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Article

When social capital is not enough: absorptive capacity and the cognitive foundations of individual ambidexterity

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Abstract

The objective of this study is to examine how individual absorptive capacity and individual social capital jointly influence individual ambidexterity in a public-sector regulatory context. Using survey data from 136 traffic agents operating across 101 regional traffic units in the state of Paraná, Brazil, the study employs Partial Least Squares Structural Equation Modeling (PLS-SEM) to evaluate the proposed relationships. The results reveal a consistent and theoretically relevant pattern. Individual absorptive capacity emerges as the dominant antecedent of individual ambidexterity, exerting a positive and statistically significant effect ($f^2 = 0.409$) on the integration of exploratory and exploitative behaviors. Absorptive capacity also positively predicts individual social capital, indicating that cognitive learning capabilities contribute to the development of relational resources. In contrast, the direct effect of social capital on individual ambidexterity is positive but not statistically significant, suggesting that relational embeddedness alone is insufficient to enable ambidextrous behavior in rule-intensive environments. By repositioning absorptive capacity as a core cognitive micro foundation

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of individual ambidexterity, this study frames this finding as a theoretical boundary condition: the role of social capital in ambidexterity is contingent on institutional context, rather than general evidence that cognitive capabilities are intrinsically superior to relational resources. The findings advance a more context-sensitive and cognitively anchored understanding of ambidexterity, with implications for micro-foundation research, public-sector management, and regulatory governance.

Keywords: individual ambidexterity, absorptive capacity, social capital, micro foundations, regulated environments.

Quando o capital social não é suficiente: capacidade de absorção e fundamentos cognitivos da ambidestria individual

Resumo

O objetivo deste estudo é examinar como a capacidade de absorção individual e o capital social individual influenciam conjuntamente a ambidestria individual em um contexto regulatório do setor público, na perspectiva de uma micro fundação. Utilizando dados de pesquisa de 136 agentes de trânsito que operam em 101 unidades regionais de tráfego no estado do Paraná, Brasil, o estudo emprega a Modelagem de Equações Estruturais de Mínimos Quadrados Parciais (PLS-SEM) para avaliar as relações propostas. Os resultados revelam um padrão consistente e teoricamente relevante. A capacidade de absorção individual surge como o antecedente dominante da ambidestria individual, exercendo efeito positivo e estatisticamente significativo ($f^2 = 0,409$) na integração dos comportamentos exploratórios e explotatórios. A capacidade de absorção também prediz positivamente o capital social individual, indicando que as capacidades de aprendizagem cognitiva contribuem para o desenvolvimento dos recursos relacionais. Em contraste, o efeito direto do capital social na ambidestria individual é positivo, mas não estatisticamente significativo, sugerindo que a incorporação relacional por si só é insuficiente para permitir um comportamento ambidestro em ambientes de regras intensivas. Ao reposicionar a capacidade de absorção como micro fundação cognitiva central da ambidestria individual, este estudo posiciona esse achado como uma condição de contorno teórica: o papel do capital social na ambidestria é dependente do contexto institucional, e não uma evidência geral de que capacidades cognitivas sejam intrinsecamente superiores a recursos relacionais. Os resultados promovem uma compreensão da ambidestria mais sensível ao contexto e cognitivamente ancorada, com

implicações para a pesquisa de micro fundações, gestão do setor público e governança regulatória.

Palavras-chave: ambidestria individual, capacidade de absorção, capital social, micro fundamentos, ambientes regulados.

Cuando el capital social no es suficiente: capacidad de absorción y fundamentos cognitivos de la ambidestreza individual

Resumen

El objetivo de este estudio es examinar cómo la capacidad de absorción individual y el capital social individual influyen conjuntamente en la ambidestreza individual en un contexto regulatorio del sector público, desde la perspectiva de una microfundación. Utilizando datos de investigación de 136 agentes de tránsito que operan en 101 unidades regionales de tráfico en el estado de Paraná, Brasil, el estudio emplea la Modelación de Ecuaciones Estructurales de Mínimos Cuadrados Parciales (PLS-SEM) para evaluar las relaciones propuestas. Los resultados revelan un patrón consistente y teóricamente relevante. La capacidad de absorción individual surge como el antecedente dominante de la ambidestreza individual, ejerciendo efecto positivo y estadísticamente significativo ($f^2 = 0,409$) en la integración de los comportamientos exploratorios y explotativos. La capacidad de absorción también predice positivamente el capital social individual, indicando que las capacidades de aprendizaje cognitivo contribuyen al desarrollo de los recursos relacionales. En contraste, el efecto directo del capital social sobre la ambidestreza individual es positivo pero no estadísticamente significativo, lo que sugiere que la incorporación relacional por sí sola es insuficiente para permitir un comportamiento ambidiestro en entornos intensivos de reglas. Al reposicionar la capacidad de absorción como micro base cognitiva central de la ambidestreza individual, este estudio posiciona ese hallazgo como una condición de contorno teórico: el papel del capital social en la ambidestreza depende del contexto institucional, y no una evidencia general de que las capacidades cognitivas son intrínsecamente superiores a los recursos relacionales. Los resultados promueven una comprensión de la ambidestreza más sensible al contexto y cognitivamente anclada, con implicancias para la investigación de micro fundaciones, gestión del sector público y gobernanza regulatoria.

Palabras clave: ambidestreza individual, capacidad de absorción, capital social, microfundamentos, entornos regulados.

1. INTRODUCTION

In professional contexts characterized by prominent levels of regulation, discretion is neither unlimited nor absent; rather, it is exercised through continuous interpretation of rules, norms, and situational contingencies. In such environments, adaptive performance depends not only on compliance with established procedures but also on the ability to interpret and apply them flexibly. This tension is particularly salient in regulatory occupations, where professionals must reconcile precision with judgment, stability with adaptation, and standardization with contextual responsiveness.

The organizational learning literature has long framed this tension through the distinction between exploration and exploitation (March, 1991). Exploration involves experimentation, variation, and the pursuit of new interpretations, whereas exploitation emphasizes refinement, efficiency, and disciplined application of existing knowledge. While early research conceptualized this tension primarily at the organizational level, subsequent studies have increasingly recognized that the enactment of exploration and exploitation ultimately occurs at the individual level (Mom et al., 2009; Rosing & Zacher, 2017). This shift has given rise to the concept of individual ambidexterity, defined as the capacity to alternately or simultaneously engage in exploratory and exploitative behaviors within the same role.

