criminal offending were estimated. Our focus is on within effects,[15] so these results are displayed in Fig. 3 and Table 3—point estimates and 95% confidence intervals are reported. All results, including between effects and coefficients associated with each control variable from all four models, can be found in the Appendix (Table 8).

Again, results suggest little evidence that witnessing police officers stopping and questioning a suspect or arresting a suspect influences adolescents' propensity to engage in criminal offending. Coefficients are nearly zero, with the 95% confidence interval yielding both positive and negative results across all model specifications. However, results from model 3 suggest that witnessing an episode of police violence can increase respondents' propensity to engage in criminal offending: adolescents who have witnessed a police officer assaulting a member of the public are more likely to engage in deviant behaviors such as theft, disorder, drug use or violent assault.

In terms of legal socialization, results indicate that beliefs about the legitimacy of the law are negatively associated with the odds of engaging in criminal offending. When adolescents have a normative recognition of the rule of law and believe that laws should always be obeyed, they are less likely to commit acts such as thefts, disorder, drug offenses or violent aggression. Crucially, the inclusion of scores of legitimacy beliefs in the model controls away the effect of exposures to police violence—which decreases slightly and loses statistical significance (it remains only marginally significant).

After adjusting for exposure to neighborhood violence and disorder (including gunshots, gun carrying, drug use and robberies), personal victimization (including assault by an adult and exposure to fights), family victimization (including relatives or friends being robbed, murdered or imprisoned), offending behavior among peers (including

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[15] We are primarily interested in assessing the extent to which changes in exposure to policing are associated with changes in legitimacy beliefs and offending behavior, which is why our focus is on within effects. To ensure that there is enough within-unit variation over time, we estimated intraclass correlation coefficients (ICCs). Given that these are logistic models, ICCs are calculated using the latent variable approach that uses the variance of the logistic distribution ($\frac{\pi^2}{3}$) as the level-1 variance, so that the ICC is given by $ICC = \frac{\tau^2}{\tau^2 + \frac{\pi^2}{3}}$ (Goldstein et al., 2002). The estimated ICCs (0.11, 0.10, 0.10 and 0.10 across all four models) indicate that within-individual change over time is substantial, which implies that the growth model specification is picking up relevant temporal dynamics.
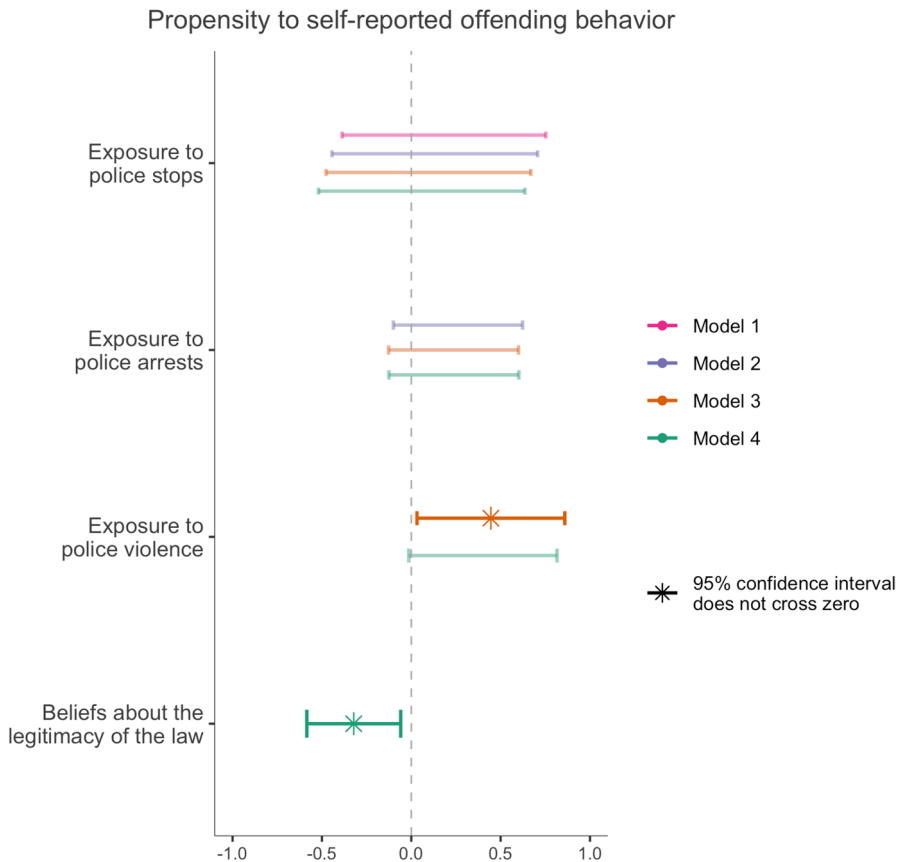
Fig. 3 Effects of exposure to police behavior and legitimacy beliefs on self-reported offending behavior. Note: Four longitudinal, multivariate Rasch within-between logistic regression models estimated with 11,904 item responses nested within 792 survey respondents and a growth curve specification (age and age squared) over four time points. Point estimates and 95% confidence intervals reported. All four models control for exposure to neighborhood violence and disorder (including gunshots, gun carrying, drug use and robberies), personal victimization (including assault by an adult and exposure to fights), family victimization (including relatives or friends being robbed, murdered or imprisoned), offending behavior among peers (including friends or siblings engaging in theft, disorder, drug use or violent assault), bullying behavior, bullying victimization, gender, race and type of school, as well as survey item (offending behaviors) difficulty parameters

