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Generation Z and Non-Generation Z Radiographers: Differences in Innovative Work Behaviour and Creative Task Performance

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Abstract

Radiography is increasingly influenced by advances in digital imaging and artificial intelligence, requiring radiographers to demonstrate innovative work behavior (IWB) and creative task performance (CTP). The growing participation of Generation Z in the health care workforce has raised questions about generational differences in workplace innovation, although generational classifications often overlap with age, career stage, and organizational tenure. This secondary analysis investigated differences in strategic work flexibility (SWF), quality of work life (QWL), IWB, and CTP between Generation Z and non-Generation Z radiographers and examined whether the relationship between IWB and CTP varied across cohorts. Data from 197 hospital radiographers in Yogyakarta, Indonesia, were analyzed using Welch's t-tests, false discovery rate (FDR)-adjusted comparisons of dimensions and indicators, heteroskedasticity-consistent (HC3) robust moderation analysis, bootstrapped simple slope estimates, tenure-adjusted regression, and conditional indirect effect analysis. Generation Z radiographers (n = 36) demonstrated significantly lower IWB scores than non-Generation Z radiographers (n = 161), with the most consistent differences observed in Task Flexibility and Idea Sustainability. In contrast, SWF, QWL, and CTP scores were comparable between the two cohorts. Although the association between IWB and CTP was descriptively stronger among Generation Z radiographers, evidence of moderation was marginal under robust statistical inference. Furthermore, the between-cohort difference in IWB was no longer statistically significant after adjustment for organizational tenure. These findings suggest that the observed differences in IWB may be associated with career stage and organizational embeddedness rather than inherent generational characteristics. The results also indicate a potentially stronger association between innovative work behavior and creative task performance among Generation Z radiographers, although this interpretation requires further validation. Health care managers should consider strengthening cross-functional development opportunities, structured mentoring, access to organizational resources, and upward communication channels to support innovation among early-career radiographers.

INTRODUCTION

Radiography is increasingly influenced by advances in digital imaging, artificial intelligence, imaging protocol optimization, radiation dose management, and rapidly evolving clinical workflows (Reviansyach Dewandra & Ariffudin Islam, 2022). In this context, technical

competence alone is insufficient to meet the growing demands of contemporary radiographic practice. Radiographers must also be capable of identifying operational challenges, generating feasible ideas, mobilizing organizational support, implementing improvements, and sustaining these improvements without compromising patient safety. Innovative work behavior (IWB) therefore serves as a behavioral link between individual adaptive capabilities and creative task performance (CTP), as innovative activities contribute to organizational performance when novel ideas are translated into practical and valuable task outcomes (AlEssa & Durugbo, 2022; Darvishmotevali et al., 2024; Hernaus et al., 2023; Kumar et al., 2022).

The dataset analyzed in the present study was derived from a broader investigation examining strategic work flexibility (SWF), quality of work life (QWL), IWB, and CTP among hospital radiographers in the Special Region of Yogyakarta, Indonesia. The previous structural model demonstrated that SWF and QWL were associated with CTP and that IWB partially mediated these relationships (Sulistyo et al., 2026). However, the earlier investigation did not examine differences between age-based cohorts, patterns at the indicator level, the potential explanatory role of organizational tenure, or whether the association between IWB and CTP varied between younger and older radiographers. Accordingly, the present study employed a secondary analytical approach to address distinct research questions and extend the interpretation of the previously reported findings rather than replicate the original structural model.

Generation Z has attracted increasing attention in workforce research as its members enter health care professions during a period of accelerated digital transformation (Barhate & Dirani, 2022). Recent evidence from the health care sector suggests that younger professionals belonging to Generation Z place considerable importance on workplace flexibility, supportive organizational environments, psychological safety, professional recognition, and technology-enabled work processes. However, they may also require further development in teamwork, interpersonal communication, and practical professional competencies (Kanste et al., 2025). Research involving Generation Z employees in Indonesia has similarly indicated that flexible working arrangements may facilitate IWB (Widiaristi & Etikariena, 2024). Other investigations have identified associations between innovative behavior and several individual and organizational factors, including workplace well-being, psychological capital, leadership practices, incentive systems, job involvement, and knowledge sharing (Hernawa & Angraini, 2026; Himawan & Hartono, 2026; Hu et al., 2026; Putri & Ninawati, 2024). These findings suggest that innovative behavior among younger employees may be shaped by the interaction of personal capabilities, workplace conditions, and organizational support rather than generational characteristics alone.

Nevertheless, the use of generational classifications requires careful methodological consideration. A recent meta-analysis identified limited evidence of systematic and practically meaningful differences across generational groups and cautioned that nonsignificant or inconsistent findings are frequently underrepresented in generational research (Ravid et al., 2025). Furthermore, generational classifications often overlap with chronological age, career stage, organizational tenure, and broader historical influences, making it difficult to isolate the effects of generational membership. This concern is particularly relevant in professional health care environments, where the ability to propose, promote, and institutionalize innovative ideas

may depend on accumulated clinical experience, professional networks, procedural knowledge, and perceived legitimacy within organizational hierarchies. Consequently, younger radiographers may possess considerable creative potential and digital competencies while having fewer opportunities, less professional experience, or more limited organizational influence to translate innovative ideas into sustained workplace improvements.

