



Navigating the virtual frontier: A study on telecommuting

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Orientation: The coronavirus disease 2019 (COVID-19) pandemic accelerated the adoption of telecommuting (TC), but its effect on the relationship between employee engagement (EE), its dimensions and employee performance (EP) remains unclear.

Research purpose: This study aims to examine the mediating role of TC on the relationship between EE, its dimensions (physical, cognitive and emotional) and EP in virtual work settings.

Motivation for the study: As traditional office-based work dynamics undergo transformation, organisations need to understand the impact of TC on employee outcomes.

Research approach/design and method: This is a quantitative study executed with a positivism philosophy. An online survey using a mix of non-probability sampling techniques yielded 478 complete responses from information and communications technology (ICT) sector employees in South Africa. A range of descriptive and statistical analysis tools, including structural equation modelling, were subsequently employed to interrogate the data and distil empirical findings.

Main findings: The study established that TC does not mediate the relationship between EE and EP. A similar finding was made with respect to TC's interference with the relationship between EE dimensions and EP.

Practical/managerial implications: The technical nature of ICT work may require collaboration and hands-on interaction not easily facilitated through remote arrangements, potentially diluting the anticipated positive effects of TC on EE, its dimensions and performance. The limitations of virtual work environments in conveying emotional expressions and maintaining emotional bonds remotely may also contribute to the diminished mediating role of TC.

Contribution/value-add: This article addresses the research gap arising from limited existing empirical studies on the mediating role of TC on employee outcomes. In addition, relying on empirical evidence, the study enriches the body of knowledge by contending that TC does not play any mediating role in the context of the links between EE with EP.

Keywords: COVID-19 pandemic; employee engagement; employee performance; ICT sector; telecommuting; virtual frontier.

Introduction

Background of the study

In the ever-evolving landscape of the modern workplace, the concept of telecommuting (TC) has gained a lot of prominence (Bello et al., 2024), lately. Telecommuting, also known as working from home, working remotely or telework, is a method of conducting work away from the employer's premises on a regular basis using technology (Walentek, 2020). Telecommuting has been steadily growing globally across many sectors with employees having to work in places different from the traditional workplace (Contreras et al., 2020). The recent growth of technology for information and communication has changed how people work and broadened the traditional idea of TC, which used to be limited to specific jobs, temporary situations or unique employees' circumstances (Domínguez-Amorocho et al., 2023).

This new workplace, unrestrained by geography, time and organisational boundaries, offers flexibility and collaboration to employees (Osiyevskyy et al., 2022). In addition, the flexible working arrangement includes any place other than the traditional office where formal work can happen (Fayomi & Sani, 2022). It is worth observing that post the coronavirus disease 2019 (COVID-19) pandemic, organisations that adopted TC and transformation in the workplace managed to survive, unlike those that did not and had to cease their operations (Reidhead, 2022).

One crucial aspect of this transformation is the potential influence of TC on the relationship between employee engagement (EE), its dimensions and employee performance (EP), which this study seeks to investigate.

Employee engagement has long been recognised, in traditional work environments, as a critical factor in organisational success, with previous research linking it to improved productivity, customer satisfaction and financial performance (Byrne, 2022; Shettigar & Shiva Shankar, 2021). The multidimensional nature of EE, encompassing physical, cognitive and emotional dimensions, suggests that the various facets may have differential impacts on employee outcomes (Davis & Van Der Heijden, 2023; Yagil & Oren, 2021).

Employee performance, commonly defined as the behaviour exhibited by an employee while performing a particular task assigned by the employer, is related to the deliverables in an organisation (Kalogiannidis, 2020). In essence, EP entails an individual's behaviour in a particular situation, in order to achieve the desired results (Khtatbeh et al., 2020). Consequently, EP can either have positive or negative outcomes (Sitopu, Sitinjak & Marpaung, 2021). Whatever the case may be, clearly, EP reflects a quality organisation (Sugiarti et al., 2021), and as a result, an organisation can be considered effective if EP meets the company's targets (Fidyah & Setiawati, 2020).

In the contemporary workplace, organisations have become more considerate of TC, as they strive to enhance productivity, reduce office space and improve the quality of work (Coelho et al., 2020). This possibly stems from a conviction that TC gives employees the autonomy to decide on how to work, while collaterally boosting the creative and innovative activities of employees (Sarbu, 2022). This is important because in a traditional office setting, work and personal life can be segregated, but in the virtual work environment, the spatial and temporal differences seem to disappear, sometimes leading to overworking and after hours work for many employees (Ganguly et al., 2022).

In contrast to traditional office models, recourse to TC however means a reduction in face-to-face communication with colleagues, and consequently, when problems arise at work, they may be difficult to solve (Chen, 2021) as employees are isolated. In addition, working virtually may be attended by technological challenges, heavy workloads and diminished relationships with colleagues, which may cause substantial stress for employees (Graves & Karabayeva, 2020).