friends or siblings engaging in theft, disorder, drug use or violent assault), bullying behavior, bullying victimization, gender, race and type of school, as well as growth parameters, and focusing on within-unit change over time, results indicate not only that beliefs about the legitimacy of law contribute to decrease adolescents' propensity to criminal offending, but they also potentially transmit the effects of previous exposures to police violence.

Truncated table only displaying within effects of selected independent variables. All four models control for exposure to neighborhood violence and disorder (including

Table 3 Longitudinal, multivariate Rasch within-between models predicting propensity to criminally offend

	Model 1	Model 2	Model 3	Model 4
Police stops	0.183 [−0.387; 0.753]	0.131 [−0.444; 0.707]	0.096 [−0.477; 0.669]	0.058 [−0.519; 0.636]
Police arrests		0.261 [−0.100; 0.623]	0.237 [−0.127; 0.600]	0.238 [−0.125; 0.602]
Police violence			0.446 [0.032; 0.859]	0.401 [−0.014; 0.816]
Legitimacy of law				−0.322 [−0.585; −0.059]
N (observations)	11,904	11,904	11,904	11,904
N (respondents)	792	792	792	792
ICC	0.11	0.10	0.10	0.10
Pseudo R^2 (total)	0.55	0.55	0.55	0.55
BIC	2618.81	2634.94	2641.10	2649.15

gunshots, gun carrying, drug use and robberies), personal victimization (including assault by an adult and exposure to fights), family victimization (including relatives or friends being robbed, murdered or imprisoned), offending behavior among peers (including friends or siblings engaging in theft, disorder, drug use or violent assault), bullying behavior, bullying victimization, gender, race and type of school, as well as survey item (offending behaviors) difficulty parameters. A full table including both within and between effects and coefficients for all independent variables can be found in the Appendix (Table 8).

Discussion

We set out to examine whether exposure to police violence weakens adolescents' legal socialization, eroding their perceptions of legal legitimacy and increasing their risk of offending. Drawing on research on legal socialization (Fagan & Tyler, 2005; Tyler & Trinkner, 2017), we hypothesized that when young people witness violent behavior by law enforcement, they may come to see the law not as a protective force but as an instrument of coercion. Rather than viewing legal agents as rightful authorities, they may perceive them as enforcers of power—symbols of control rather than justice (Oliveira, 2025). This disillusionment can foster the belief that the law is not something to be respected but something to be resisted or broken. Once legitimacy is questioned, particularly during adolescence, a period when the propensity for criminal offending peaks (Sampson et al., 2005), a crucial internal constraint on rule-breaking may weaken. Exposure to police violence, in this way, has the potential to disrupt legal socialization, weakening adolescents' commitment to legal norms and increasing their likelihood of offending.

We tested this theorized pathway in São Paulo, a setting where violent policing is widespread (González, 2021) and where even routine police stops often involve

aggressive conduct (Oliveira, 2024). The city presents a unique context for studying the effects of police violence on adolescents, as residents of disadvantaged communities face threats from both law enforcement and organized crime (Lessing & Willis, 2019; Willis, 2015). While police abuse is pervasive, many working-class residents paradoxically support violent policing as a means of crime control (Caldeira, 1996). Against this backdrop, we leveraged longitudinal data from the São Paulo Legal Socialization Study (SPLSS), a four-wave cohort-based survey tracking adolescents aged 11 to 14 from 2016 to 2019.