The distinction between innovation activation and innovation conversion provides a useful conceptual framework for examining these differences. Innovation activation refers to the extent to which employees engage in IWB, including identifying opportunities, generating ideas, promoting innovative solutions, implementing improvements, and sustaining successful changes. In contrast, innovation conversion refers to the strength of the association between IWB and CTP, reflecting the extent to which innovative activities correspond to creative task outcomes. These dimensions represent conceptually distinct aspects of workplace innovation. Employees within a particular cohort may demonstrate lower average levels of IWB while exhibiting a stronger association between innovative behavior and creative performance when such behavior occurs. This interpretation is consistent with previous research indicating that job autonomy, organizational support, psychological empowerment, and psychologically safe working environments are associated with IWB in health care and other professional settings (Indrayanti, 2024; Pederson & Slowiak, 2026; Rahimi et al., 2024; Yalap et al., 2025). However, because innovation conversion is assessed through statistical associations, it should not be interpreted as direct evidence of causal performance gains.

Another important consideration concerns the conceptualization of work flexibility. In the present study, SWF was defined as an individual strategic capability rather than an organizational human resource policy involving remote work arrangements or flexible working hours. SWF comprised three dimensions: Task Flexibility, Temporal Flexibility, and Divisional Flexibility. This distinction is particularly relevant when comparing age-based cohorts because younger employees may express preferences for flexible working conditions without necessarily possessing the same breadth of clinical experience, task-related competencies, or cross-functional knowledge as more experienced professionals. Previous research has indicated that workplace flexibility is positively associated with employee engagement among younger workers (Lee et al., 2024), while studies in health care settings have linked flexible working conditions and supportive organizational environments to occupational outcomes (Lee & Chang, 2022). Accordingly, comparisons between Generation Z and non-Generation Z radiographers should consider specific dimensions of work flexibility rather than attributing observed differences solely to generational preferences.

Despite growing research on generational characteristics and workplace innovation, limited evidence has specifically examined how age-based cohort differences relate to innovative behavior and creative task performance among radiographers. Existing studies have primarily emphasized general workforce preferences, organizational support, and the determinants of innovative behavior, with comparatively less attention given to differences across individual innovation dimensions and indicators. Furthermore, the extent to which organizational tenure may account for observed generational differences remains insufficiently explored. Previous research has also provided limited insight into whether the relationship between IWB and CTP differs across cohorts or whether the indirect associations of SWF and

QWL with CTP through IWB vary according to generational membership. Addressing these gaps is important because radiographers operate within highly regulated clinical environments in which innovation must be balanced with procedural standardization, patient safety, and multidisciplinary coordination.

The present study therefore addressed four research questions. First, did Generation Z and non-Generation Z radiographers differ in SWF, QWL, IWB, and CTP at the construct, dimension, and indicator levels? Second, did the association between IWB and CTP differ between Generation Z and non-Generation Z radiographers, particularly in terms of the strength of the relationship? Third, were observed differences in IWB between the cohorts attenuated after accounting for organizational tenure? Fourth, did the indirect pathways linking SWF and QWL to CTP through IWB differ between the two cohorts? These questions were examined through mean comparisons, false discovery rate-adjusted analyses of dimensions and indicators, heteroskedasticity-robust moderation analysis, and regression models accounting for organizational tenure, alongside conditional indirect effect analysis (Hayes, 2022).

The distinctive contribution of this study lies in its integrated examination of generational differences in workplace innovation among hospital radiographers using secondary data from an established structural investigation. Rather than treating generational membership as an independent explanation for innovative capability, the study evaluated whether observed differences were associated with specific dimensions of workplace behavior, the relationship between innovation and creative performance, and organizational tenure. By distinguishing innovation activation from innovation conversion and incorporating sensitivity analyses for tenure-related differences, the study sought to provide a more nuanced understanding of workplace innovation across age-based cohorts. The findings were intended to inform organizational strategies for supporting early-career radiographers through targeted professional development, mentoring, cross-functional learning opportunities, and organizational mechanisms that facilitate the communication and implementation of innovative ideas. More broadly, the study aimed to contribute to evidence-based workforce management in radiography by emphasizing measurable workplace characteristics and organizational conditions rather than relying on generalized assumptions about generational differences.

METHOD

Study Design, Data Provenance, and Participants

This study employed a quantitative, cross-sectional secondary analysis of 197 valid questionnaire responses from radiographers working in general hospitals in the Special Region of Yogyakarta, Indonesia. The target population comprised 716 radiographers across 57 hospitals. Data were collected online in 2025 using Google Forms, with questionnaires distributed through professional radiographer networks. Participants were informed of the study objectives, confidentiality measures, voluntary participation, and consent procedures before completing the survey. No direct personal identifiers were included in the analytical outputs.