In the specific case of South Africa, these challenges are exacerbated by electricity outages (loadshedding) that adversely affect employee productivity and morale (Steenkamp et al., 2016). Given that for employees to TC, they need a stable Internet connection and power, loadshedding makes working virtually less viable (Sucheran & Olanrewaju, 2021).

Research purpose and objectives

Considering the growing prevalence of TC, this study sets out to investigate the potential mediating role that TC could have on the relationships that the independent variables of EE and its sub-dimensions of physical engagement (PhyEng), cognitive engagement (CogEng) and emotional engagement (EmoEng) may have with the dependent variable of EP.

Theoretical framework

The theoretical framework of this study and hypotheses development leverage seminal thoughts espoused by two theories, namely, the EE theory and the social exchange theory (SET). On account of the EE theory, employees express and dedicate themselves physically, cognitively and emotionally to the company where they work (Akob et al., 2020). In the light of this, the EE theory as conceptualised by Kahn (1990) will be used as the theoretical lens for EE. As the theoretical foundation relates to EP, organisations have found substantial benefits in EE for performance and profit (Ferguson & Carstairs, 2007). According to Kahn (1990), EE is the simultaneous employment and appearance of an individual's preference in work behaviours, which promote relations to task and to others, individual presence and performance. The study leans on the SET theory as a veritable prism to understand TC and how it might influence employee outcomes. According to Wang et al. (2022), the SET explains social and psychological processes that underlie employees' job-related behaviour and outcomes. This position is echoed by Chi et al. (2023) who assert that the SET is useful in understanding EP in the context of developing countries.

Literature review

The effect of telecommuting on the relationship between employee engagement and employee performance

With the fast-changing world of work, managers must ensure that their employees are engaged and empowered to perform (Darvishmotevali & Altinay, 2022) in a virtual frontier (VF) where TC has become quite popular. This is despite the contention of Contreras et al. (2020) that TC remains a subject of debate owing to its ability to blur the lines between work and non-work spheres, as well as the benefits and drawbacks that characterise flexible work schedules. Notably, TC employees exhibiting disengagement manifest deficiencies in customer service, display a dearth of commitment and deliver subpar performance (Bin & Shmailan, 2015). As work has undergone significant changes, it has become a common phenomenon for organisations to have frequent virtual meetings and conferences, especially in developed nations (Chidambaram et al., 2024). These changes may affect the employees, for example, difficulty concentrating on work or lack of energy to devote to work, ultimately leading to lower work engagement (Ma et al., 2023). As a result, TC has therefore been linked with lower work engagement (Wang et al., 2023). Nonetheless, when employees, including telecommuters, feel engaged, they are motivated to participate actively in their tasks (Rubianto & Kembaren, 2023).

However, it is also plausible as observed by Chaudhary et al. (2022) as well as Butoi and Ștefănuț (2022) that TC does not influence the relationship between EE and EP. In harmony with this view, Park and Jae (2022) observe that the impact of work factors on job performance is not mediated by TC. Contrastingly, a study by Kapoor et al. (2021) reports that TC partially mediates the association between perceived stress and psychological well-being. Furthermore, in a study conducted on 405 employees who work in a technology services company in the United States, Golden and Eddleston (2020) report that TC can be considered as a contextual factor that may interact with EE. These assertions emphasise a lack of consensus in extant literature as it pertains to the exact nature of the role of TC in the relationships between work factors and work outcomes.

This notwithstanding, TC can enhance or diminish the effects of other variables, depending on the context and the outcome of interest (Shabanpour et al., 2018). Arguably, this may, partially, be the reason why some scholars have touted TC as a mediating variable (Schall, 2019). In their study, Lopes et al. (2023) conclude that involuntariness in telework (sometimes used interchangeably with TC) contributed to a decrease in work engagement and an increase in workers' exhaustion, thereby confirming a possible mediating role of TC. According to Allen et al. (2015), TC may increase individual employees' productivity but hamper the development and maintenance of quality co-worker relationships. Curiously, the study undertaken by Vander Elst et al. (2017) among 878 employees from an international telecommunication company in Belgium found no interfering role of TC in the relationship between emotional exhaustion and cognitive stress complaints.

This notwithstanding, Moffa (2023) notes that TC can influence how leadership style affects employee satisfaction. On this score, the contention seems to be as hinted by Wojcak et al. (2016) that different types of leadership may be more-or-less effective for telecommuters than for office workers. Telecommuting is also likely to interfere with the association between work-related attitudes and behaviours, such as job satisfaction and organisational commitment (Dahlstrom, 2013). Furthermore, according to Nicklin et al. (2016), TC affects how organisational outcomes such as commitment, turnover and performance relate to each other. Moreover, Elldér's (2017) study that relied on data obtained from the Swedish National Travel Survey collected from 7392 respondents concluded that TC weakens the association between urban structure and travel patterns.