The literature has yet to reach consensus on whether ambidextrous behavior is primarily grounded in cognitive mechanisms, such as learning, sensemaking, and the integration of competing knowledge frames (Smith & Lewis, 2011; Weick et al., 2005), or in relational mechanisms, including social embeddedness, access to networks, and interpersonal trust (Gibson & Birkinshaw, 2004; Mom et al., 2009). Much of the existing research implicitly assumes that social capital plays a central enabling role by facilitating access to diverse information and interpretive support, thereby enabling individuals to balance exploration and exploitation (Gibson & Birkinshaw, 2004; Nahapiet & Ghoshal, 1998). However, this assumption has rarely been examined empirically in contexts where rule interpretation and sensemaking, rather than discretionary innovation, constitute the core task, leaving an important gap in the understanding of the boundary conditions under which relational versus cognitive mechanisms underpin individual ambidexterity (Weick et al., 2005).

Absorptive capacity (ACAP) offers a promising lens for addressing this gap. Originally conceptualized as an organizational capability (Cohen & Levinthal, 1990) ACAP has increasingly been recognized as a micro-level construct reflecting individuals' abilities to acquire, assimilate, transform, and apply knowledge (Zahra & George, 2002). At the individual level, ACAP captures fundamental cognitive processes that enable professionals to recognize the relevance of new information, integrate it with prior knowledge, and apply it appropriately across situations. These processes are particularly critical in regulatory environments, where learning is continuous, and errors in interpretation may carry significant social consequences.

Alongside cognitive capabilities, social capital has been widely theorized as a key resource for individual performance. Through networks of relationships characterized by trust, reciprocity, and shared understanding, individuals gain access to information, validation, and support (Lin, 1999; Nahapiet & Ghoshal, 1998). In principle, such relational resources should facilitate both exploration—by exposing individuals to diverse perspectives—and exploitation—by enabling efficient coordination and reliable exchange of information. Yet, whether social capital plays a decisive role in enabling individual ambidexterity under conditions of strong institutional constraint remains an open empirical and theoretical question.

This study addresses this issue by developing and testing an integrative micro-level model that links individual absorptive capacity, individual social capital, and individual ambidexterity in a highly regulated public sector context. Empirically, we examine traffic agents operating within regional traffic units in the state of Paraná, Brazil—a setting characterized by complex legal frameworks, continuous regulatory updates, and limited discretion. In this respect, traffic agents perform a consistent function with what Lipsky (1980) describes as street-level bureaucracy: professionals whose discretion is exercised within, and constrained by, dense webs of rules and accountability requirements. Theoretically, this context provides a critical case for reassessing dominant assumptions about the relative importance of cognitive versus relational foundations of ambidextrous behavior. Therefore, the objective of this study is to examine how individual absorptive capacity and individual social capital jointly influence individual ambidexterity in a public-sector regulatory context, from a micro-foundation's perspective.

By doing so, the study makes three core contributions. First, it advances ambidexterity research by explicitly theorizing and testing absorptive capacity as a primary micro foundation of individual ambidexterity. Second, the study establishes that the role of social capital in individual ambidexterity is a boundary condition, contingent on the regulatory intensity of the task environment, rather than a claim that cognitive capabilities are universally superior to relational resources. Third, it extends micro foundations research by demonstrating how cognitive capabilities shape not only adaptive behavior but also the development of relational resources themselves.

2. THEORETICAL BACKGROUND

2.1 Organizational ambidexterity

The debate on organizational learning and adaptation is fundamentally rooted in the tension between exploration and exploitation, a distinction systematically articulated by March (1991). Exploration refers to activities associated with search, experimentation, variation, and innovation, whereas exploitation emphasizes refinement, efficiency, implementation, and execution. March's framework established that while both processes are essential for organizational survival, they compete for limited resources and managerial attention, creating an enduring paradox rather than a trade-off to be permanently resolved (Ding et al., 2023).

Duncan (1976) introduced the concept of dual structures, arguing that organizations may need distinct mechanisms to support exploratory and exploitative activities. Building on this logic, Tushman & O'Reilly (1996) and O'Reilly & Tushman (2013) formalized the concept of organizational ambidexterity, proposing that superior performance in dynamic environments depends on the organization's ability to pursue both forms of learning simultaneously. Empirically, He and Wong (2004) provided early support for this framework, showing that the interaction between exploratory and exploitative innovation strategies, rather than either strategy alone, is positively associated with sales growth, which reinforced ambidexterity's status as a distinct organizational capability rather than a simple trade-off.

Raisch and Birkinshaw (2008) and Junni et al. (2013), consolidated ambidexterity as a dynamic capability that manifests through multiple mechanisms, including structural

differentiation, contextual integration, temporal cycling, and leadership cognition (Birkinshaw & Gupta, 2013).

The remainder of this theoretical background moves directly from this organizational-level debate to the individual level, where the mechanisms of exploration and exploitation are enacted.

2.2 Individual ambidexterity: a micro-level perspective

Rather than viewing ambidexterity as an aggregate outcome of organizational structures, scholars increasingly argue that exploration and exploitation are enacted through individuals' daily behaviors, decisions, and cognitive processes. Individual ambidexterity refers to the capacity of professionals to engage in exploratory and exploitative activities within the same role or period (Kauppila & Tempelaar, 2016; Mom et al., 2009).

Mom et al. (2009) further differentiate exploration as the pursuit of new opportunities and exploitation as the refinement of existing competencies, arguing that individuals differ systematically in their propensity to engage in these behaviors. Rosing and Zacher (2017) reinforce this view by demonstrating that innovative performance depends on individuals' dynamic adjustment between exploration and exploitation over time, rather than on static orientations.

Importantly, this literature suggests that individual ambidexterity cannot be fully explained by motivation or role design alone. Instead, it requires underlying cognitive resources that allow individuals to interpret information, manage contradictions, and apply knowledge appropriately in complex situations (Good & Michel, 2013; Zhang & Bartol, 2010), enabling individuals to navigate paradoxical demands inherent in complex and constrained work environments (Jain, 2024).

2.3 Absorptive capacity as a cognitive micro foundation

Absorptive capacity (ACAP), originally conceptualized by Cohen and Levinthal (1990), refers to the ability to recognize the value of new information, assimilate it, and apply it for practical purposes. While initially developed at the organizational level, subsequent research emphasized that absorptive capacity fundamentally resides in individuals' cognitive structures and learning processes.