The dataset had previously been analyzed using partial least squares structural equation modeling (PLS-SEM) to examine relationships among strategic work flexibility (SWF), quality of work life (QWL), innovative work behavior (IWB), and creative task performance (CTP)

(Sulistyo et al., 2026). The present secondary analysis focused on age-based cohort differences at the construct, dimension, and indicator levels, the potential role of organizational tenure, moderation of the IWB–CTP relationship, and conditional indirect effects. These cohort-specific analyses had not been the primary focus of the previous publication.

Generation Z membership was operationalized using respondents' chronological age because exact birth years were unavailable. Respondents aged 28 years or younger at the time of the 2025 survey were classified as Generation Z, approximating a birth year of 1997 or later. Accordingly, 36 respondents (18.27%) were categorized as Generation Z, while 161 (81.73%) were classified as non-Generation Z. Given the absence of exact birth-year data and variations in generational classification criteria, this categorization was treated as an age-based cohort proxy rather than a definitive measure of generational identity.

Statistical Analysis

Group means were compared using Welch's t test because it does not assume equal group variances. Hedges' g was reported as a standardized mean-difference effect size, and Mann-Whitney tests were used as a distribution-robust sensitivity check at the construct level. Pearson and Spearman associations were examined during diagnostic analysis. The IWB-CTP moderation model used mean-centered IWB, a binary age-based cohort indicator (Generation Z=1), and their interaction term.

Regression diagnostics identified heteroskedasticity in the simple moderation model; therefore, HC3 heteroskedasticity-consistent standard errors were treated as the primary inferential basis. Conventional ordinary least-squares statistics are mentioned only to show why robust inference changed the conclusion. Case-resampling bootstrap analyses with 5,000 replications were used to obtain percentile confidence intervals for the interaction and simple slopes. Additional models adjusted for SWF and QWL, and then for organizational tenure. A continuous-age interaction was estimated as a sensitivity analysis to determine whether the pattern depended on dichotomizing age. Finally, exploratory conditional indirect effects were calculated for SWF->IWB->CTP and QWL->IWB->CTP, with cohort-specific indirect effects and an index of moderated mediation estimated by 5,000 bootstrap replications. Two-sided $p<.05$ was used for primary group comparisons; robust confidence intervals and multiplicity-adjusted results were emphasized when conclusions differed from nominal p values.

RESULTS AND DISCUSSION

Sample Profile and Cohort Operationalization

The Generation Z subgroup was younger by design (M=25.00 years, SD=2.14) than the non-Generation Z subgroup (M=38.83, SD=7.40). More importantly for interpretation, organizational tenure differed substantially: Generation Z radiographers had worked in their institutions for an average of 3.03 years (SD=1.68), whereas non-Generation Z radiographers averaged 12.59 years (SD=7.29). Gender and educational composition did not differ significantly at conventional levels. This tenure imbalance is not a nuisance characteristic; it is a substantive alternative explanation for observed differences in innovation behaviour because tenure represents accumulated exposure to procedures, decision structures, and organizational relationships.

Table 1. Participant characteristics by age-based cohort

Characteristic	Generation Z (n=36)	Non-Generation Z (n=161)
Age, years, M (SD)	25.00 (2.14)	38.83 (7.40)
Organizational tenure, years, M (SD)	3.03 (1.68)	12.59 (7.29)
Male, n (%)	14 (38.9)	91 (56.5)
Female, n (%)	22 (61.1)	70 (43.5)
Diploma III, n (%)	32 (88.9)	124 (77.0)
Diploma IV, n (%)	4 (11.1)	31 (19.3)
Master degree, n (%)	0 (0.0)	6 (3.7)

Construct-Level Differences: Lower IWB but Comparable CTP

At the construct level, Generation Z and non-Generation Z radiographers reported similar SWF, QWL, and CTP. The only statistically significant mean difference was IWB: Generation Z reported a lower composite IWB score (M=5.186, SD=0.715) than non-Generation Z radiographers (M=5.502, SD=0.880), mean difference=-0.316, Welch p=.025, Hedges' g=-0.369. The Mann-Whitney sensitivity test yielded the same substantive conclusion (p=.023). By contrast, the CTP difference was very small (g=-0.083, p=.666). This combination is the first central finding: the younger cohort showed lower observed innovation activation without evidence of lower creative task performance.

Table 2. Construct-level comparison between Generation Z and non-Generation Z radiographers

Construct	Gen Z M (SD)	Non-Gen Z M (SD)	Mean diff.	Welch p	MW p	Hedges g
SWF	4.963 (0.807)	5.013 (0.882)	-0.050	.740	.526	-0.058
QWL	5.925 (0.769)	6.123 (0.653)	-0.199	.157	.104	-0.293
IWB	5.186 (0.715)	5.502 (0.880)	-0.316	.025	.023	-0.369
CTP	5.844 (0.741)	5.903 (0.694)	-0.059	.666	.715	-0.083

Note. SWF=Strategic Work Flexibility; QWL=Quality of Work Life; IWB=Innovative Work Behaviour; CTP=Creative Task Performance; MW=Mann-Whitney sensitivity test.

