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Determining Critical Organizational Thresholds: Revealing the Necessary Conditions of Knowledge Sharing, Culture and Leadership for Employee Performance

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ABSTRACT

This study investigates the structural effects and necessary threshold conditions of Transformational Leadership, Knowledge Sharing, and Organizational Culture on Employee Performance within public sector agencies in Bandung City. By moving beyond traditional linear approaches, the study aims to determine both the direct/indirect causal pathways and the non-compensatory bottleneck conditions required to achieve optimal public sector productivity. The researchers deployed a quantitative survey approach, collecting primary data via 5-point Likert scale questionnaires from 55 public sector employees across government offices in Bandung City. Prior to structural evaluation, measurement scales underwent rigorous validity and reliability testing. The study then utilized a two-stage analytical design: path analysis to test linear direct and indirect hypotheses (Y = 0.386X_1 + 0.357X_2 + 0.287X_3 + epsilon), followed by Necessary Condition Analysis (NCA) to calculate specific bottleneck values and percentage thresholds across low, moderate, and peak performance levels. The path analysis reveals that Transformational Leadership, Knowledge Sharing, and Organizational Culture significantly drive employee performance, collectively accounting for an 89.1% total effect. Furthermore, the NCA findings demonstrate that these three factors operate as non-compensatory prerequisites; failing to meet minimum threshold values in any single construct severely caps performance regardless of how strongly the other dimensions perform. Practically, this study provides public sector managers in Bandung with concrete, actionable bottleneck metrics rather than generic recommendations. Administrators can now prioritize resource allocation according to exact performance targets—ensuring that essential leadership behaviors, knowledge-sharing channels, and cultural norms satisfy baseline necessity thresholds before attempting to maximize secondary organizational drivers. This research offers novel empirical value by integrating conventional path analysis with Necessary Condition Analysis (NCA) within a public administration context. Unlike previous studies that treat leadership, culture, and knowledge sharing as purely additive drivers, this dual-analytical framework identifies both the net predictive effects and the precise necessary bottleneck conditions needed to unlock high-level employee performance.

Keywords: Transformational Leadership, Knowledge Sharing, Organizational Culture, Employee Performance, Necessary Condition Analysis (NCA), Path Analysis, Public Sector.

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INTRODUCTION

Existing empirical studies extensively examine how leadership, organizational culture, and knowledge sharing drive employee and organizational performance through linear and mediating relationships. For instance, Sanosra et al. (2022) and Mokhchy et al. (2025) demonstrate that leadership styles and knowledge sharing significantly improve performance, with organizational work culture acting as a pivotal intervening and dynamic context. Similarly, Raziq et al. (2024) and Udin (2024) confirm across multi-country and sectoral settings that ethical leadership and knowledge sharing, supported by organizational culture and workplace ethics, directly elevate performance outcomes. However, these prevailing studies rely almost exclusively on traditional additive and net-effect models, assuming that a high score in one predictor (e.g., strong leadership) can fully compensate for a deficit in another (e.g., weak knowledge sharing). Scholars demonstrate that various leadership styles—ranging from transformational and ethical leadership to servant leadership—actively foster collaborative cultures, psychological ownership, and knowledge-exchange behaviors (Nauman et al., 2022; Saeed et al., 2022; Udin, 2024). In turn, research confirms that knowledge sharing directly elevates employee productivity, organizational citizenship behavior, and task performance, especially when mediated by work culture, leader-member exchange (LMX), and employee well-being (Sa'adah & Rijanti, 2022; Sanosra et al., 2022; Shaikh et al., 2023). Furthermore, global and cross-sectoral studies establish that leadership, culture, and knowledge sharing dynamically interact to drive broader organizational performance (Mokhchy et al., 2025; Raziq et al., 2024).

Despite extensive investments in leadership training, organizational development, and knowledge-management systems, public sector organizations frequently struggle to achieve optimal employee performance. Conventional management research often treats leadership, organizational culture, and knowledge sharing purely as additive drivers—assuming that a strength in one area can offset a deficit in another. However, this traditional perspective overlooks potential bottleneck conditions where the total absence or insufficiency of a single critical factor cap employee performance, regardless of how strongly other organizational dimensions perform. Government agencies in rapidly evolving urban centers, such as Bandung City, face heightened pressure to deliver high-quality public services, making it essential to identify not just what

influences performance, but what conditions are strictly necessary to achieve it.

