

The mediation role of psychological well-being at work on the relationship between shiftwork and work engagement among nurses in Zambia: a case of selected hospitals in Kabwe district

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ABSTRACT

Work engagement is an important latent variable because of it being linked to the bottom line of the organisation. Engaged employees work hard by investing their physical energies towards accomplishing work tasks hence improved work performance that eventually leads to good financial performance. An empirical evaluation of the antecedents of work engagement is therefore required. A quantitative ex post facto survey design was used in this study. The research hypotheses were empirically evaluated using a sample of 200 respondents from two selected level one hospitals in Kabwe district with a mean age of 2.35 and standard deviation of .819. The sample was comprised of males (12%) and female (88.0%) with levels of qualification distributed as follows: Certificates (15%), Diploma (80%), others (5%). Non-probability technique specifically convenient sampling was used to select the sample. Hypothesized relationships in the proposed structural model was analysed through partial least squares structural equation modelling in Smart PLS 4.0. Good reliability coefficients as well as convergent and discriminant validity were established. Reasonable fit for the measurement model was attained. The study established that psychological well-being mediated the relationship between shift work and job engagement with a t-value bigger than 1.96 and $p < 0.05$. Statistically significant path coefficients between shift work and psychological well-being, as well as psychological well-being and job engagement were established. This study has provided empirical evidence that psychological well-being acts as a mediator in the relationship between shift work and job engagement. Since shift work disrupts ones biological clock, human resource practitioners ought to mentally prepare employees on the negative effect of shift work on how well they can remain engaged. The study recommends that future studies with bigger and culturally diverse samples be carried out due to limited evident of convergent validity and with smaller r-squared values.

Keywords: Partial least squares, shift work, psychological well-being, job engagement, Zambia

INTRODUCTION

Public health institutions such as hospitals and clinics exist to provide and serve the country with need satisfying public services and goods (Mokena as cited in Mukwena, 2020). For this to be realized, public health institutions need engaged employees who are

well informed about their expectations, business and work in unison with fellow workers to improve on efficiency, quality and service delivery to the people of Zambia. Work engagement is an important latent variable because it determines organisational success and competitive advantage because engaged employees have the passion and zeal for work, they perform

to their potential creating high performing organisation (Macleod & Clarke, 2009; Kataria, Garg & Rastogi, 2013). The importance of work engagement can be seen from its outcomes that are beneficial to the organisation such as high productivity (Patro, 2013), customer satisfaction (Saks, 2006), customer loyalty (Gallup, 2006), profitability (Van Allen, 2013) and employee retention (Harter, Schmidt & Hays, 2002). If work engagement is an important variable in determining the overall success of any organisation, then there is need to explore its antecedents.

Industrial psychology literature has documented several predictors of work engagement such as role clarity (Simpson, 2009), employee's personal resources such as optimism, self-esteem, self-efficacy and psychological well-being (Chikampa, 2013; Tierney & Farmer, 2002; Vancouver & Kendall, 2006), psychological climate (Shuck, Reio & Rocco, 2011), affective commitment (Shuck et al., 2011) as well as job resources such as autonomy, performance, feedback, supervisory coaching and the physical/organisational aspect of the job that reduces job demands and the associated physiological and psychological costs such as shift work (Chikampa, 2013; Schaufeli & Bakker, 2004).

Although there are numerous latent variables that act as antecedents of work engagement yet due to practical and theoretical reasons as well as limiting the scope of the study to a governable and meaningful level, a selection of variables was necessary. Two considerations were used. The first one was to consider known antecedents of work engagement and secondly to examine available work engagement literature for future research direction. Based on the above, two variables were considered namely psychological well-being and shift work.

Research-initiating question

The research-initiating question for this study is therefore: why variance exists in employee work engagement, with specific reference to the role that psychological well-being and shift work play in this regard not to the exclusion of other factors in the organisation. The need for this research

study is justified on grounds that to the researcher's knowledge there has been no Zambian study yet that has investigated this specific research problem.

Objective

The general objective was to examine the empirical relationships between shift work, work psychological well-being and work engagement. From this general research objective, more specific operational research objectives were derived for this study.

1. To evaluate the influence of shift work on psychological well-being.
2. To investigate whether psychological well-being acts as a mediator between shift work and work engagement.
3. To evaluate the influence of shift work on work engagement
4. To assess the influence of psychological well-being on work engagement

LITERATURE REVIEW

Theoretical Framework

Social exchange theory is used as the central theoretical foundation for this study. According to Paille (2009; 2011) Social exchange is seen as voluntary actions on the part of employees with expectations of return from others. It is based on the reciprocity principle where resources are exchanged through the process of reciprocity, where one party tends to repay the good deeds of another party (Gergen, 1969). The main reason for this exchange is to maximize benefits and minimize costs (Qureshi, 2015). In exchange theory, the relationship between the organization, unit leaders and employees is important (Robertson, 2013). Most of the theory centers around an employee defined role and obligation based on norms within the organization (Robertson, 2013). In this case, unit leaders give nurses a benefit in form of rest through work scheduling (shiftwork), this enhances wellbeing which enables nurses to reciprocate through employee's engagement.