This pattern argues against a simple deficit interpretation. If younger radiographers were generally less capable of creative task accomplishment, a corresponding CTP gap would be expected. Instead, the data locate the difference in the behavioural innovation process. This distinction aligns with the broader IWB literature, which conceptualizes IWB as a multistage process involving opportunity recognition, idea generation, championing, implementation, and sustained use rather than a unitary creativity trait (AlEssa & Durugbo, 2022). It also aligns with evidence that innovative behaviour and task performance are related but not interchangeable outcomes (Hernaus et al., 2023; Kumar et al., 2022).

Dimension-Level Pattern: Task Flexibility and Idea Sustainability

Dimension-level analysis showed that the mean-level IWB difference was not uniformly distributed across the innovation process. Two dimensions remained statistically different after FDR correction across 13 dimensions: Task Flexibility and Idea Sustainability. Generation Z radiographers reported lower Task Flexibility (M=5.319 vs 5.773; p=.004; g=-0.537; FDR-adjusted p=.038) and lower Idea Sustainability (M=4.986 vs 5.432; p=.006; g=-0.419; FDR-adjusted p=.038). Temporal Flexibility was descriptively higher among Generation Z, while Divisional Flexibility was virtually identical. Within IWB, the generational gap was relatively small at Opportunity Exploration and became larger at Idea Generation, Idea Promotion, and Idea Sustainability.

Table 3. Dimension-level comparison

Construct	Dimension	Gen Z	Non-Gen Z	Diff.	p	g	FDR p
SWF	Task Flexibility	5.319	5.773	-0.454	.004	-.537	.038
SWF	Temporal Flexibility	4.528	4.233	0.295	.232	.201	.340
SWF	Divisional Flexibility	5.042	5.034	0.008	.969	.006	.969
QWL	Safe & Conducive Work Environment	5.958	6.115	-0.157	.325	-.183	.423
QWL	Active Participation	5.764	6.040	-0.276	.077	-.347	.200
QWL	Professional Behaviour	6.009	6.184	-0.175	.235	-.252	.340
IWB	Opportunity Exploration	5.792	5.966	-0.174	.227	-.243	.340
IWB	Idea Generation	5.389	5.696	-0.307	.039	-.356	.169
IWB	Idea Promotion	4.806	5.168	-0.362	.052	-.329	.169
IWB	Idea Realization	4.958	5.248	-0.290	.130	-.239	.282
IWB	Idea Sustainability	4.986	5.432	-0.446	.006	-.419	.038
CTP	Novelty	5.759	5.818	-0.059	.669	-.081	.749
CTP	Utility	5.972	6.031	-0.059	.691	-.077	.749

Note. FDR p values are Benjamini-Hochberg adjusted across the 13 dimension-level comparisons. Bold formatting is not used to avoid overemphasizing nominal results; Task Flexibility and Idea Sustainability were the two dimensions that remained below .05 after adjustment.

The SWF result is theoretically important because it differentiates strategic adaptive capacity from a preference for flexible working arrangements. Generation Z did not report lower Temporal Flexibility. The main difference was Task Flexibility, particularly the ability to move between different work demands. In radiology, this capability can require exposure to multiple modalities, patient conditions, workflow contingencies, and technical protocols. Accumulated professional experience may therefore be more relevant than generational preference. Research on young workers indicates that flexibility can support engagement and innovation (Lee et al., 2024; Widiaristi & Etikariena, 2024), but the present result shows why flexibility should not be treated as a single construct.

The downstream IWB pattern is equally informative. Opportunity Exploration was relatively preserved, whereas Idea Sustainability showed the clearest adjusted difference. This suggests that younger radiographers can recognize opportunities and discuss problems, but may face greater difficulty sustaining innovations once those ideas require organizational endorsement, resources, procedures, and continued support. Such a pattern is compatible with healthcare evidence that a supportive climate, safety perceptions, autonomy, and psychological resources facilitate innovative behaviour (Pederson & Slowiak, 2026; Yalap et al., 2025) and with broader evidence that organizational support is important for translating individual creativity into IWB (Volery & Tarabashkina, 2021).

Indicator-Level Diagnostic Pattern

Indicator-level results were examined to identify where the dimension-level differences originated. Because 28 simultaneous item tests create a high multiplicity burden, these findings are interpreted diagnostically. Three items were nominally significant before global item-level FDR correction: TaF1, IP2, and IS1. No single indicator remained below .05 after FDR correction across all 28 items, so isolated item p values should not be interpreted as independent confirmatory findings. The pattern, however, was coherent with the dimension-level results: the largest negative differences involved switching across tasks, requesting resources for ideas, and communicating innovations upward in the organization.