The findings in extant literature as it concerns the possible intervening role that TC plays in the relationships between different factors and outcomes in the workplace are clearly mixed. While this provides a compelling basis to anticipate that TC might act as an intermediary in the relationship between EE and EP, as well as EE dimensions (PhyEng, CogEng, EmoEng), and EP, the exact nature of the interference remains unknown. Accordingly, this study aims to contribute towards the comprehension of the intricate interplay between

these constructs, in the presence of TC, within the context of the ICT sector in South Africa. Duly cognisant of the different positions advanced by scholars with respect to the possible intervening role of TC in work-related relationships, the study is swayed to hypothesise that in the VF:

H1: TC mediates the relationship between EE and EP

H2: TC mediates the relationship between PhyEng and EP

H3: TC mediates the relationship between CogEng and EP

H4: TC mediates the relationship between EmoEng and EP

These hypotheses that have been formulated for this study are illustrated in a conceptual framework as shown in Figure 1.

Research design

Research approach

The study adopted a quantitative research approach to examine the mediating effect of TC on the relationship between EE and EP, as well as the relationship between EE dimensions (PhyEng, CogEng and EmoEng) and EP. This study was underpinned by a positivist philosophy, which emphasises the objective and observable aspects of reality. Adhering to a deductive reasoning approach, the hypotheses were formulated based on the existing theoretical principles with the objective of testing the hypotheses, through the collection and analysis of empirical evidence. Specifically, a survey strategy was employed within the framework of a cross-sectional time horizon. This allowed this study to gather quantitative information at a single point in time from a sample of employees working in the South African ICT sector.

Research participants

According to ICASA (2023), there are approximately 52 000 employees in the South African ICT sector. The study targeted employees from both private and public organisations in the South African ICT sector including telecommunications, software, Internet service providers, consulting, hardware and electronics. However, given that there is no known compendium of all these employees, the study had to rely on the use of non-probability techniques to create a sample. A combination of snowball sampling, purposive sampling and self-selection techniques were employed to realise the sample of 478 employees working in the South African ICT sector who participated in this cross-sectional study.

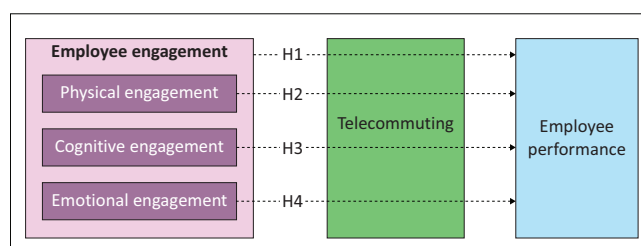


FIGURE 1: Conceptual framework of the study.

The demographics of interest to this study were gender, age, highest formal qualification, organisation profile and organisation size. As presented in Table 2, most of the respondents worked in private sector organisations, which accounted for 70% ($n = 336$), while 30% ($n = 142$) of the respondents worked in the public sector. In addition, the majority of the employees were employed by large enterprises (56.07%, $n = 268$), followed by medium enterprises (23.64%, $n = 113$) and small enterprises (20.29%, $n = 97$).

Measuring instruments

This study measured the respondents' perception of EE through a 16-item scale developed by Rich et al. (2010) that comprises three dimensions, namely, PhyEng (five items), CogEng (five items) and EmoEng (six items). Telecommuting was assessed using a six-item scale adapted from Green (2019). Employee performance was appraised through a 22-item scale developed by Pradhan and Jena (2017). The internal consistency reliability, convergent and discriminant validity pertaining to EE, along with its constituent dimensions, TC, and EP results of the analyses are presented in Table 1.

Hair et al. (2021) suggested that Cronbach's alpha values exceeding 0.90 indicate excellent internal consistency, average variance extracted (AVE) values of 0.50 or higher indicate convergent validity, while heterotrait-monotrait ratio of correlations (HTMT) values above 0.90 indicate that discriminant validity is not present. The Cronbach's alpha values obtained for EE, EE dimensions, TC and EP ranged between 0.897 and 0.965, suggesting excellent internal consistency reliability. An AVE of 0.902 was obtained for EE, meaning that the CogEng, EmoEng and PhyEng constructs converge to reflect the higher-order construct of EE. As for TC with an AVE of 0.690 and EP with an AVE of 0.939, the results indicate that the observable variables converge to form these constructs. In addition, the HTMT ratios for all the constructs range between 0.367 and 0.858. These HTMT correlation ratios fall below the 0.900 discriminant validity criteria, providing confirmation that the factors are discriminant of each other.

Data collection

An online survey instrument that was hosted on the *Qualtrics* platform was utilised for data collection purposes. The questionnaire was designed based on previously validated

TABLE 1: Internal consistency reliability, convergent and discriminant validity.