To address this critical gap, this study investigates how Knowledge Sharing, Organizational Culture, and Transformational Leadership function as both direct/indirect drivers and necessary prerequisites for Employee Performance. While traditional linear approaches explain how these variables correlate with outcomes, they fail to identify the precise threshold values needed to prevent performance bottlenecks at low, moderate, and peak productivity targets. By integrating structural path analysis with Necessary Condition Analysis (NCA), this research reveals both the direct/indirect effects and the indispensable bottleneck conditions across these core management constructs. Ultimately, this dual analytical approach equips public sector leaders with targeted, threshold-based insights to allocate resources effectively and systematically elevate public servant performance.

METHOD

This quantitative study employs a survey approach targeting 55 public sector employees in Bandung City to address the research question, Revealing the Necessary Conditions of Knowledge Sharing, Culture, and Leadership for Employee Performance. The research framework examines four key variables: Knowledge Sharing, Organizational Culture, Transformational Leadership, and Employee Performance. Researchers collected primary data using a five-point Likert scale questionnaire administered directly to the selected government staff.

Prior to structural evaluation, researchers conducted validity and reliability testing to ensure the integrity and consistency of all measurement items. The analytical strategy then proceeds in two complementary stages: first, utilizing path analysis to evaluate direct and indirect structural relationships among the variables, followed by Necessary Condition Analysis (NCA). Through NCA, the study identifies critical bottleneck values and calculates specific target percentages required across each predictor to achieve optimal employee performance levels.

RESULTS and DISCUSSION

Researchers evaluated the measurement model's validity and reliability across four main constructs: Knowledge Sharing, Organizational Culture, Transformational Leadership, and Employee Performance. Using a correlation cutoff benchmark of 0.30, all 15 survey items in each construct demonstrated strong item validity. Specifically, item-total correlations ranged from 0.352 to 0.591 for Knowledge Sharing, 0.340 to 0.624 for Organizational Culture, 0.538 to 0.782 for Transformational Leadership, and 0.414 to 0.649 for Employee Performance (Table 1).

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Table 1. Validity and Reliability Test

	Knowledge Sharing		Organizational Culture		Transformational Leadership		Employee Performance	
	Correl	CA	Correl	CA	Corre	CA	Correlation	CA
Itm1	0,479		0,394		0,610		0,637	
Itm2	0,352		0,433		0,538		0,462	
Itm3	0,373		0,409		0,619		0,583	
Itm4	0,591		0,587		0,550		0,497	
Itm5	0,459		0,490		0,608		0,511	
Itm6	0,411		0,624		0,745		0,499	
Itm7	0,562		0,394		0,629		0,547	
Itm8	0,513	0,842	0,482	0,852	0,747	0,927	0,614	0,887
Itm9	0,552		0,530		0,782		0,458	
Itm10	0,371		0,427		0,650		0,622	
Itm11	0,551		0,340		0,651		0,616	
Itm12	0,413		0,584		0,668		0,649	
Itm13	0,556		0,591		0,621		0,637	
Itm14	0,416		0,392		0,611		0,414	
Itm15	0,410		0,596		0,744		0,448	

Because every single item surpassed the minimum threshold, all 60 indicators validly capture their respective underlying variables.

Table 2. Path Analysis Result

Path	Standardized Coefficients	P value	Conclusion
Transformational Leadership	0,386	0,000	Significant
Knowledge Sharing	0,357	0,000	Significant
Organizational Culture	0,287	0,000	Significant

In addition to item validity, all four measurement scales demonstrated high internal consistency by exceeding the standard reliability threshold of 0.70. Transformational Leadership yielded the highest Cronbach's Alpha at 0.927, followed by Employee Performance at 0.887, Organizational Culture at 0.852, and Knowledge Sharing at 0.842. These high alpha values confirm that the survey items dependably measure their intended concepts without significant measurement error. Consequently, researchers can confidently retain all items and proceed to structural analysis and hypothesis testing as show at table 2.