Zahra and George (2002) redefined ACAP as a multidimensional construct involving acquisition, assimilation, transformation, and exploitation of knowledge, while Lane et al. (2006) cautioned against its reification and called for renewed attention to its underlying mechanisms. At the individual level, Ter Wal et al. (2011) demonstrate that absorptive capacity manifests in professionals' ability to engage with external knowledge sources and translate insights into actionable outcomes (Elidjen et al., 2022).

In regulatory environments, individual ACAP is particularly salient. Professionals must continuously update their understanding of formal rules, interpret legislative changes, and apply abstract norms to concrete situations. This process requires not only access to information but also the cognitive ability to integrate new knowledge with existing schemas and retrieve it when needed. As such, absorptive capacity functions as a micro foundation of ambidexterity by enabling individuals to move between exploratory interpretation and exploitative application of rules (Felin et al., 2015). Thus, ACAP provides the cognitive infrastructure that supports ambidextrous behavior, allowing individuals to balance learning and execution in contexts characterized by complexity and constraint (Volberda et al., 2009). In this sense, the hypothesis H_1 is stated.

H_1 - Individual absorptive capacity is positively related to individual ambidexterity.

2.4 Individual social capital and individual ambidexterity

Social capital refers to the resources embedded in social relationships that facilitate action and knowledge exchange. Coleman (1988) conceptualized social capital as a facilitator of coordinated action, while Nahapiet and Ghoshal (1998) articulated its structural, relational, and cognitive dimensions. At the individual level, social capital captures the quality and scope of personal networks, including trust-based ties, access to information, and opportunities for collaboration (Lin, 1999).

This informational and relational reading, however, captures only part of what social capital entails. Bourdieu (1986) conceptualizes social capital as unequally distributed and inseparable from broader relations of power, meaning that access to relational resources is itself shaped by an individual's position within institutional hierarchies. Suchman (1995) further shows that legitimacy determines what counts as valid knowledge and action within a given field, so that the value of a relational tie

depends on the legitimacy the involved actors are able to confer. In highly regulated occupations, these power- and legitimacy-based dimensions of social capital are particularly consequential, because access to influential networks is itself constrained by formal position and institutional standing, not merely by informational exchange. Engaging with this broader conceptualization helps explain why relational resources may fail to translate into ambidextrous behavior in the present context: it is not that networks are unimportant, but that their capacity to confer actionable knowledge and legitimacy is itself bounded by the same regulatory structure that constrains discretion.

Empirical studies suggest that social capital enhances learning and performance by providing access to diverse perspectives and reducing uncertainty (Burt, 2000, 2004; Seibert et al., 2001).

Mom et al. (2009) argue that social networks support both exploration—by exposing individuals to novel ideas—and exploitation—by enabling efficient information exchange and coordination (Aslam et al., 2024). However, the effectiveness of social capital may vary across contexts. In highly regulated environments, where discretion is constrained and accountability is high, relational resources may play a supportive rather than leading role. Lipsky's (1980) account of street-level bureaucracy offers a theoretical rationale for this constraint: when behavior is governed by dense rules and continuous accountability to superiors and clients, professionals' discretion is exercised within, rather than through, their social ties, which limits how much relational resources can independently drive adaptive behavior. Access to networks cannot substitute for technical competence or accurate rule interpretation. Instead, social capital may complement cognitive capabilities by facilitating validation, discussion, and diffusion of interpretations, without necessarily driving ambidextrous behavior directly (Adler & Kwon, 2002).

The more balanced are the dimensions of an individual's social capital (Nahapiet & Ghoshal, 1998), the greater support it offers to its ability to adapt and innovate in complex environments (Uzzi & Spiro, 2005; Wasti et al., 2022). In this sense, the hypothesis H₂ is stated.

H₂ - Individual social capital is positively related to individual ambidexterity.

2.5 Individual absorptive capacity and individual social capital

The association between individual absorptive capacity and social capital is often seen as synergistic and bidirectional (Ali et al., 2023; Burt, 2004; Kanwal et al., 2022; Lyu et al., 2022). Social capital can be an important facilitator for the expansion of an individual's absorptive capacity. For Cohen and Levinthal (1990), social connections can provide access to sources of knowledge, mentoring, and learning opportunities that would otherwise be inaccessible. Through social networks and interpersonal relationships, individuals can learn from others and absorb knowledge more effectively.

Social capital can function as a bridge between different knowledge networks, allowing individuals to acquire varied perspectives and broaden their repertoire of absorbable information. Social capital provides access to different perspectives and learning opportunities that can enhance an individual's absorptive capacity (Burt, 2004; Cohen & Levinthal, 1990).

While the literature reviewed above treats social capital primarily as an antecedent of absorptive capacity, largely at the organizational level, the mechanism proposed here for the individual level runs in the opposite direction. Individuals who are more capable of acquiring, assimilating, and applying knowledge become more valuable interlocutors within their professional networks: their competence increases their visibility, legitimacy, and attractiveness as collaboration partners, which in turn expands the ties and relational resources available to them (Ter Wal et al., 2011). Absorptive capacity, in this sense, does not merely draw on pre-existing social capital; it actively contributes to generating it, as cognitively capable individuals are more often sought out, consulted, and included by others. This directionality is consistent with a micro-foundational view in which relational structure is, at least in part, an emergent outcome of individual cognitive capability rather than solely its precondition, and it is this individual-level mechanism, rather than a direct transposition of the organizational-level relationship, which underlies H₃.

The more balanced the dimensions of an individual's social capital (Nahapiet & Ghoshal, 1998), the greater support it offers to its ability to adapt and innovate in complex environments (Uzzi & Spiro, 2005; Wasti et al., 2022). Given the individual-level mechanism outlined above, in which cognitive competence may contribute to relational standing rather than the reverse, the hypothesis H₃ is stated.

H₃ - Individual absorptive capacity is positively related to individual social capital.

3. METHODOLOGICAL PROCEDURES

3.1 Research design and empirical context

This study adopts a quantitative, cross-sectional survey design to examine the relationships among individual absorptive capacity, social capital, and ambidexterity. This design is appropriate for testing theoretically grounded associations among latent constructs at the individual level and is widely used in research on learning, ambidexterity, and micro foundations of organizational capabilities.