Constructs	EE	TC	EP	CogEng	EmoEng	PhyEng
Cronbach α	0.965	0.935	0.945	0.897	0.947	0.922
AVE	0.902	0.69	0.939	0.710	0.762	0.620
EE	-	-	-	-	-	-
TC	0.391	-	-	-	-	-
EP	0.756	0.367	-	-	-	-
CogEng	-	0.353	0.717	-	-	-
EmoEng	-	0.394	0.664	0.822	-	-
PhyEng	-	0.389	0.775	0.858	0.827	-

AVE, average variance extracted; TC, telecommuting; EP, employee performance; EE, employee engagement; PhyEng, physical engagement; CogEng, cognitive engagement; EmoEng, emotional engagement.

scales. The instrument contained scales for measuring EE, its dimensions, TC and EP that comprised statements accompanied by 5-point Likert-type answer options anchored by 1 (strongly disagree) to 5 (strongly agree). For EE, statements included 'I work with intensity on my job'. For TC, statements included 'telecommuting is common in my organisation'. For EP, statements included 'I complete my assignments on time'. To retain a high response rate, the link to the survey was distributed through social media platforms, such as WhatsApp, LinkedIn and X (formerly known as Twitter). The survey was disseminated through the researchers' personal professional network, with a request for respondents to forward the survey link to other potential participants. The adoption of snowball sampling for this study allowed the adoption of a recruitment technique where respondents were requested to assist the researchers in identifying other potential respondents who can be engaged to participate in the study.

Consequently, a total of 1368 questionnaires were distributed online with 1054 responses collected, of which 576 responses were unusable because of incomplete responses. The high number of unusable data were because of missing data on the survey and technical problems such as poor Internet connectivity during data collection, which resulted in corrupted data. Subsequently, this study proceeded with 478 complete responses that were considered adequate for the intended descriptive and inferential statistical analysis. Table 2 presents the descriptive statistics for the respondents' demographic profile.

According to Table 2, 55.23% ($n = 264$) of this study's respondents were male, while 44.77% ($n = 214$) of respondents were female. Most study participants were 41–50 years old (41.63%, $n = 199$), and 40.17% ($n = 192$) of respondents were 31–40 years old. These age groups were followed by respondents aged

TABLE 2: Respondents' demographic profile descriptive statistics ($N = 478$).

Demographic factor	Classification	Frequency (n)	%
Gender	Female	214	44.77
	Male	264	55.23
Age (years)	Less than 21	1	0.21
	21–30	43	9.00
	31–40	192	40.17
	41–50	199	41.63
	51–60	41	8.58
	61+	2	0.42
Highest formal qualification	No formal qualification	1	0.21
	Matric or Grade 12	17	3.56
	Certificate or Diploma	114	23.85
	Bachelor's degree	123	25.73
	Honours degree	107	22.38
	Master's degree	106	22.18
	Doctorate degree	10	2.09
Organisation profile	Public organisation	142	29.71
	Private organisation	336	70.29
Organisation size	Large enterprises	268	56.07
	Medium enterprises	113	23.64
	Small enterprises	97	20.29

21–30 years (9%, $n = 43$), 51–60 (8.58%, $n = 41$), 61+ years (0.42%, $n = 2$) and under 21 years (0.21%, $n = 1$). The study also examined the respondents' greatest educational credentials. All respondents had some schooling, while 0.21% ($n = 1$) of respondents had none. Despite this, 3.56% ($n = 17$) of respondents had matric or Grade 12, 23.85% ($n = 114$) of respondents had certificates and Diplomas and 48.11% of respondents had degrees (Bachelor's degrees, 25.73% and Honours degrees, 22.38%). The remaining 24.27% of respondents had postgraduate degrees (22.18% and 2.09%). The study found that the majority of respondents (72.38%, $n = 346$) had university degrees, indicating that most were well-educated.

Statistical analysis

The structural equation modelling (SEM) technique was employed to test the hypothesised relationships. This was conducted in two phases; the first phase assessed the measurement model, which entails internal consistency reliability measured through Cronbach's alpha and construct validity (convergent and discriminant validity) measured through AVE and HTMT approaches. The second phase detailed the construction of a mediating path analysis model (see Figure 2 and Figure 3) and the path analysis coefficients.

This study employed mediation analysis through SEM because according to Gunzler et al. (2013), although mediation analysis can be conducted through a series of regression models, there are a number of advantages to conducting mediation analysis with SEM such as the ease of interpretation and analysis. Compared to regression analyses that can fit one equation at a time to a data set, SEM allows the simultaneous fit of a set of regression equations to data and tests how well those equations collectively capture the variation in the data

(Ballen & Salehi, 2021). Moreover, SEM has been acknowledged as a relevant approach for testing mediation, because it allows for the use of both latent variables (for underlying factors) and mediation analyses that other methods such as multilevel regressions cannot offer (Tarlao et al., 2021).

Ethical considerations

Ethical clearance to conduct this study was obtained from the University of Pretoria, Research Ethics Committee (Reference No. EMS019/23). Consent was sought from the participants through an informed letter of consent to advise respondents on the purpose of the study and guidelines for participation. Respondents were advised of confidentiality and anonymity and that their responses will remain anonymous because they cannot be individually identified based on the answers they provided. The study made no use of any form of incentives to induce responses from participants. Through this process, adequate efforts were made to adhere and uphold ethical research considerations.