Table 4. Indicator-level descriptive and inferential comparison

Construct	Code	Indicator (abridged)	Gen Z	Non-Z	Diff.	p	g	FDR p
SWF	TaF1	Switching between different tasks	4.722	5.360	-0.638	.005	-.485	.075
SWF	TaF2	Developing multiple skills for adaptation	5.917	6.186	-0.270	.165	-.307	.331
SWF	TeF1	Ability to change working hours	4.278	3.839	0.439	.141	.239	.331
SWF	TeF2	Flexible scheduling options	4.778	4.627	0.150	.643	.090	.721
SWF	DF1	Core/support workforce allocation	4.861	4.795	0.066	.814	.040	.814
SWF	DF2	Flexible human-resource allocation	5.222	5.273	-0.051	.805	-.038	.814
QWL	SC1	Safe and comfortable work environment	5.944	6.124	-0.180	.342	-.174	.543
QWL	SC2	Skill and knowledge development	5.972	6.106	-0.133	.433	-.142	.635
QWL	AP1	Empowerment of ideas at work	5.583	5.913	-0.330	.072	-.370	.319
QWL	AP2	Future-oriented thinking capacity	5.944	6.168	-0.223	.149	-.270	.331
QWL	PB1	Quality of work process	5.944	6.143	-0.198	.208	-.252	.389

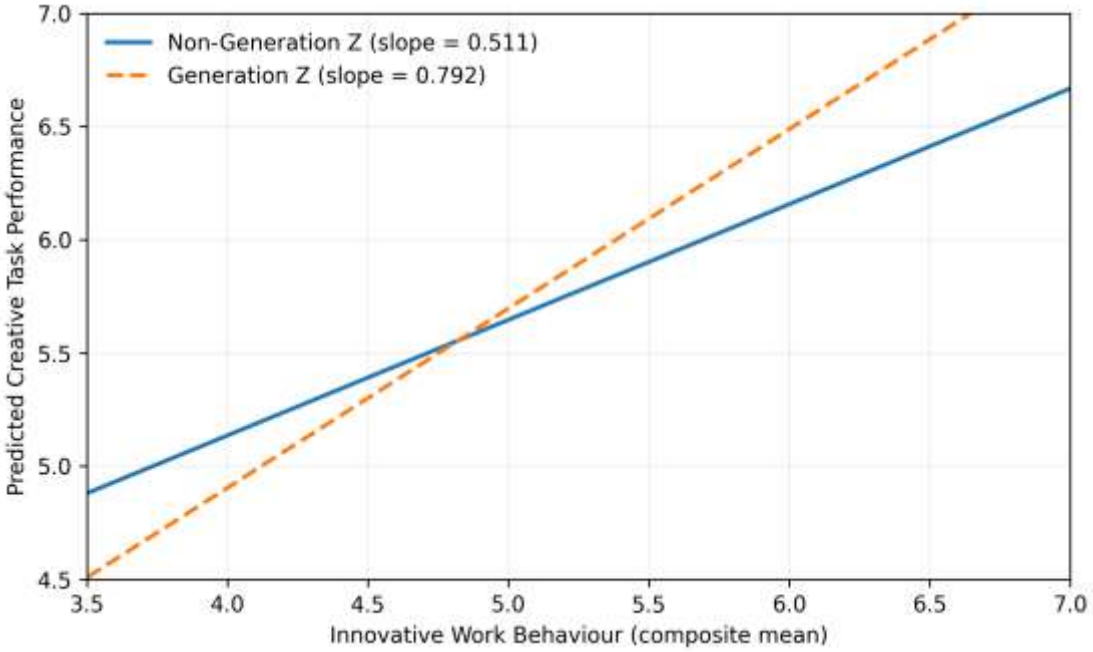
Construct	Code	Indicator (abridged)	Gen Z	Non-Z	Diff.	p	g	FDR p
QWL	PB2	Quality of work results	6.028	6.261	-0.233	.158	-.301	.331
QWL	PB3	Use of digital facilities	6.056	6.149	-0.094	.560	-.105	.721
IWB	OE1	Exploring opportunities for innovation	5.528	5.752	-0.224	.131	-.262	.331
IWB	OE2	Exchanging ideas about developments/problems	6.056	6.180	-0.125	.453	-.160	.635
IWB	IG1	Generating new and useful ideas	5.417	5.683	-0.267	.080	-.281	.319
IWB	IG2	Proposing improvements to ideas	5.361	5.708	-0.347	.071	-.375	.319
IWB	IP1	Seeking colleague/supervisor support	5.111	5.404	-0.293	.145	-.263	.331
IWB	IP2	Requesting budget/facilities for ideas	4.500	4.932	-0.432	.041	-.320	.319
IWB	IR1	Developing procedures for new ideas	4.750	5.149	-0.399	.065	-.289	.319
IWB	IR2	Implementing new ideas	5.167	5.348	-0.181	.349	-.154	.543
IWB	IS1	Communicating ideas to higher structures	4.667	5.267	-0.600	.002	-.466	.070
IWB	IS2	Developing self for idea continuity	5.306	5.596	-0.291	.093	-.280	.325
CTP	N1	Creative solutions to work problems	5.361	5.547	-0.185	.280	-.208	.490
CTP	N2	Efficient task completion	6.028	5.944	0.084	.591	.102	.721
CTP	N3	Completion according to plan	5.889	5.963	-0.074	.637	-.092	.721
CTP	U1	Relevant and useful work outcomes	6.000	6.037	-0.037	.800	-.046	.814
CTP	U2	Completion according to priorities	5.944	6.025	-0.080	.635	-.092	.721

Note. Indicator labels are abridged for table readability. FDR p values are adjusted across all 28 observed indicators; none remained below .05 after this global correction. Indicator analysis is therefore exploratory and should be read together with the construct- and dimension-level findings.