Conceptualising Work Engagement

Work engagement refers to individual employee's unique personal relationship with work (Vancouver & Kendall, 2006). In Schaufeli, Martinez, Marques-pinto, Salanova, & Bakker, (2002) and

Bakker (2002) work engagement is conceptualized as a three dimension concept defined as a positive fulfilling work related state of mind characterized by vigour, dedication, and absorption. According to Bakker et al., (2008), vigour is characterized by energy and mental resilience while working as well as the willingness to invest effort in one's work and persistence even in the face of difficulties. Dedication refers to being strongly involved in one's work and experiencing a sense of inspiration, pride, challenge, significance and enthusiasm (ibid.). The third dimension of work engagement known as absorption refers to total concentration on and immersion in work characterized by time passing quickly and finding it difficult to detach oneself from one's work (Mauno, Kinnunen & Ruokolainen, 2007).

Conceptualising Psychological well-being at work

Well-being is conceptualized as optimal psychological functioning and experience (Ryan & Deci, 2001). The World health organisation (WHO) defines health as a state of complex physical, mental and social well-being and not merely the absence of disease (Henn et al., 2016). It is about striking a balance between positive and negative affects determined by life satisfaction (Ryff & Keyes, 1995). Traditionally, psychological well-being is organised into two segments namely hedonic/subjective well-being and eudaimonic psychological well-being. Subjective well-being focuses on an individual's subjective experiences of happiness and satisfaction with life (Deci & Ryan, 2008). Eudaimonic well-being refers to personal development, an individual's ability to resolve life challenges and the extent to which individuals are flourishing and reaching their full potential in life (Henn et al., 2016). Psychological well-being at work describes an individual subjective positive experience at work which comprises of eudaimonic dimensions (Dagenais-Desmarais & Savoie (2012). The construct of psychological well-being at work consists of five dimensions namely interpersonal fit at work, thriving at work, feelings of competency at work, perceived recognition at work and desire for involvement at work (Vermaak, Ekermans & Nieuwenhuize, 2017). The perception of experiencing positive relationships with the individuals with whom

one interacts at work is conceptualised as interpersonal fit at work (Vermaak et al., 2017). The second dimension refers to the perception of accomplishing a significant and interesting job that enables feelings of fulfillment (Vermaak et al., 2017). The third dimension of feelings of competency at work, involve the perception of possessing the necessary aptitudes to efficiently perform one's job (Vermaak et al., 2017). Perceived recognition at work refers to the perception of being appreciated within the organisation for one's work and personhood (Vermaak et al., 2017). The fifth dimension is conceptualised as the desire for involvement at work, which is the will to involve oneself in contributing to the organisation's functioning and success (Vermaak et al., 2017).

Conceptualising Shift Work

Shift work is conceptualised as employment practices designed to keep a service or a product line operation at all times (Pisarski & Barbour, 2014). Barnes-Farell, Davies-Schris, McGonagle, Walsh, Di Milia, Fischer, Hobbs, Kaliterna and Tepas (2008) defined shift work as work that is contemplated outside the parameters of the traditional day shift. With shift work the working day is divided into shifts or set periods of time during which different group of employees perform their duties. The health care industry is morally expected to provide care to patients 24h a day, seven days a week and as such will always depend on non-standard work schedules to ensure continuity of care given (Ogeil et al., 2021; Vermaak et al., 2017). Different formats of work shifts exists across the world for nurses such as early morning shifts, night shifts, rotating shifts and irregular schedules and shift times depending with the needs of the business (Liang, Hsieh, Lin & Chen, 2014).

Empirical Relationship between Psychological well-being and Work engagement

Humans always endeavor to live and be well and as such seek for happiness at work by attempting to be successful with work tasks despite the challenges (Henn et al., 2016). This prompts employees to apply effort, to be absorbed and dedicated hence high work engagement is achieved. Optimal psychological functioning allows employees

to fully concentrate and channel their energies to work related tasks. It is therefore hypothesized that psychological well-being positively influences employees work engagement.

Empirical Relation between Shift work and Work engagement

Literature on health care has extensively reported on the negative impact of shift work as a stressor on employees' health and performance. Despite the negative attributes of shift work on employees' health, the positive side of the coin can also be argued out. Timely breaks can positively contribute to employee alertness and prevent fatigue which is a recipe for well engaged employees (Dall'ora et al., 2016). According to Vermaak et al., (2017), if shift work is managed well the negative implications of shift work in the health care industry can be minimised. It can therefore be hypothesized that shift work positively influences work engagement.