The Path Effects equation represents the relationship between the independent variables—Transformational Leadership, Knowledge Sharing, and Organizational Culture —and the dependent variable, expressed as:

$$Y = 0{,}386X1 + 0{,}357X2 + 0{,}287X3 + €$$

This model indicates that all three independent variables exert a positive direct impact on the dependent variable. Transformational Leadership shows the strongest individual contribution with a regression

coefficient of 0.386, followed by Knowledge Sharing at 0.357, and Organizational Culture at 0.287. When examining both direct and indirect effect, Transformational Leadership emerges as the most influential factor, yielding a direct effect of 15.0% and a total indirect effect of 19.4% (comprising 11.0% mediated through Knowledge Sharing and 8.4% through Organizational Culture), which results in a dominant total effect of 34.3%. Knowledge Sharing contributes a direct effect of 12.8% alongside a total indirect effect of 18.2% (via Transformational Leadership at 11.0% and Organizational Culture at 7.2%), accumulating to a total effect of 31.0%. Lastly, Organizational Culture contributes an 8.2% direct effect and a 15.6% total indirect effect (via Transformational Leadership at 8.4% and Knowledge Sharing at 7.2%), generating a total effect of 23.8%.

In total, direct effects account for 35.9% of the variance, while indirect mechanisms contribute 53.2%, bringing the combined explanatory power of the model to a total effect of 89.1%.

These findings closely mirror the work of Shahzad et al. (2022) and Alqatan et al. (2025), who highlighted how transformational leaders inspire followers, stimulate intellectual engagement, and build strategic pathways that directly uplift organizational performance. Moreover, Pangaribuan and Satrya (2024) confirm that transformational leadership continuously boosts employee performance in organizational settings by establishing clear goals and fostering strong employee commitment. Roy and Islam (2026), who highlight that supportive, forward-looking leadership styles build the foundational trust and psychological safety necessary to drive organizational outcomes. By inspiring vision and providing continuous support, transformational leaders enable employees to consistently exceed baseline expectations.

Knowledge Sharing directly contributes 12.8% to performance and achieves a total effect of 31.0%. Interacting strongly with leadership, Knowledge Sharing acts as a vital mechanism through which leadership vision translates into daily operational outcomes. Alqatan et al. (2025) and Shahzad et al. (2022) emphasize that knowledge exchange amplifies performance by transforming individual expertise into institutional capabilities. In addition, Pangaribuan and Satrya (2024) support these results, demonstrating that systematic knowledge management practices empower employees to perform their tasks more effectively. Sa'adah and Rijanti (2022), who demonstrated that active knowledge sharing enhances organizational citizenship behaviors and directly elevates employee performance across service sectors. When employees actively transfer insights and technical expertise, they turn individual competence into collective strength, sharply reducing operational errors and elevating service quality.

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Organizational Culture provides an 8.2% direct effect and a 23.8% total effect, reinforcing the execution environment. This aligns with Mohammed and AL-Abrrow (2023), who identified organizational culture as a crucial contextual framework that moderates and enables leadership effectiveness and performance outcomes. Furthermore, the combined indirect effects (53.2%) across all three variables reveal that these constructs operate as an interconnected ecosystem. By aligning transformational vision, continuous knowledge exchange, and supportive cultural values, organizations ignite employee creativity, task performance, and engagement—an essential dynamic echoed by Sidharta (2023) for improving overall task quality and employee performance. Sanosra et al. (2022), who established that work culture functions as a critical intervening variable that connects leadership and knowledge management to individual job performance. Furthermore, the combined indirect pathways (53.2%) illustrate that culture and knowledge sharing work synergistically; leadership vision flows through a positive cultural environment, enabling knowledge exchange to flourish and ultimately maximizing overall employee performance.