Results

This study sought to examine the mediating effect of TC on the relationship between EE, PhyEng, CogEng, EmoEng and EP for the cohort of employees in the ICT sector of South Africa. The results are categorised into two major segments, namely, correlation analysis and mediating effects.

Correlation analysis results

Before conducting mediating effects analysis, correlation analysis was performed to determine the relationship between EE, its dimensions, TC and EP. The correlation analysis results are shown in Table 3.

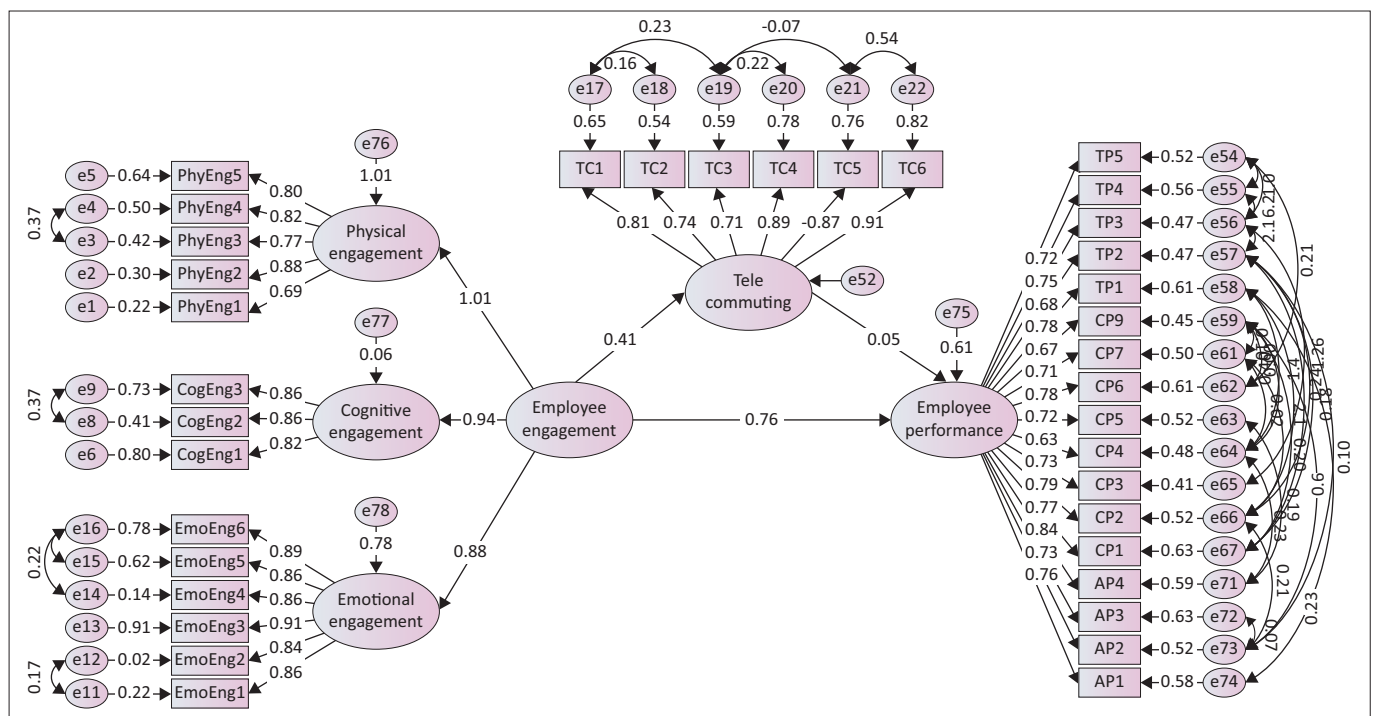


FIGURE 2: Structural equation modelling pathway: Mediation model for telecommuting, employee engagement and employee performance.

The correlation coefficients between PhyEng and CogEng ($r = 0.807, p < 0.01$), PhyEng and EmoEng ($r = 0.791, p < 0.01$) and CogEng and EmoEng ($r = 0.760, p < 0.01$) from Table 3 indicate that the first-order elements of EE have high positive connections. Based on the data acquired from employees in the ICT sector of South Africa, there is a significant positive association between PhyEng, CogEng and EmoEng. This suggests that when one of these elements, such as CogEng, grows or decreases, the other components, EmoEng and PhyEng, also change in the same direction. Considering that these parameters serve as markers of a second-order reflective construct, the significant positive correlations further validate the high reflection of the constructs on EE.