We first examined whether secondary exposure to policing practices influences changes in adolescents' beliefs about legal legitimacy (cf. Desmond et al., 2016; Fine et al., 2025). Specifically, we assessed the effects of recently witnessing officers stopping and questioning a suspect, arresting a suspect and physically assaulting a suspect. We estimated both short-term (same year) and long-term (cumulative) effects up to two years after exposure. Findings provided little evidence for hypotheses 1.1 and 1.2: witnessing a police stop or arrest had minimal impact on legitimacy beliefs. However, results supported hypothesis 1.3: adolescents who had recently witnessed police violence reported significantly lower legitimacy scores than those who had not observed an officer assaulting a suspect. This conclusion persisted both in the short term and up to two years later. Using state-of-the-art causal inference methods for panel data (Imai et al., 2023), including matched sets based on treatment history, lagged outcomes and 15 time-varying confounders, followed by a difference-in-differences estimator, we found important evidence suggesting that exposure to police violence weakens the legal socialization of adolescents.

We then examined whether exposure to policing practices and beliefs about legal legitimacy predicted self-reported offending. We assessed behaviors including theft, disorderly conduct, drug use and violent assault, estimating the odds that an adolescent in the SPLSS sample would engage in any of these behaviors over the four-year study period (Raudenbush et al., 2003). Findings provided little support for hypotheses 2.1 and 2.2: witnessing a police stop or an arrest did not significantly alter offending risk. However, results again indicated some support for hypothesis 2.3: exposure to police violence was associated with an increased propensity to engage in criminal behavior. Findings also supported hypothesis 3: adolescents with stronger beliefs in the legitimacy of the law were less likely to engage in offending over time. This reinforces the idea that legitimacy plays a critical role in predicting law-abiding behavior, and that its erosion—especially through exposure to police violence—can weaken adolescents' commitment to legal norms.

Although we did not estimate indirect effects (Imai et al., 2010), our findings allow us to assess whether mediation effects might be present, linking exposure to police violence with an increased propensity to criminally offend via weakened legitimacy beliefs. Hypotheses 4.1 and 4.2 were not supported—witnessing a police stop or arrest did not appear to influence changes in legitimacy perceptions or offending behavior. However, hypothesis 4.3 cannot be dismissed. The association between recent exposure to police violence and self-reported offending behavior became statistically insignificant, with a slight reduction in effect size, when the mediator—legal legitimacy beliefs—was included in the model. The fact that legitimacy beliefs 'control away' the potential effects of exposure to

police violence on offending, alongside its alignment with our theoretical framework, suggests that the hypothesized mechanism is plausible. Witnessing police officers using violence against a suspect appears to erode adolescents' legal socialization, increasing their likelihood of criminal offending. Future research should build on recent advances in causal mediation analysis (Pósch, 2021; VanderWeele & Tchetgen, 2017) to further investigate the role of legitimacy as a mediating force in shaping behavior (Jackson & Pósch, 2019; Tyler & Jackson, 2014).

Existing research shows that individuals often adapt to violent environments by developing strategies that help them cope (Harding, 2009), including adopting the belief that the law is not binding and that legal authorities are indifferent to public safety (Bell, 2017; Kirk & Papachristos, 2011). However, little is known about how exposure to violent policing influences adolescents' legal socialization. When young people witness police violence, they may come to see legal institutions as untrustworthy, law enforcement officers as unconcerned with public safety, and social order as weak. As a result, they may develop greater skepticism toward the law and a higher propensity for offending.

This study demonstrates that exposure to police violence undermines adolescents' internalization of legal values. In a setting where both state and non-state violence are common (Lessing & Willis, 2019; Oliveira, 2025), our findings suggest that growing up in an environment where aggressive and often violent policing is routine is associated with declining legitimacy beliefs and an increased propensity to criminally offend. Exposure to police violence appears to socialize adolescents into viewing the law as lacking the authority to dictate public behavior, failing to protect communities, being unequally applied across social groups and not necessarily deserving of obedience.

Our study also adds to a growing body of research on the developmental consequences of coercive policing by estimating both contemporaneous and cumulative associations between secondary exposure to police violence and adolescents' beliefs about the legitimacy of the law. While not our primary analytic focus, the ability to model cumulative effects allowed us to assess whether legitimacy beliefs change in ways consistent with a life-course perspective. In particular, we found that while exposure to routine police actions had little measurable effect, cumulative exposure to police violence was associated with more substantial and enduring declines in legitimacy beliefs. Witnessing police assault was linked to a 0.31-point drop in legitimacy scores over a two-year period—suggesting that repeated exposure to coercive force may have lasting consequences for how adolescents interpret and internalize legal authority.