The empirical context comprises traffic agents operating in regional traffic units in the state of Paraná, Brazil. This setting constitutes a theoretically relevant and critical case, as traffic agents work in highly regulated environments characterized by formal rules, continuous regulatory updates, and constrained discretion. Performance in such contexts depends not only on procedural compliance but also on agents' ability to interpret, integrate, and apply regulations in situationally appropriate ways. These characteristics make the context particularly suitable for investigating the cognitive and relational foundations of individual ambidexterity.

3.2 Population, sample, and statistical power

The target population consisted of approximately 500 traffic agents distributed across 101 regional traffic units. Data were collected through voluntary participation using an online questionnaire. A total of 136 valid responses were obtained and retained for analysis after screening for completeness and consistency.

To assess the adequacy of the sample size, statistical power analysis was conducted using G*Power 3.1. Assuming a model with two predictors, a medium effect size ($f^2 = 0.15$), a significance level of $\alpha = .05$, and statistical power of .80, the minimum recommended sample size was 68 observations. The achieved sample size ($N = 136$) exceeds this threshold and meets established guidelines for Partial Least Squares Structural Equation Modeling (PLS-SEM), particularly for models of moderate complexity (Hair et al., 2014). While not intended for population-level generalization, the sample size is sufficient for theory testing within the proposed analytical framework.

3.3 Measures

Individual absorptive capacity was measured using the scale developed by Wang et al. (2014), grounded in the foundational work of Cohen and Levinthal (1990). The scale captures three dimensions of individual-level ACAP: knowledge acquisition, knowledge assimilation, and knowledge application. Items assess respondents' ability to recognize relevant information, integrate new knowledge with existing understanding, and apply it to practical situations. Responses were recorded on a six-point Likert scale ranging from 1 ("strongly disagree") to 6 ("strongly agree").

Individual social capital was measured using the scale proposed by Ben-Hador et al. (2021), which distinguishes between internal and external social capital. Internal social capital includes weak ties, strong ties, participation in internal activities, and connections with influential individuals within the organization. External social capital captures participation in external activities and ties with influential actors outside the organization. This multidimensional approach allows for a nuanced assessment of relational resources available to individuals in public-sector settings.

Individual ambidexterity was measured using the multidimensional scale developed by Popadiuk (2012). The scale captures four behavioral orientations: propensity to search for knowledge, propensity for efficiency, strategic orientation, and propensity for innovation. Together, these dimensions reflect individuals' capacity to integrate exploratory and exploitative behaviors within their professional roles. All items were measured using the same six-point Likert scale to ensure consistency across constructs.

3.4 Data collection

Data were collected through an online survey distributed to all regional traffic units. Participation was voluntary and anonymous. Respondents were informed about the purpose of the study, assured of confidentiality, and provided informed consent prior to completing the questionnaire. The data collection procedure complied with ethical standards for research involving human participants and followed established guidelines for survey-based research in organizational studies.

3.5 Analytical approach: PLS-SEM

The hypotheses were tested using Partial Least Squares Structural Equation Modeling (PLS-SEM) implemented in SmartPLS 4.0. PLS-SEM was selected for several reasons. First, the study adopts a prediction-oriented perspective, consistent with theory development at the micro level of ambidexterity. Second, PLS-SEM is suitable for models involving multiple latent constructs and hierarchical component structures. Third, the method is robust to deviations from multivariate normality and performs well with moderate sample sizes, such as the present dataset. These characteristics make PLS-SEM more appropriate for the present study than covariance-based SEM (CB-SEM), which requires larger sample sizes relative to model complexity, assumes multivariate normality, and is oriented toward confirming a well-established theoretical model rather than predicting outcomes in a still-emerging area of theory such as the individual-level micro foundations of ambidexterity. Because the theoretical relationships tested here (particularly H_3) are comparatively novel rather than well-established, and because the model includes second-order constructs estimated from a moderate sample, PLS-SEM's prediction orientation and lower sample-size requirements represent a better fit than a confirmatory, covariance-based alternative.

Following recommended procedures (Hair et al., 2014), the analysis employed the path-weighting scheme and a bootstrapping procedure with 5,000 resamples to estimate standard errors and assess the statistical significance of the structural paths. Given the model complexity and the presence of second-order constructs, a two-stage approach was adopted: latent variable scores for first-order constructs were estimated in the first stage and subsequently used as indicators for the higher-order constructs in the structural model. This approach reduces model complexity without compromising the estimation of structural relationships. Concretely, absorptive capacity (acquisition, assimilation, application) and individual ambidexterity (knowledge-seeking propensity, efficiency propensity, strategic orientation, innovation propensity) were specified as reflective-formative second-order constructs. In the first stage, the model was estimated using the repeated-indicators approach, and the standardized latent variable scores obtained for each first-order dimension were saved. In the second stage, these saved scores were used as the manifest indicators of the corresponding second-order constructs, which were then re-estimated within the full structural model together with social capital. This sequential

procedure, consistent with Hair et al. (2014), avoids inflating the number of indicators used to estimate the higher-order constructs and produces the path coefficients, R^2 , and effect sizes reported in Table 1.

3.6 Assessment of the measurement model

The measurement model was evaluated in terms of indicator reliability, internal consistency, convergent validity, and discriminant validity. Indicator reliability was assessed through standardized loadings, with values above 0.70 considered acceptable. Internal consistency was evaluated using composite reliability coefficients. Convergent validity was assessed using average variance extracted (AVE), with values above 0.50 indicating adequate convergence. Discriminant validity was examined using both the Fornell and Larcker (1981) criterion and heterotrait–monotrait (HTMT) ratios.

3.7 Common method bias and multicollinearity

Several procedural and statistical remedies were employed to mitigate and assess common method bias (CMB). Procedurally, anonymity and confidentiality were ensured, and items were carefully worded to reduce evaluation apprehension. Statistically, full collinearity variance inflation factors (VIFs) were computed following Kock (2015), with all values below the recommended threshold of 3.3, indicating the absence of substantial CMB. Additionally, Harman's single-factor test showed that no single factor accounted for the majority of variance, providing further evidence that common method bias is unlikely to confound the results.