Table 3. Effect Size

	Original effect size	95.0%	CE-FDH	CR-FDH	Permutation p value	Necessary Condition
Knowledge Sharing	0.352	0.135	0.352	0.323	0.000	Strong
Organizational Culture	0.342	0.198	0.342	0.317	0.000	Strong
Transformational Leadership	0.412	0.180	0.412	0.359	0.000	Strong

The Necessary Condition Analysis (NCA) figure 1 and table 3 demonstrates that all three organizational drivers fundamentally restrict Employee Performance, as evidenced by large ceiling effect sizes (d > 0.30) and highly significant permutation p-values (p = 0.000). Following Dul's (2016) criteria, these results confirm that Knowledge Sharing, Organizational Culture, and Transformational Leadership operate as strong necessity conditions rather than traditional, compensatory predictors.

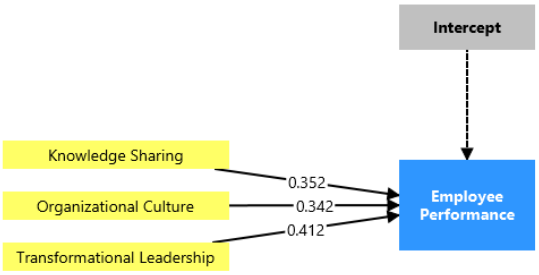


Figure 1. NCA Result

Among these, Transformational Leadership imposes the most severe bottleneck on the outcome, generating the highest ceiling effect sizes of 0.412 (CE-FDH) and 0.359 (CR-FDH). This finding indicates that a leadership deficit will instantly paralyze workforce outcomes, meaning that no amount of cultural alignment or resource

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Table 4. Bottleneck Value

	Bottleneck CE-FDH			Bottleneck CR-FDH		
Employee Performance (Y)	Knowledge Sharing	Organizational Culture	Transformational Leadership	Knowledge Sharing	Organizational Culture	Transformational Leadership
0	22.560	NN	NN	NN	NN	NN
10	26.485	28.030	NN	NN	NN	20.932
20	30.410	28.030	NN	NN	NN	23.582
30	34.335	28.110	NN	26.171	22.618	26.231
40	38.260	29.420	30.310	29.515	27.516	28.881
50	42.185	30.860	35.440	32.859	32.414	31.531
60	46.110	36.290	38.710	36.204	37.312	34.181
70	50.035	40.610	46.680	39.548	42.210	36.830
80	53.960	42.220	49.220	42.892	47.109	39.480
90	57.885	47.720	50.020	46.236	52.007	42.130
100	61.810	50.690	50.020	49.581	56.905	44.779

sharing can substitute for a lack of transformational guidance at the baseline level. Concurrently, Knowledge Sharing (d = 0.352 for CE-FDH; 0.323 for CR-FDH) and Organizational Culture (d = 0.342 for CE-FDH; 0.317 for CR-FDH) establish rigid operational boundaries that heavily constrain the peak performance ceiling.

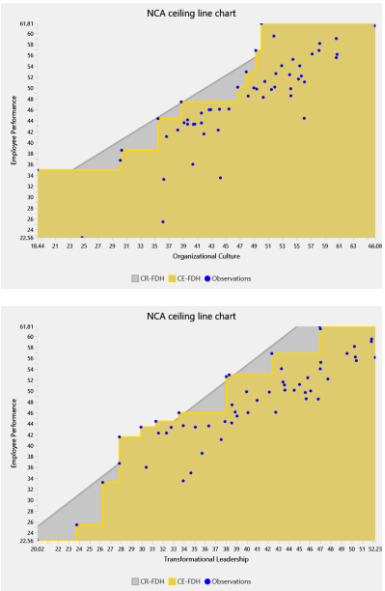


Figure 2. NCA Ceiling Chart

The permutation tests actively validate the statistical robustness of these constraints, proving that the observed ceiling zones did not occur by chance. Practically, this bottleneck architecture dictates a strict law of non-compensation for management: a failure in even a single pillar—whether it manifests as a toxic cultural environment or a breakdown in internal information sharing—will single-handedly cap and restrict maximum Employee Performance, regardless of how exceptionally the organization executes its other strategic initiatives.