The correlations between the independent variables of EE and PhyEng ($r = 0.925, p < 0.01$), EE and CogEng ($r = 0.889, p < 0.01$), and EE and EmoEng ($r = 0.950, p < 0.01$) indicate a highly significant and strong relationship between the second-order reflective construct and the first-order factors, suggesting a strong interrelation between these factors. The findings in Table 3 suggest that EmoEng has the most significant correlation with EE, followed by PhyEng, and finally CogEng. These results align with the EE second-order estimation, which reveals that EmoEng has the most impact on the EE reflective construct. The findings of this study align with the findings of Pepra-Mensah and Kyeremeh (2018), which suggest that the aspects of PhyEng, CogEng and EmoEng best represent the concept of EE.

The findings presented in Table 3 demonstrate a significant and positive correlation ($r = 0.722, p < 0.01$) between EE and EP, suggesting a clear relationship between these two variables among the personnel surveyed in the South African ICT sector. The findings of this study are in direct opposition to those of Riyanto et al. (2021) about ICT personnel in Indonesia who found no direct correlation between EE and EP; however, this study's analysis demonstrates otherwise.

This study found a strong positive correlation ($r = 0.717, p < 0.01$) between PhyEng and EP, indicating a significant relationship. EmoEng and EP also showed a moderate positive correlation ($r = 0.667, p < 0.01$), while CogEng and EP had a similar moderate positive correlation ($r = 0.642, p < 0.01$). The results indicate that PhyEng has a significantly greater correlation with EP compared to the other dimensions

TABLE 3: Correlation analysis (Pearson product-moment coefficient) results.

Constructs	EP	EE	TC	PhyEng	CogEng	EmoEng
EP	1.000	-	-	-	-	-
EE	0.722***	1.000	-	-	-	-
TC	0.346***	0.382***	1.000	-	-	-
PhyEng	0.717***	0.925***	0.366***	1.000	-	-
CogEng	0.667***	0.889***	0.319***	0.807***	1.000	-
EmoEng	0.642***	0.950***	0.365***	0.791***	0.760***	1.000

EP, employee performance; EE, employee engagement; TC, telecommuting; PhyEng, physical engagement; CogEng, cognitive engagement; EmoEng, emotional engagement.

***, indicates statistical significance at a 5% level of significance.

of EE. The findings of this study, which focused on a sample of employees in the South African ICT sector, align with previous research conducted by Kuok and Taormina (2017) as well as Črnjar et al. (2020). These studies have confirmed that EE, a construct with three dimensions, has a significant impact on an employee's work performance.

Furthermore, the correlation coefficient of 0.382 suggests a low level of association between EE and TC. The results indicate that there is a modest association between the EE dimensions and TC. Specifically, the correlation coefficients for PhyEng and TC, CogEng and TC, and EmoEng and TC are 0.366, 0.319 and 0.365, respectively, all with a significance level of $p < 0.01$. Regarding EP and TC, there was a modest correlation ($r = 0.346, p < 0.01$) indicating a positive association between TC and EP. Upon examining the correlation results displayed in Table 3, it is evident that there are linear positive correlations between the main components of this study.

Mediating effects' results

This study assessed the mediating effects of TC on the relationship between EE, its dimensions, and EP through the SEM bootstrapping procedure. To conduct SEM mediation analysis, two path diagrams were formulated, with the first path diagram (Figure 2) detailing the mediating effect of TC on the relationship between EE and EP.

The second path diagram (Figure 3) depicts the mediating effect of TC on the nexus between PhyEng, CogEng, EmoEng and EP.

The mediation evaluation results attained through SEM path analysis as indicated in Figure 2 and Figure 3 could not reflect the indirect effects of TC. The results, as tabulated in Table 4, outline the direct effects, indirect effects and the values of asymptotic confidence intervals, comprising the lower (LLCI) and upper (ULCI) bounds of these asymptotic confidence intervals.

The results presented in Table 4 reveal that in the presence of TC as a mediating variable, EE exerts a positive but statistically insignificant indirect effect on EP ($\beta = 0.019, p = 0.173, CI [0.009, 0.047]$). Collaterally, in the same context, the direct effect of EE on EP was found to be positive and

TABLE 4: Results of the test of the hypothesised relationships between employee engagement, employee engagement dimensions, telecommuting and employee performance.

Relationship	Direct effect		Indirect effect		Confidence interval		Conclusion
	β	<i>p</i> -value	β	<i>p</i> -value	LLCI	ULCI	
EE \rightarrow TC \rightarrow EP (H1)	0.755	< 0.001	0.019	0.173	0.009	0.047	No mediation
PhyEng \rightarrow TC \rightarrow EP (H2)	1.07	< 0.001	0.017	0.145	-0.010	0.211	No mediation
CogEng \rightarrow TC \rightarrow EP (H3)	0.119	0.544	0.005	0.406	-0.124	0.015	No mediation
EmoEng \rightarrow TC \rightarrow EP (H4)	0.210	0.044	0.008	0.155	-0.002	0.054	No mediation

EE, employee engagement; TC, telecommuting; EP, employee performance; LLCI, lower bounds of asymptotic confidence intervals; ULCI, upper bounds of asymptotic confidence intervals.

statistically significant ($\beta = 0.755, p < 0.001$). These results highlight that in the presence of TC, a direct only non-mediation relationship exists between EE and EP. Consequently, H1 which posits that TC has a mediating effect on the relationship between EE and EP is not statistically supported.