3.8 Model evaluation criteria

The structural model was evaluated based on path coefficients, statistical significance, effect sizes (f^2), and explained variance (R^2). Effect sizes were interpreted following Cohen's (1988) guidelines, and R^2 values were used to assess the model's explanatory power. Together, these criteria provide a comprehensive assessment of the strength and relevance of the hypothesized relationships.

4. RESULTS

4.1 Sample profile and descriptive statistics

The final sample comprised 136 traffic agents distributed across 101 regional traffic units in the state of Paraná, Brazil. The respondents were predominantly male (54.4%), highly experienced, and professionally mature: 96.3% had more than five years of tenure, 94.9% held a higher education degree, and 76.4% were over 40 years old. With respect to organizational roles, 63.2% occupied technical positions, while 36.8% held supervisory or coordination responsibilities. This profile indicates a workforce with substantial accumulated experience and exposure to regulatory routines, which is theoretically appropriate for examining learning-based and ambidextrous behaviors in rule-intensive environments.

Descriptive statistics show that respondents reported important levels of absorptive capacity across their three dimensions—acquisition, assimilation, and application of knowledge. Mean values ranged from 4.19 to 5.04 on a six-point Likert scale, suggesting a strong perception of individual learning and knowledge-use capabilities.

Regarding social capital, the descriptive results reveal a differentiated pattern between internal and external relational resources. Internal social capital was more strongly developed than external social capital, particularly in terms of strong internal ties characterized by trust and close interpersonal relationships. In contrast, ties with influential actors—both internally and externally—were reported at lower levels. This pattern is consistent with the institutional characteristics of public-sector organizations, where hierarchical structures and formal authority limit access to influential networks, while fostering dense peer-based relationships within organizational units.

Descriptive statistics for individual ambidexterity indicate moderately high levels across all dimensions. Respondents reported strong propensities for knowledge seeking, efficiency-oriented behavior, and strategic orientation, alongside a moderate propensity for innovation. Together, these results suggest that traffic agents tend to combine disciplined execution of routines with ongoing learning and forward-looking orientation, reflecting the dual demands of regulatory enforcement and contextual adaptation.

4.2 Measurement model assessment (Table 1)

The measurement model was assessed before evaluating the structural relationships. All first-order constructs demonstrated satisfactory indicator reliability, with most standardized loadings exceeding the recommended threshold of 0.70. One exception was the strategic orientation dimension of ambidexterity, which exhibited a lower loading (0.553). This dimension was retained in the model, however, as its average variance extracted (AVE) exceeded the minimum threshold of 0.500, supporting convergent validity at the construct level.

Convergent validity was further confirmed by AVE values ranging from 0.554 to 0.758 across constructs, while composite reliability values exceeded 0.800, indicating strong internal consistency. Discriminant validity was supported by both the Fornell and Larcker (1981) criterion and the heterotrait–monotrait (HTMT) ratios, with all correlations between constructs remaining below the square root of the corresponding AVE and HTMT values remaining within acceptable limits. Together, these results provide evidence of measurement adequacy.

Table 1 – Cross loadings – Correlation matrix – VIF-HTM- f^2

Cross loadings			
Latent variable	Absorptive capacity	Ambidexterity	Social capital
Acquisition	.826	.514	.274
Application	.869	.449	.267
Assimilation	.915	.577	.351
Efficiency	.357	.702	.105
Innovation practices	.476	.839	.178
Knowledge practices	.602	.845	.431
Strategic orientation	.187	.553	.254
External social capital	.223	.294	.822
Internal social capital	.356	.307	.895
Fornell & Larcker (1981) – Correlation matrix			
Latent variable	Absorptive capacity	Ambidexterity	Social capital
Absorptive capacity	.871		
Ambidexterity	.595	.744	
Social capital	.345	.349	.859
AVE	.758	.554	.738

Composite reliability	.904	.829	.849
R^2	-----	.377	.119
Adjusted R^2	-----	.369	.113
Relationships	VIF	HTMT	f^2
Absorptive capacity -> Ambidexterity	1.135	.681	.409
Absorptive capacity -> Social capital	1.000	.451	.135
Social capital -> Ambidexterity	1.135	.465	.038

Note: Values in bold refer to the square roots of AVE; R^2 denotes the unadjusted coefficient of determination and adjusted R^2 is the sample-size-corrected counterpart, reported separately to avoid ambiguity between text and table.

Source: Research data.

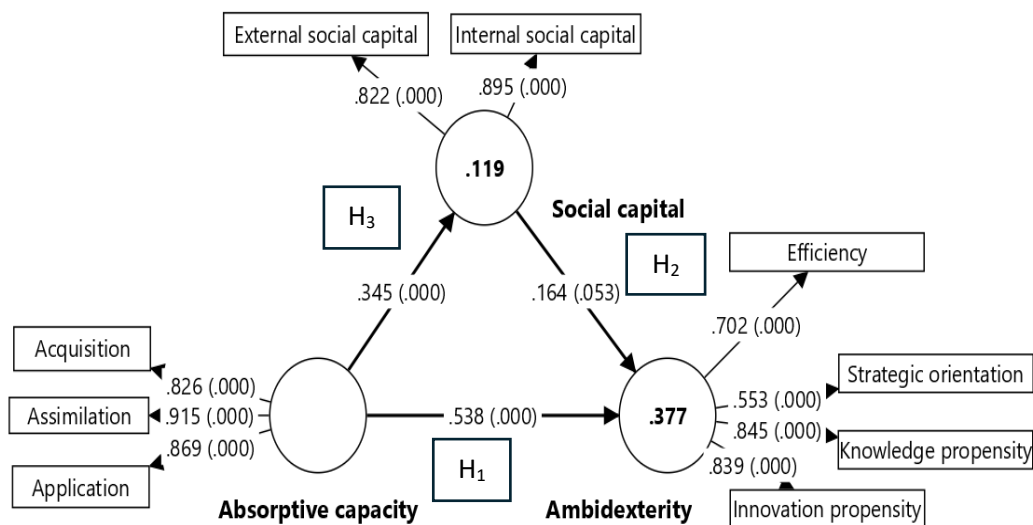
The variance inflation factors (VIFs) were below the critical threshold, indicating no multicollinearity concerns. In addition, full collinearity assessments and Harman's single-factor test did not indicate common method bias, supporting the validity of the estimated relationships.

4.3 Structural model assessment and hypothesis testing (Table 1)

The structural model was estimated using Partial Least Squares Structural Equation Modeling (PLS-SEM) with bootstrapping procedures (5,000 subsamples). The results reveal a clear and theoretically informative pattern.