The bottleneck table 4 and table 5 dynamically quantifies the exact operational thresholds that organizations must secure across all three predictors to unlock incremental levels of Employee Performance (Y). The data reveals a clear non-linear escalation in necessity, where low-tier performance targets (Y 10%) initially demand no critical constraints, represented by the "NN" (Not Necessary) designations. However, as the organization aims for higher performance brackets, the system rapidly activates these constraints. This shift proves that while employees can maintain basic, sub-optimal

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Table 5. Bottleneck Percentage

Employee Performance (Y)	Bottleneck CE-FDH			Bottleneck CR-FDH		
	Knowledge Sharing	Organizational Culture	Transformational Leadership	Knowledge Sharing	Organizational Culture	Transformational Leadership
0	NN	NN	NN	NN	NN	NN
10	14.8	NN	19.3	NN	NN	2.8
20	14.8	NN	19.3	NN	NN	11.1
30	15.0	NN	24.2	8.9	8.8	19.3
40	19.1	24.9	24.2	19.4	19.1	27.5
50	23.6	35.7	30.6	29.9	29.3	35.7
60	40.7	42.5	55.9	40.4	39.6	44.0
70	54.3	59.3	55.9	50.9	49.9	52.2
80	59.3	64.6	69.4	61.4	60.2	60.4
90	76.6	66.3	83.5	71.9	70.5	68.6
100	85.9	66.3	83.5	82.4	80.7	76.9

performance without strong organizational support, achieving excellence triggers a strict reliance on all three foundational pillars.

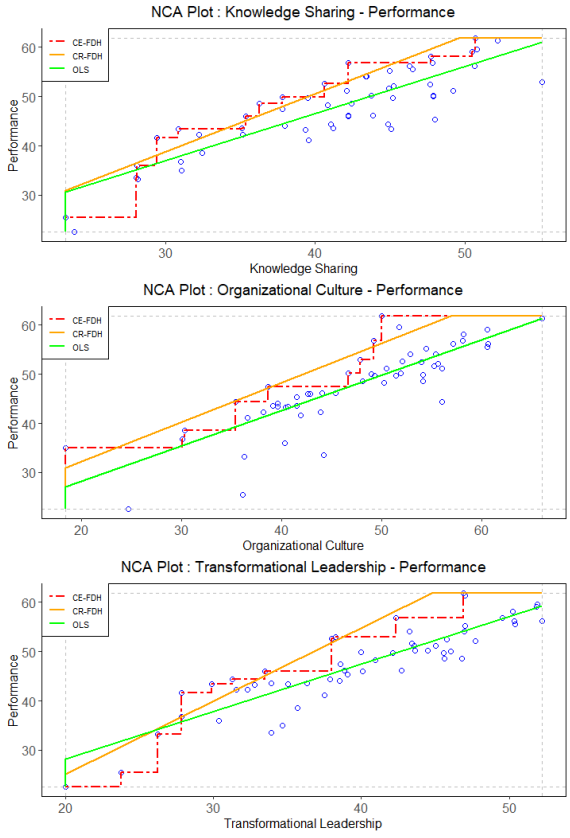


Figure 3. NCA Parameters of Knowledge Sharing, Organizational Culture, Transformational Leadership Performance.

Among the predictors, Transformational Leadership consistently enforces the earliest and most restrictive bottleneck across nearly every performance tier. For instance, mid-level employee performance requires a substantial baseline of leadership capability, and this requirement aggressively scales up as expectations rise. To secure peak performance outcomes (Y 80%), the data indicates that leadership quality must reach an exceptionally high minimum threshold. This specific bottleneck structure warns management that a leadership vacuum will instantly cap workforce capabilities, making visionary guidance the most critical prerequisite in the model.

Simultaneously, Knowledge Sharing and Organizational Culture operate as tight secondary constraints that close the remaining escape routes for poor performance. While middle-tier performance targets demand moderate thresholds from both variables, maximizing Employee Performance to its absolute peak

(100%) leaves no room for deficiencies, forcing all three predictors to achieve near-maximum capacity. Ultimately, this bottleneck profile confirms a strict law of non-compensation: a brilliant corporate culture cannot substitute for a breakdown in knowledge flows, nor can motivated information sharing override a lack of leadership. If any single factor drops below these active percentage thresholds, it will single-handedly stall and limit the ultimate growth of Employee Performance.