Furthermore, the results indicate that in the presence of TC as a mediating variable, the indirect effect of PhyEng on EP was statistically insignificant ($\beta = 0.017, p = 0.145$ CI [-0.010, 0.211]), whereas the direct effect was statistically significant ($\beta = 1.065, p < 0.001$). These results imply that in the presence of TC, a direct only non-mediation relationship exists between PhyEng and EP. Consequently, H2 which states that TC mediates the relationship between PhyEng and EP was not statistically supported.

The results further indicate that CogEng has a statistically insignificant positive indirect effect on EP ($\beta = 0.005, p = 0.406$), in the presence of TC as a mediating variable. Similarly, in comparison, the direct effect of CogEng on EP was also found to be statistically insignificant ($\beta = 0.119, p = 0.544$, CI [-0.124, 0.015]). Consequently, the results support a no effect non-mediation relationship between CogEng and EP in the face of TC as a mediating variable. Therefore, H3 which proposed that TC has a mediating effect on the relationship between CogEng and EP was not statistically supported.

As the mediating results relate to EmoEng and EP, the findings from the analysis show statistical significance of the direct effect ($\beta = 0.210, p = 0.044$, CI [-0.002, 0.054]) and statistical insignificance of the indirect effect ($\beta = 0.008$,

$p = 0.155$) with TC as a mediating variable. These results indicate the existence of a direct effect non-mediation relationship between EmoEng and EP. Consequently, H4 which proposes that TC mediates the relationship between EmoEng and EP was not statistically supported. These results compel the study to conclude that TC has no mediating effects on the relationships that exist between EE, its dimensions (PhyEng, CogEng and EmoEng) and EP.

Discussion

Outline of the results

This study drew on existing literature to elucidate the mediating role that TC plays in some work-based relationships. However, the findings of the study show that in the cohort of ICT employees in South Africa that participated in the study, the expected mediation effects of TC could not be empirically confirmed. Conclusively, H1, H2, H3 and H4 were not statistically supported, confirming that TC has no mediating effects on the relationship between EE, its dimensions and EP. These results are curious yet insightful. They possibly stem from the reality of the technical nature of ICT work that characteristically requires a level of collaboration and hands-on interaction, which are not easily facilitated through remote arrangements. As a result of this, the anticipated effects of TC on EE, its dimensions and subsequently EP could have become diluted. This underscores the complex interplay between work arrangements, EE and its dimensions, and EP outcomes in contemporary organisational contexts, particularly within technology-intensive sectors. Instructively, this study's results highlight the complex nature of aligning work practices with engagement levels and their subsequent