Individual absorptive capacity exhibits a strong and positive effect on individual ambidexterity, with a large effect size ($f^2 = 0.409$), confirming H₁. This relationship explains a substantial proportion of variance in ambidextrous behavior ($R^2 = 0.377$; adjusted $R^2 = 0.369$), indicating that knowledge-processing capabilities constitute a central explanatory mechanism for balancing exploratory and exploitative behaviors in regulatory work (Figure 1). Table 1 reports both statistics; all subsequent in-text R^2 values likewise refer to the unadjusted coefficient of determination unless otherwise noted.

Figure 1 – Final model



Source: Research data.

Absorptive capacity also shows a positive and statistically significant effect on individual social capital, with a medium effect size ($f^2 = 0.135$), and confirms H₃. This finding suggests that individuals who are more capable of acquiring, assimilating, and applying knowledge tend to develop richer relational resources within their professional networks. The explained variance in social capital ($R^2 = 0.119$; adjusted $R^2 = 0.113$), while modest, is meaningful given the complexity of relational dynamics and the constrained nature of public-sector contexts.

In contrast, the direct effect of social capital on individual ambidexterity is positive but does not reach conventional levels of statistical significance (p -value = 0.053), and its effect size is small ($f^2 = 0.038$). This result indicates that, in this regulatory context, social capital does not play a decisive role in enabling ambidextrous behavior once cognitive learning capabilities are considered. Therefore, H₂ is not confirmed.

Additional analyses confirm that social capital does not mediate the relationship between absorptive capacity and ambidexterity. Together, these findings suggest an asymmetric configuration in which absorptive capacity functions as the primary driver of ambidextrous behavior, while social capital operates as a secondary and complementary resource. Table 2 presents the synthesis of hypotheses.

Table 2 – Synthesis of the hypothesis

Hypothesis	Coefficient	p -value	Decisions
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H ₁ – Absorptive capacity > ambidexterity	.538	.000	Confirmed
H ₂ – Social capital > Ambidexterity	.164	.053	Not confirmed
H ₃ – Absorptive capacity > Social capital	.345	.000	Confirmed

Source: Research data.

5. DISCUSSION

This study set out to examine how cognitive and relational mechanisms jointly shape individual ambidexterity in a public regulatory context. The findings show that individual absorptive capacity emerges as the dominant antecedent of ambidexterity ($\beta = .538$, $p < .001$), while social capital—although positively related ($\beta = .164$)—does not reach conventional significance ($p = .053$) as a direct predictor of ambidextrous behavior.

The effect of absorptive capacity on individual ambidexterity reinforces the view that ambidextrous behavior is fundamentally rooted in cognitive processes. Individuals with higher ACAP are better equipped to recognize relevant information, integrate new knowledge with existing cognitive schemas, and apply it flexibly across situations. These abilities directly map onto the dual demands of exploration and exploitation described by March (1991): exploration requires the capacity to reinterpret and recombine knowledge, while exploitation depends on the disciplined application of learned routines.

From a micro-foundations perspective (Felin et al., 2015; Helfat & Peteraf, 2015), these findings suggest that ambidexterity does not merely arise from structural arrangements or motivational orientations, but from individuals' underlying knowledge-processing capabilities. In regulatory environments, where discretion is exercised through interpretation rather than innovation per se, ambidexterity becomes less about switching between tasks and more about cognitive calibration, that is, the ability to continuously adjust interpretations of rules to fit situational contingencies without violating institutional constraints.

This interpretation extends prior research on individual ambidexterity (Mom et al., 2009; Rosing & Zacher, 2017) by showing that the balance between exploration and exploitation can be internally orchestrated through learning mechanisms, even in the absence of high autonomy or structural flexibility. Ambidexterity, in this sense, is not simply enacted through behavioral alternation but emerges from the individual's capacity to integrate novelty and discipline within the same cognitive frame.

One of the most theoretically informative findings of this study is the non-significant direct effect of social capital on individual ambidexterity (H_2 not confirmed). This result contrasts with a substantial body of literature that portrays social capital as a central enabler of learning, innovation, and adaptive behavior (Burt, 2004; Nahapiet & Ghoshal, 1998). Rather than viewing this outcome as anomalous, we argue that it points to an important boundary condition of social capital theory. This boundary-condition interpretation should nonetheless be read as suggestive rather than definitive: because respondents were drawn from a single occupational group operating under transit legislation, the finding establishes that social capital's role can be weak in at least one highly regulated setting, rather than demonstrating precisely how regulatory intensity moderates that role across contexts.

In highly regulated environments, performance hinges on accurate interpretation and consistent application of formal rules. While social networks may facilitate access to information or informal advice, they may be less effective in enhancing ambidexterity when discretion is constrained by legal and procedural frameworks. Under such conditions, relational embeddedness cannot substitute for analytical competence and domain-specific expertise. Ambidexterity thus becomes less socially negotiated and more cognitively anchored.

Although social capital does not directly predict ambidexterity, absorptive capacity significantly predicts social capital. This pattern suggests a directional relationship in which cognitive capabilities facilitate the development of relational resources. Individuals who effectively process and apply knowledge become valuable points of reference within their networks, enhancing their legitimacy, visibility, and attractiveness as collaboration partners (Ter Wal et al., 2011).

Taken together, these findings contribute to ambidexterity theory in several ways. First, they reposition absorptive capacity as a central micro foundation of individual ambidexterity, particularly in institutionalized environments. Second, they qualify the role of social capital by demonstrating that its impact is contingent rather than universal. Third, they suggest that ambidexterity at the individual level may be better understood as a cognitive integration process rather than a purely behavioral or relational balancing act.

More broadly, the study highlights the importance of considering task structure and institutional context when theorizing ambidexterity. In settings where rule interpretation and compliance are central, adaptive behavior depends less on social

interaction and more on individuals' capacity to learn, interpret, and apply knowledge with precision. This insight opens new avenues for research at the intersection of ambidexterity, judgment, and micro foundations.

This study makes three interrelated theoretical contributions to the literature on individual ambidexterity, absorptive capacity, and social capital by advancing a more cognitively grounded and context-sensitive understanding of adaptive behavior in regulated environments.