Innovation Conversion: A Steeper IWB-CTP Slope in Generation Z, with Robustness Caveats

The initial ordinary least-squares interaction model explained 45.3% of CTP variance (R2=.453). Under conventional standard errors, the IWB x Generation Z interaction was positive (b=.281, p=.035), which would conventionally be classified as statistically significant. However, the Breusch-Pagan diagnostic indicated marked heteroskedasticity. Primary

inference was therefore based on HC3 robust standard errors and bootstrap intervals. With HC3 inference, the interaction retained the same positive coefficient but became borderline (b=.281, SE=.152, p=.065, 95% CI [-.017, .580]); the 5,000-replication bootstrap percentile interval likewise included zero (95% CI [-.022, .555]).



Note. Lines show predictions from the unadjusted composite-score interaction model. The Generation Z slope was 0.792 and the non-Generation Z slope was 0.511. The between-slope interaction was positive but borderline under HC3 robust inference (p=.065).

Figure 1. Simple slopes of innovative work behaviour and creative task performance by age-based cohort

Simple slopes remained clearly positive in both cohorts. Among non-Generation Z radiographers, the IWB-CTP slope was b=.511 (HC3 95% CI [.380, .641]); among Generation Z radiographers it was b=.792 (HC3 95% CI [.524, 1.060]). Thus, the observed slope was approximately 55% steeper in the Generation Z subgroup. The data therefore support a descriptive pattern of stronger innovation conversion among younger radiographers, but robust uncertainty does not support a definitive claim that cohort membership statistically moderates the IWB-CTP relationship at the .05 threshold. This distinction is essential for avoiding overstatement.

Table 5. Robust moderation and simple-slope analysis of the IWB-CTP relationship by generational cohort

Analysis	Effect / group	b	Robust SE	p value	95% CI	R2
Primary HC3 moderation model	IWB	0.511	0.067	<.001	.380 to .641	-

Analysis	Effect / group	b	Robust SE	p value	95% CI	R2
Primary HC3 moderation model	Generation Z	0.175	0.087	.043	.005 to .345	-
Primary HC3 moderation model	IWB x Generation Z	0.281	0.152	.065	-.017 to .580	-
Overall moderation model	Model fit	-	-	<.001	-	0.453
Simple-slope model	Non-Generation Z	0.511	0.067	<.001	.380 to .641	0.419
Simple-slope model	Generation Z	0.792	0.137	<.001	.524 to 1.060	0.584

Note. IWB = Innovative Work Behaviour; CTP = Creative Task Performance; HC3 = heteroskedasticity-consistent standard errors; CI = confidence interval; R2 = coefficient of determination. IWB was mean-centered before the interaction term was constructed. R2 is reported only for the overall moderation model and the separate simple-slope models because it is a model-level statistic, not an effect-specific statistic. A dash (-) indicates that the statistic is not applicable to the corresponding row. The 5,000-replication bootstrap 95% CI for the IWB x Generation Z interaction was -.022 to .555.

Table 5 shows that Innovative Work Behaviour was positively associated with Creative Task Performance in the HC3-robust moderation model (b = .511, robust SE = .067, p < .001, 95% CI [.380, .641]). The overall model explained 45.3% of the variance in CTP (R2 = .453). Because R2 describes the explanatory power of the regression model as a whole, it is not reported for individual coefficients such as IWB, Generation Z, or the interaction term.The IWB x Generation Z interaction was positive (b = .281), indicating a steeper IWB-CTP relationship among Generation Z radiographers. However, under HC3 robust inference the interaction did not reach the conventional 5% significance threshold (p = .065, 95% CI [-.017, .580]). The bootstrap analysis led to the same cautious conclusion because the 95% CI [-.022, .555] included zero. Although the conventional OLS specification produced a statistically significant interaction (p = .035), the robust results indicate that the evidence for a population-level generational moderation effect is suggestive rather than conclusive.

The simple-slope analysis nevertheless revealed a substantively meaningful pattern. Among non-Generation Z radiographers, the estimated IWB-CTP slope was .511 (p < .001, 95% CI [.380, .641]) and the group-specific model explained 41.9% of CTP variance (R2 = .419). Among Generation Z radiographers, the corresponding slope was .792 (p < .001, 95% CI [.524, 1.060]) with R2 = .584. Thus, IWB was more strongly associated with CTP within the Generation Z subgroup, even though the difference between slopes was not robustly significant. This pattern supports a cautious interpretation of potentially stronger innovation conversion among Generation Z rather than a definitive generational moderation effect.