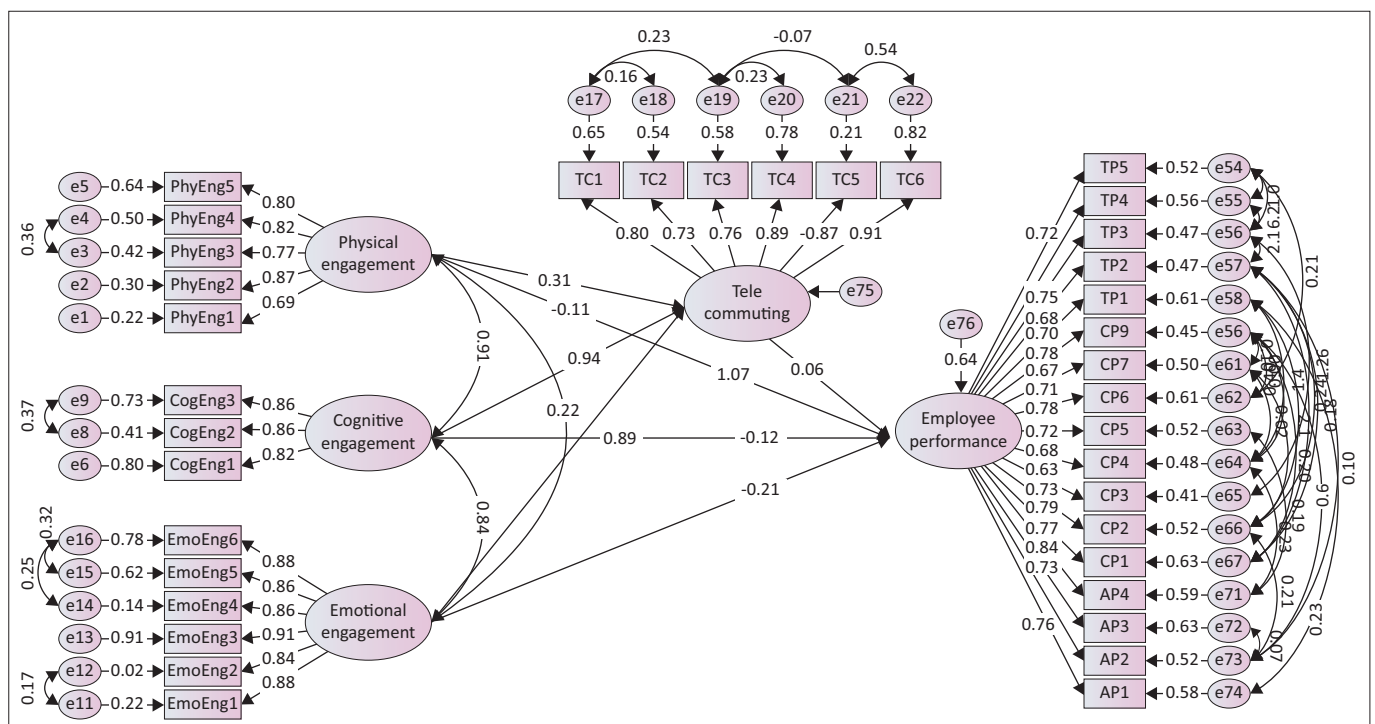


FIGURE 3: Structural equation modelling pathway: Mediation model for telecommuting, employee engagement dimensions and employee performance.

impact on overall performance in environments heavily reliant on technology and innovation.

Practical implications

With organisations progressively re-integrating employees into office environments, the culture in some organisations in the South African ICT sector that value face-to-face collaboration makes TC less effective in fostering EE and influencing EP outcomes. This dynamic can have distinct practical implications for different gender and age biographical groups. For example, younger employees and those with fewer family responsibilities might adapt more readily to a return to in-office work, whereas older employees or those with significant caregiving responsibilities may find TC more beneficial. Similarly, gender-related expectations and roles could influence how male and female employees experience and respond to the shift from TC to in-office work, potentially affecting their engagement and performance differently. More so, the limitations of virtual communication platforms in conveying the complexity of emotional expressions and the potential challenges in creating and maintaining emotional bonds remotely pose a diminishing mediating role of TC. To be sure, based on this study's results, TC is not an intermediary in the workplace; rather, it is a form of employee behaviour that could strengthen or weaken existing relationships in the workplace. Essentially, therefore, the relationships between EE, its dimensions and EP in the South African ICT sector may be influenced by both external and internal factors other than TC. Within high-technology sectors, the dynamic interplay between TC arrangements, EE and EP becomes particularly nuanced. Considering that the technical nature of ICT roles often demands a high degree of collaboration, problem-solving and interactive teamwork, these can be challenging to replicate in virtual settings. This underscores the importance of designing tailored strategies that account for the unique demands of these roles, aiming to optimise both EE and EP outcomes in the VF.

Limitations and recommendations

This study has some limitations that should be recognised to inform future research. This study was conducted in South Africa, and it is unclear whether it applies to other countries. Consequently, the TC mediation model should be tested in different cultural contexts and countries. Given the uncertainty of an epidemic and people's adaptability to changes over time, the impact of the length of time spent on TC could affect results. This aspect could be addressed through a longitudinal study in future studies. Given that this study focused on the mediating role of TC on the relationship between EE and EP as well as EE dimensions and EP; to further advance the understanding of these concepts, future studies could investigate the moderating effect of TC and conduct comparative analyses with other regions or industries with the end objective of informing strategies to optimise remote work practices in the VF. Given the heightened state of global competitiveness, organisations are forced to meet the challenges of employees and ensure that they are engaged to

perform optimally in the dynamic, virtual and competitive business environment. So, organisations should revisit their TC policies, explore alternative ways to foster EE and focus on managing the results.

Conclusion

This study interrogated the intervening role of TC on the relationship between EE and EP, as well as the relationship between dimensions of EE (PhyEng, CogEng, and EmoEng) and EP. This study's results that TC has no mediating effects on the relationship between EE, its dimensions and EP offer valuable insights that organisations and managers should acknowledge as they seek to optimise TC effectiveness and support EE and EP. Invariably, this study challenges some of the conventional assumptions and findings about the effects of TC on either EE or EP by offering new insights. Notably, the value of TC is emphasised according to the perspectives of Henke et al. (2016) as well as Martin and MacDonnell (2012) who aver that previous studies could not determine the immediate effect of TC, possibly because of varying implementation practices by employers in earlier years. Instructively, the decision to telecommute is a behavioural choice made by employees or organisations, influenced by various factors such as convenience, flexibility, efficiency and technological advancements. Understanding these factors can facilitate the formulation of tailored TC strategies and practices that are congruent with the objectives of the organisation and the requisites of employees within the rapidly evolving landscape context of South Africa's ICT sector.

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Authors' contributions

H.R.R. and C.E.-E. have contributed equally to the conceptualisation, methodology, planning, researching, data collection, analysis, structuring, writing and review of this article.

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Data availability

The data that support the findings of this study are available on request from the corresponding author, H.R.R.

Disclaimer

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