These findings support a dynamic understanding of legal socialization—one that moves beyond isolated encounters and toward the idea that state authority is learned through repeated, patterned interactions over time. This aligns with Sampson and Laub's (1997) life-course theory of cumulative disadvantage, which emphasizes how early, repeated institutional contacts—especially when experienced as unfair or violent—can gradually redirect developmental pathways. Our results are also consistent with theories of legal cynicism, which view adolescents' normative orientations as shaped by the broader structural and institutional context in which they

grow up (Kirk & Papachristos, 2011; Sampson & Bartusch, 1998). While our study does not identify sharp 'turning points' in the sense described by Sampson and Laub (1993), it points to the plausibility that cumulative exposure to police violence operates as a corrosive force that weakens normative commitments to the law over time.

Future research should build on this foundation by integrating life-course criminology more explicitly into the study of legal socialization. In particular, longitudinal designs that track adolescents into adulthood, and that allow for the identification of key inflection points or dose–response effects, would be well-positioned to test whether certain types of police encounters—especially violent ones—trigger broader trajectories of disadvantage. Such work could also incorporate other domains of adolescent development—educational attainment, mental health, peer relationships and civic engagement—to examine how legal attitudes interact with other life-course outcomes. In doing so, scholars can move beyond documenting the harm of coercive policing to building a fuller theoretical account of how state power shapes individual development. In settings like São Paulo, where both legal legitimacy and institutional protection are routinely contested, understanding how adolescents come to relate to the law remains a pressing empirical and normative challenge.

Limitations

Several limitations must be acknowledged. First, while our hypotheses are causal in nature, our empirical findings rely on relatively strong assumptions. Results derived from Imai et al.'s (2023) approach, which combines matching methods for longitudinal data with a difference-in-differences estimator, depend on a conditional parallel trends assumption. Additionally, results from the longitudinal, multivariate Rasch model with a hybrid specification remain susceptible to unobserved, time-varying confounders. While we applied state-of-the-art causal inference methods and controlled for a comprehensive set of covariates, these assumptions still present a limitation. Future research should continue to draw on the potential outcomes framework and causal graphs while leveraging experimental and quasi-experimental designs to strengthen causal inference.

Second, we did not estimate indirect effects, as causal mediation analysis requires a strong sequential ignorability assumption. While our findings suggest mediation effects, future research should quantify the extent to which weakened legitimacy beliefs transmit the effects of exposure to police violence onto offending (cf. Jackson & Pósch, 2019). Third, our reliance on self-reported survey data means we do not incorporate objective measures of police violence or offending. While self-reports provide valuable insights (Kirk, 2006; Sampson et al., 2005), future research should integrate administrative and observational data to validate and refine these findings. Fourth, our study was constrained by the sampling characteristics of the SPLSS data. Future research should explore cultural and collective processes of legal socialization using broader community surveys.

Finally, our findings are specific to adolescents in São Paulo, a Global South city where violence is embedded in everyday life (Oliveira, 2025). The extent to which

our results generalize to other settings remains uncertain. Future research should examine these relationships in diverse contexts to assess the broader applicability of our conclusions.

Final Words

This study explored whether exposure to police violence shapes the legal socialization of adolescents in São Paulo, tracking their experiences from 2016 to 2019 (Trinkner et al., 2020). While research on exposure to violence has often focused on major US cities (Hagan et al., 2022), an increasing body of work examines these dynamics in Global South contexts (Jackson et al., 2022b; Oliveira, 2025). Our findings show that secondary exposure to police violence is linked to declining legitimacy beliefs and a greater likelihood of offending.

Looking ahead, research on legal socialization must expand its scope, applying causal inference methods, examining exposure to violence in various forms and studying legal attitudes in contexts where the legitimacy of state institutions is contested. Understanding how young people internalize—or reject—legal authority remains a pressing challenge in societies where the law itself is often perceived as a source of coercion rather than protection.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s40865-025-00271-y.

Data Availability All replication materials, including data and code, are publicly available at https://github.com/oliveirathiago/PoliceViolence_LegalSocialisation.

Declarations

Conflict of interests The authors declare no competing interests.

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