The positive Generation Z coefficient (b = .175, p = .043) should not be interpreted as an unconditional mean difference in CTP. Because IWB was mean-centered, this coefficient represents the expected difference between Generation Z and non-Generation Z radiographers

when IWB is at the sample mean. Accordingly, the cohort coefficient, interaction coefficient, and simple slopes should be interpreted jointly rather than as independent evidence of a general Generation Z performance advantage.

Why is IWB Lower in Generation Z? Organizational Tenure as a Career-Stage Explanation

Organizational tenure provided the strongest explanation for the apparently paradoxical combination of lower IWB and comparable CTP. Generation Z radiographers had approximately 9.6 fewer years of organizational tenure on average. Tenure was positively correlated with IWB (Spearman rho=.235, p=.001). In a robust regression containing only cohort status, Generation Z was associated with lower IWB (b=-.316, p=.024). After organizational tenure was added, the Generation Z coefficient attenuated to b=-.107 and became non-significant (p=.531), whereas tenure remained positively associated with IWB (b=.022 per year, p=.025).

This attenuation suggests that the lower IWB mean should not be interpreted as an intrinsic generational deficit. The indicator pattern identifies a more plausible mechanism. The largest gaps occurred in activities that require organizational embeddedness: switching across task demands, seeking resources, contributing to procedures, and communicating ideas upward. These behaviours depend on knowing whom to approach, understanding formal and informal decision channels, possessing credibility based on clinical experience, and having sufficient role latitude to champion change. Such resources accumulate with career stage and tenure. In contrast, opportunity exploration and digital-facility use were relatively similar across groups.

The finding also clarifies why IWB can be lower while the within-group IWB-CTP slope is steeper. Mean IWB captures how often innovative behaviour is activated. The slope captures the task-performance payoff once such behaviour varies. A younger radiographer may initiate or sustain fewer organizational innovations because of limited authority and networks, yet when innovative behaviour is activated and supported, the resulting task benefit can be substantial. This is best described as lower innovation activation with potentially high innovation conversion efficiency, rather than as lower creativity. Generation Z healthcare evidence emphasizing technology orientation, flexibility, recognition, and supportive environments provides a plausible contextual basis for this interpretation (Kanste et al., 2025; Shorey et al., 2021), although the present cross-sectional data cannot directly test those psychological mechanisms.

Conditional Indirect Effects of SWF and QWL through IWB

Exploratory moderated-mediation analysis examined whether the previously established SWF/QWL-to-IWB-to-CTP process differed by cohort. In the mediator model, SWF (b=.144, p=.022) and QWL (b=.728, p<.001) positively predicted IWB. Cohort-specific bootstrap indirect effects were positive for both pathways in both groups. The SWF indirect effect was .042 in non-Generation Z and .065 in Generation Z; the QWL indirect effect was .202 and .319, respectively. However, the bootstrap indices of moderated mediation included zero for both SWF and QWL. Therefore, there is no robust evidence that the indirect effects differ between cohorts, despite larger point estimates among Generation Z.

Table 6. Bootstrap conditional indirect effects

Indirect pathway	Cohort	Indirect effect	Bootstrap 95% CI	Index of moderated mediation	Index 95% CI
SWF -> IWB -> CTP	Non-Generation Z	.0416	.0068 to .0932		
SWF -> IWB -> CTP	Generation Z	.0647	.0122 to .1346	.0231	-.0034 to .0625
QWL -> IWB -> CTP	Non-Generation Z	.2019	.0984 to .3064		
QWL -> IWB -> CTP	Generation Z	.3195	.1932 to .4639	.1175	-.0172 to .2579

Note. 5,000 case-resampling bootstrap replications. Conditional indirect effects were positive in both cohorts, but both indices of moderated mediation included zero.

The absence of robust moderated mediation is substantively useful. It suggests that SWF and QWL remain relevant upstream conditions for IWB across age groups rather than operating through fundamentally different mechanisms for Generation Z. This is consistent with studies showing that flexible work arrangements, psychological empowerment, autonomy, work-life conditions, and organizational climate can support innovation across contemporary workforces (Indrayanti, 2024; Pederson & Slowiak, 2026; Rahimi et al., 2024). For radiology management, cohort-specific interventions should therefore complement, not replace, organization-wide efforts to improve work quality and strategic flexibility.

Theoretical Implications

The study offers three theoretical contributions. First, it separates innovation activation from innovation conversion. Generational research often asks whether younger employees are 'more innovative' or 'less innovative,' but that formulation conflates the average frequency of IWB with the performance value produced when IWB occurs. The present findings show why these should be analysed separately: Generation Z had lower average IWB but comparable CTP, and a descriptively steeper IWB-CTP slope.

Second, the results locate the strongest cohort differences at organizationally embedded stages of innovation rather than at initial opportunity recognition. Idea Sustainability and Task Flexibility, not general digital facility use or CTP, showed the most durable adjusted differences. This points toward experience-dependent organizational capital as a boundary condition for innovation. Third, the attenuation of the cohort coefficient after tenure adjustment adds empirical support to methodological critiques of generational explanations. In professional work, age-based cohort labels can act as proxies for career stage, experience, authority, and organizational socialization. Theoretical models should therefore specify those mechanisms rather than attributing behaviour directly to generational identity.