The Necessary Condition Analysis (NCA) figure 4 reveals how performance thresholds shift across lower, middle, and upper target levels of Employee Performance (Y), demonstrating a progressive, non-compensatory demand on Transformational Leadership, Knowledge Sharing, and Organizational Culture. At the lower performance threshold, the organization does not activate strict operational demands, as evidenced by the dominance of "Not Necessary" (NN) indicators. This finding demonstrates that employees can achieve baseline or minimal performance by relying on routine capabilities without heavy structural support. However, as the performance target reaches 30%, Transformational Leadership becomes the first essential prerequisite, followed gradually by Knowledge Sharing and Organizational Culture.

Consequently, management does not need to intervene aggressively in the system if the organization aims only for low-level productivity.

As performance targets enter the middle threshold, the NCA model actively introduces dynamic prerequisite conditions. To push Employee Performance to a moderate level (50% - 70%), the organization must simultaneously secure moderate levels across all three predictors. At this stage, Transformational Leadership and Knowledge Sharing become tightly interconnected; any disruption in information flow or leadership quality immediately anchors employee performance below average. Thus, achieving average performance demands a balanced combination of clear leadership direction and workplace transparency.

At the highest performance threshold, the NCA model strictly enforces the law of non-compensation. To lock Employee Performance at peak level (100%), the system tolerates zero deficiencies in any predictor, forcing Transformational Leadership, Knowledge Sharing, and Organizational Culture to reach their upper threshold values (typically >80%). At this pinnacle, Organizational Culture sustains a high-performance environment, while leadership and knowledge exchange serve as the foundational pillars. Ultimately, an organization's failure to meet any single upper threshold will bottleneck employees and prevent them from reaching excellence.

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CONCLUSION

This study confirms that Transformational Leadership, Knowledge Sharing, and Organizational Culture collectively act as primary drivers of Employee Performance in Bandung City's public sector agencies. Through path analysis, the empirical results demonstrate that Transformational Leadership exerts the strongest direct influence, closely followed by Knowledge Sharing and Organizational Culture. Beyond these linear relationships, the integration of Necessary Condition Analysis (NCA) uncovers a vital non-compensatory reality: these three dimensions do not merely influence performance in an additive manner—they function as indispensable baseline prerequisites. The NCA bottleneck analysis proves that an agency cannot offset a deficit in one core driver simply by over-performing in another; failing to satisfy specific minimum threshold values in leadership, culture, or knowledge exchange places an absolute ceiling on achievable employee productivity.

Despite these significant empirical contributions, this study operates under specific limitations that define its operational scope. First, the cross-sectional survey design captures employee perceptions at a single point in time, limiting the ability to observe long-term behavioral dynamics and shift patterns over extended policy implementation cycles. Second, the study evaluates a targeted sample size of 55 public sector staff members within Bandung City government offices. While this sample provides sufficient statistical power to validate the dual-stage framework (path analysis and NCA), caution is warranted when generalizing these specific bottleneck percentage thresholds directly to larger federal Ministries or private-sector corporate environments with vastly different operational scales.

To translate these empirical findings into practical administrative strategies, public sector leaders in Bandung must adopt a dual-focus management model agency leaders should immediately conduct necessity audits to ensure baseline conditions are met across all units. Before launching complex performance initiatives, administrators must verify that knowledge-sharing channels exist, supportive cultural norms are active, and transformational leadership behaviors are present at the required baseline thresholds. Human resource departments should prioritize leadership development programs cantered on vision communication, intellectual stimulation, and individual employee mentorship. The public agencies must build formal peer-learning platforms and structured knowledge repositories, ensuring that critical task knowledge moves freely rather than remaining trapped in organizational silos.

Building on this dual-analytical framework, future scholars can expand this research line in

several promising directions. Researchers should extend the sample size across multiple regional municipalities and federal ministries to cross-validate these exact bottleneck thresholds in broader public-administration settings. Additionally, conducting longitudinal studies would allow researchers to track how necessity thresholds evolve as digital government transformations and automated workflows reconfigure public sector operations. Finally, future studies can incorporate additional contextual variables—such as digital literacy, public service motivation, or psychological safety—into the NCA framework to map an even more comprehensive profile of necessary conditions for high-performing public servants.

CONFLICTS OF INTEREST

The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.

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