First, the study repositions absorptive capacity as a primary micro foundation of individual ambidexterity. While prior research has emphasized structural arrangements, leadership behaviors, or social embeddedness as enablers of ambidexterity, our findings demonstrate that ambidextrous behavior at the individual level is fundamentally rooted in knowledge-processing capabilities. By showing that individual absorptive capacity exerts a positive and statistically significant effect on ambidexterity ($\beta = .538, p < .001, f^2 = .409$), this study shifts the theoretical focus from external coordination mechanisms to internal cognitive calibration processes. Ambidexterity emerges not merely from alternating between exploratory and exploitative tasks, but from individuals' ability to acquire, assimilate, and apply knowledge in ways that integrate novelty and discipline within the same cognitive frame. This contribution advances microfoundation research by explicitly linking learning-based capabilities to the enactment of ambidextrous behavior under institutional constraints.

Second, the study challenges universalistic assumptions regarding the role of social capital in enabling individual ambidexterity. Contrary to dominant perspectives that portray social capital as a ubiquitous facilitator of adaptive and innovative behavior, our results reveal that its direct influence on ambidexterity is limited in highly regulated contexts. This finding introduces an important boundary condition to social capital theory by suggesting that relational resources may be less consequential when task performance relies on analytical interpretation, rule-based judgment, and formal accountability. Rather than serving as a primary driver of ambidexterity, social capital plays a complementary or contingent role whose effectiveness depends on the degree of discretion embedded in the task environment.

Third, the study advances a dynamic and asymmetric view of the relationship between cognition and social structure. By demonstrating that absorptive capacity significantly predicts the development of individual social capital, the findings suggest

that relational embeddedness is, at least in part, an outcome of cognitive capability rather than solely an antecedent of performance. Individuals who process and apply knowledge effectively become central and valued actors within their networks, thereby strengthening their relational resources. This asymmetric relationship challenges linear models that treat cognition and social capital as independent inputs and supports a recursive perspective in which learning capabilities shape, and are shaped by, social structure.

The findings of this study offer relevant managerial implications for public-sector managers, policymakers, and organizational leaders responsible for overseeing professionals who operate in highly regulated and institutionally constrained environments. In such context, improving performance does not primarily depend on expanding discretion or strengthening informal networks, but on enhancing individuals' capacity to process, interpret, and apply knowledge accurately and adaptively. These implications speak directly to the Brazilian regulatory bureaucracy in which the sample is embedded: traffic agents linked to state-level Departamentos Estaduais de Trânsito (DETRANs) operate as street-level bureaucrats (Lipsky, 1980) whose discretion is bounded by national traffic legislation and continuously monitored through administrative accountability mechanisms. Within this specific institutional setting, the findings suggest that regulatory governance initiatives aimed at improving service quality and legitimacy should prioritize agents' interpretive and learning capabilities over generic training or expanded managerial oversight.

Given that absorptive capacity emerged as the strongest predictor of individual ambidexterity, managerial interventions should prioritize the systematic development of employees' learning and knowledge-integration capabilities. Rather than focusing training efforts exclusively on procedural compliance or interpersonal skills, organizations should invest in initiatives that strengthen employees' ability to acquire new information, assimilate regulatory updates, and apply rules across varied and ambiguous situations. Case-based learning, scenario analysis, and structured reflection on atypical events can be particularly effective in fostering these cognitive capabilities.

Ambidextrous performance in regulatory settings depends on employees' ability to balance strict adherence to rules with context-sensitive interpretation. Managers should therefore design work systems that allow for guided flexibility—clear procedural frameworks that specify not only what must be done, but also when and how judgment may be exercised. Practices such as post-action reviews, collective discussions of

complex cases, and institutionalized feedback loops can help employees refine their interpretive skills while maintaining accountability and consistency.

Although social capital did not exert a direct effect on ambidexterity, it remains an important complementary resource. Managers should view social networks not as substitutes for expertise, but as channels that can amplify the impact of cognitive capabilities. Facilitating cross-unit interactions, peer consultation mechanisms, and mentoring relationships may enhance knowledge circulation, particularly when anchored in demonstrated competence. Importantly, such initiatives are likely to be most effective when they connect individuals who possess high absorptive capacity and domain expertise.

In regulatory occupations, frontline employees play a critical role in shaping citizens' perceptions of fairness, legitimacy, and effectiveness. The findings indicate that investments aimed at improving employees' interpretive competence—rather than merely increasing monitoring or standardization—are likely to yield greater returns in terms of service quality and trust. Decision-support tools, regularly updated interpretive guidelines, and mechanisms for incorporating frontline insights into policy refinement can further support this objective.

Overall, these managerial implications suggest a shift in emphasis from relational coordination and procedural enforcement toward the development of cognitive capabilities that enable professionals to act ambidextrously within institutional constraints. By focusing on absorptive capacity as a strategic managerial level, organizations—particularly in the public sector—can enhance adaptive performance while maintaining the consistency and accountability required in regulated environments.

The effect of individual absorptive capacity on ambidextrous behavior suggests that public-sector performance is critically dependent on frontline agents' ability to learn and interpret evolving regulatory frameworks continuously. For policymakers, this implies that capacity-building initiatives should move beyond compliance-oriented training and focus on enhancing knowledge acquisition, assimilation, and application. Regulatory reforms and implementation guidelines should therefore be accompanied by structured learning mechanisms, such as interpretive case repositories, simulation-based training, and continuous updating systems that support informed judgment in complex situations.

Effective regulation requires a balance between consistency and contextual responsiveness. The results indicate that ambidextrous performance emerges when agents are equipped to exercise judgment within clearly defined boundaries. Policymakers can support this balance by designing regulatory frameworks that explicitly articulate zones of discretion, clarify interpretive principles, and guide how rules should be adapted to situational contingencies. Such designs reduce uncertainty, limit arbitrary decision-making, and enhance both effectiveness and legitimacy in public service delivery.

The positive relationship between absorptive capacity and social capital suggests that individuals with strong learning and interpretive skills naturally serve as reference points within regulatory systems. Public managers can formalize this role by recognizing such agents as internal experts, mentors, or contributors to guideline development and policy feedback processes. This approach helps institutionalize learning, reduce interpretive variance across units, and improve policy coherence without increasing hierarchical control.