Practical Implications for Radiology Management

The managerial implication is not to demand that younger radiographers simply 'be more innovative.' The data identify specific organizational frictions that can be addressed. Radiology departments can accelerate Task Flexibility through structured cross-modality exposure,

competency rotation, supervised assignment to varied examinations, and deliberate development of multi-skill capability. Such practices can broaden the repertoire required to respond to changing clinical demands without reducing safety standards.

The IWB results suggest a second intervention point: reduce the organizational threshold for promoting and sustaining ideas. Departments can establish formal innovation huddles, small improvement grants, rapid-access channels to supervisors, transparent criteria for evaluating suggestions, and mentoring arrangements in which senior radiographers sponsor or co-champion younger colleagues' ideas. These mechanisms directly target the observed gaps in resource requests, procedural involvement, upward communication, and idea sustainability.

Intergenerational teams may be especially useful because the cohorts appear to possess potentially complementary resources. Experienced radiographers contribute procedural knowledge, clinical pattern recognition, organizational legitimacy, and internal networks; younger radiographers may contribute digital familiarity, rapid adaptation to new tools, and strong task returns when innovation is activated. This complementarity is more consistent with the data than a competition narrative in which one generation is presumed superior. Managers should also improve QWL and psychological safety for all staff, because supportive environments are repeatedly associated with innovative behaviour in healthcare and other professional settings (Diana et al., 2022; Pederson & Slowiak, 2026; Yalap et al., 2025).

Limitations and Robustness Boundaries

Several limitations constrain interpretation. First, the Generation Z subgroup was modest (n=36) and substantially smaller than the comparison group, which reduces precision for interaction estimates. Second, age rather than exact birth year was available; the <=28-year rule is an operational proxy that may misclassify respondents near a birth-year boundary. Third, generation, age, period, and career stage cannot be causally separated in a cross-sectional design. The tenure attenuation result strengthens a career-stage explanation but does not prove mediation by tenure.

Fourth, all main variables were self-reported in the same survey, creating possible common-method and social-desirability effects. Fifth, the current analysis used observed composite means rather than a new latent-variable interaction model. This was intentional because the purpose was transparent secondary comparison of respondent-level scores, but it differs from the PLS-SEM framework used in the prior structural publication. Sixth, SWF is multidimensional and showed weaker internal consistency in this raw-score secondary analysis than QWL, IWB, and CTP; consequently, SWF item-level results should be interpreted primarily as diagnostic patterns. Finally, the robust interaction and bootstrap interval did not provide definitive evidence of cohort moderation. The stronger Generation Z simple slope should therefore be replicated in a larger sample with more balanced age groups, exact birth years, objective or supervisor-rated performance outcomes, and longitudinal measures of career development.

CONCLUSION

This secondary analysis revealed a nuanced pattern of age-based differences in workplace innovation among hospital radiographers. Generation Z radiographers demonstrated no substantial differences in overall strategic work flexibility (SWF), quality of work life

(QWL), or creative task performance (CTP) compared with non-Generation Z radiographers. However, they reported significantly lower levels of innovative work behavior (IWB), with the most consistent differences observed in Task Flexibility and Idea Sustainability. These findings suggested that younger radiographers may face greater challenges in adapting across diverse tasks and sustaining innovative ideas within organizational settings rather than possessing inherently lower creative task capabilities. Although the association between IWB and CTP was descriptively stronger among Generation Z radiographers, the interaction effect showed only marginal statistical evidence under heteroskedasticity-robust inference, precluding definitive conclusions regarding generational moderation. Notably, the difference in IWB between cohorts was no longer statistically significant after adjustment for organizational tenure, suggesting that career stage and organizational experience may partially account for the observed variation. Accordingly, radiology managers should consider strengthening cross-functional professional development, structured mentoring, access to organizational resources, upward communication channels, and institutional mechanisms that support the implementation and sustainability of innovative ideas among early-career radiographers. Overall, these findings indicated that lower observed IWB among Generation Z radiographers should not be interpreted as evidence of an inherent generational deficiency in innovative capability. Instead, the results suggested that organizational tenure, professional experience, and workplace conditions may play important roles in facilitating the expression and sustained application of innovative behavior.

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CONFLICT OF INTEREST

The author declares no commercial or financial relationships that could be construed as a potential conflict of interest.

GENERATIVE ARTIFICIAL INTELLIGENCE USAGE STATEMENT

Generative artificial intelligence was used to assist language editing, manuscript structuring, and code drafting for the secondary statistical analysis. All statistical outputs were checked against the source dataset, and all interpretations, citations, and final manuscript content were reviewed by the author. Generative AI was not used to fabricate data, participants, results, or references. The author assumes full responsibility for the content of the manuscript.

DATA AVAILABILITY STATEMENT

The respondent-level data contain potentially identifying information and are therefore not publicly deposited. A de-identified version may be made available by the corresponding author upon reasonable request and subject to confidentiality and institutional requirements.

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