Frontline regulatory agents play a decisive role in shaping citizens' experiences with public institutions. The findings suggest that investments aimed at improving agents' interpretive competence—rather than intensifying monitoring or rule proliferation—can enhance perceived fairness, consistency, and trust. Policymakers should therefore prioritize feedback mechanisms that capture frontline insights and integrate them into regulatory refinement, ensuring that policies remain both robust and adaptable over time.

Overall, these implications highlight the importance of viewing absorptive capacity as a strategic capability within public governance systems. By strengthening the cognitive foundations of rule interpretation and adaptive behavior, public managers and policymakers can improve regulatory effectiveness while preserving accountability, consistency, and institutional legitimacy.

6. CONCLUSION, LIMITATIONS, AND FUTURE RESEARCH

6.1 Conclusion

This study set out to examine the micro-level foundations of individual ambidexterity in a highly regulated public sector context by integrating absorptive capacity and social capital into a single explanatory model. The findings indicate that individual

ambidexterity is primarily associated with cognitive learning mechanisms rather than with relational embeddedness. Absorptive capacity emerged as the dominant antecedent of ambidextrous behavior, exerting a positive and statistically significant effect ($\beta = .538$, $p < .001$) on individuals' ability to balance exploratory and exploitative orientations in regulatory work.

By demonstrating that social capital does not exert a significant direct influence on ambidexterity, the study challenges prevailing assumptions in the literature that emphasize relational resources as universal enablers of adaptive behavior. Instead, the results suggest that in institutionalized, rule-intensive environments, adaptive performance depends fundamentally on individuals' capacity to acquire, assimilate, and apply knowledge accurately and flexibly. Ambidexterity in such settings is less a function of social brokerage and more a process of cognitive calibration, whereby individuals integrate novelty and discipline within constrained interpretive spaces.

Beyond ambidexterity research, the study contributes to micro foundations theory by illustrating how cognitive capabilities not only shape adaptive behavior but also influence the development of social capital. Individuals with stronger absorptive capacity tend to become more embedded and central within professional networks, indicating a directional relationship in which cognition precedes and may influence relational resources. This insight advances a more dynamic and asymmetric understanding of the interplay between learning and social structure.

Taken together, the findings reposition absorptive capacity as a core capability for individual adaptation in public regulatory contexts and call for a reconsideration of the relative roles of cognition and social relations in theories of ambidexterity. By grounding ambidextrous behavior in learning and interpretation processes, the study offers a more context-sensitive and cognitively anchored account of how individuals navigate complex institutional demands.

6.2 Limitations

Despite its contributions, this study has several limitations that should be acknowledged. First, the use of a cross-sectional research design limits the ability to make causal inferences or to capture the dynamic evolution of absorptive capacity, social capital, and ambidextrous behavior over time. Learning and ambidexterity are inherently

developmental processes, and longitudinal designs provide a more robust understanding of how these capabilities unfold and interact. Because all variables were measured at a single point in time, the directional language used throughout the paper to describe H_1 and H_3 (e.g., Absorptive capacity “predicting” ambidexterity or social capital) reflects the hypothesized theoretical direction rather than demonstrated causal precedence. With cross-sectional data, an equally plausible reading is that more ambidextrous or better-networked individuals report higher absorptive capacity, or that all three constructs are jointly driven by an unmeasured trait such as general learning orientation. Accordingly, the statistical relationships reported here should be interpreted as associations consistent with, rather than proof of, the proposed causal structure.

Second, the study relies on self-reported measures, which may introduce perceptual bias despite the use of procedural and statistical controls for common method bias. This concern is not merely hypothetical: absorptive capacity, social capital, and ambidexterity were all reported by the same respondents, using the same instrument, at the same point in time, which is precisely the condition under which common method variance is most likely to inflate observed associations. Although the full-collinearity VIF and Harman’s single-factor tests reported in Section 3.7 indicate that such bias is unlikely to have substantially influenced the findings, these procedures reduce rather than eliminate the risk, and they cannot rule out more subtle forms of common method variance. Future research could strengthen validity by incorporating objective indicators, peer evaluations, or supervisor assessments, and by separating the measurement of predictor and criterion variables in time or source.

Third, the empirical context is restricted to a single public-sector domain within one geographical setting. While this context was intentionally selected as a theoretically relevant and critical case, caution is warranted in generalizing the findings to other sectors or institutional environments. Regulatory intensity, discretion, and cultural norms may vary substantially across contexts, potentially altering the relative importance of cognitive and relational mechanisms.

Finally, although the sample size is adequate for the analytical approach employed, larger samples would enable more fine-grained analyses, such as multi-group comparisons across organizational roles or levels of discretion.

6.3 Directions for future research

The findings open several promising avenues for future research. First, longitudinal and process-oriented studies could examine how absorptive capacity develops over time and how it shapes the trajectory of individual ambidexterity under changing regulatory conditions. Such designs would allow researchers to explore feedback loops between learning, performance, and social embeddedness.

Second, future studies could investigate contextual moderators that may condition the relationship between social capital and ambidexterity. Variables such as task discretion, organizational climate, leadership style, and digital decision-support systems may influence the extent to which relational resources translate into adaptive behavior.

Third, comparative research across sectors with varying degrees of regulation—such as healthcare, financial services, or private knowledge-intensive firms—would help clarify the boundary conditions identified in this study. Cross-national studies could further explore how institutional and cultural differences shape the cognitive and relational foundations of ambidexterity.

Fourth, future research could integrate complementary cognitive constructs, such as metacognition, judgment, intuition, or sensemaking, to deepen understanding of the internal processes that enable ambidextrous behavior. Linking absorptive capacity to these constructs would further enrich micro-foundations theory.

Finally, experimental and intervention-based studies could assess whether targeted investments in absorptive capacity—through training, simulations, or decision-support tools—lead to measurable improvements in ambidexterity and performance outcomes. Such research would provide valuable insights into the practical levels through which organizations and policymakers can foster adaptive capacity in complex institutional environments.

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Silvio Popadiuk: Formal analysis (Lead); Funding acquisition (Lead); Methodology (Lead); Supervision (Lead); Writing - original draft (Lead); Writing - review & editing (Lead);

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Gilberto Perez: Formal Analysis (Supporting); Writing - original draft (Support); Writing - review & editing (Lead).

RESEARCH DATA AVAILABILITY

The entire data set supporting the results of this study is available upon request to the corresponding author [Silvio Popadiuk]. The data set is not publicly available because it contains information that compromises the privacy of survey participants.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AI USAGE STATEMENT

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