Empirical Relation between Shift work and Psychological Well-being

Although the psychological functioning of employees at work can negatively be affected by shift work it is expected that the cognitive and emotional effect of work schedule demands are less for nurses who experience a better fit between their work schedule and their private lives. Work scheduling allow employees to rest periodically and work in different times, accords them the opportunity to be cognitively alert hence optimal psychological functioning encouraged. In the study by Tahghighi et al., (2017) no evidence was found for the association between shift work and impaired psychological functioning. According to Demartin (2010), the association is dependent on various individual and contextual factors. It is therefore hypothesized that shift work positively influences psychological well-being.

Psychological well-being as a mediator in the relationship between shift work and work engagement

Positive emotions at work influences mental well-being which eventually regulates the negative aspects of shift work on individual employees. A positive, satisfied and happy mind set motivates employees to be engaged on the job. It is therefore hypothesized that psychological wellbeing act as a mediator in

the relationship between shift work and work engagement.

Conceptual model

After an in-depth investigation of the literature, a conceptual model was derived. The conceptual model in figure 1 depicts the specific hypothesized causal linkages between shift work, psychological well-being and work engagement. Shift work is portrayed as the independent variable whilst psychological wellbeing and work engagement are dependent variables.

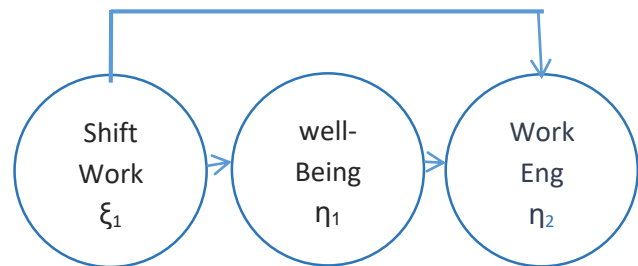


FIGURE 1: The structural model representing the relationships between shift work, psychological well-being and work engagement.

Statistical hypotheses

In order to test the validity of the proposed relationships in the structural model, the following specific research hypotheses were tested:

Hypothesis 1: Psychological well-being (η_1) is positively related to work engagement (η_2) ($H_{01}: \beta_{21} = 0$; $H_{a1}: \beta_{21} > 0$).

Hypothesis 2: Shift Work (ξ_1) is positively related to Work Engagement (η_2) ($H_{02}: \gamma_{21} = 0$; $H_{a2}: \gamma_{21} > 0$).

Hypothesis 3: Shift Work (ξ_1) is positively related to Psychological Well-being (η_1) ($H_{03}: \gamma_{11} = 0$; $H_{a3}: \gamma_{11} > 0$).

Hypothesis 4: Psychological Well-being (η_1) mediates the relationship between Shift Work (ξ_1) and Work Engagement (η_2)

DATA AND METHODOLOGY

Study design

A survey design through variance based structural equation modelling-partial least square (PLS-SEM) was used to achieve the research objects for this study.

Study population

The research hypotheses were evaluated using a sample of nurses from two level one hospitals in Kabwe district.

Sample and sampling technique

A non-probability sampling method, specifically convenience sampling, was used to select 200 respondents from two selected level one hospitals in kabwe district. Both the sampling technique and size used were due to the bigger sample size required for LISREL (SEM).

Data Collection Procedure

210 Questionnaires were distributed to identified participants and 200 completed questionnaires were returned. The sample comprised of male (12%) and female (88%) participants. The sample had a mean age of 2.35 and standard deviation of .819. The level of education in the sample was distributed as follows, Certificate (15%), Diploma (80%) and others (5%).

Data was collected using three instruments. The psychological experience of shift work was measured using the 7 item psychological experience of shift work scale developed by Vermaak, et al., (2017). Psychological well-being was measured using items from the index of psychological well-being developed by Dagenais-Desmarais and Savoie (2012). The Utrecht job engagement scale was used to measure job engagement. All the three scales have good reported psychometric properties warranting their usage.

Data Analysis

In this study data were analyzed through partial least squares (PLS) statistical technique by using SMART PLS 4.0 for measurement and structural model fit. According to Anderson and Gebing (1988), hypothesized relationships in the model are to be tested using a two-step approach. The first step requires that the measurement model be evaluated as to whether the measurement items possess the appropriate psychometrics properties to represent each construct (Baek, Kim & Yu, 2010). According to Shafi et al., (2020), measurement model analysis involves testing for reliability and validity of the scale. The traditional criterion for assessing internal consistency reliability is Cronbach's alpha (CA) and composite reliability (CR) (Henseler, 2010). The criteria

for acceptability in this case were Cronbach's alpha and composite reliability $> .70$ (Nunnally & Berstein 1994).

Measurement model analysis also involves testing for factor loadings, convergent validity and discriminant validity. Convergent validity refers to the degree to which individual items load onto their designated construct (Jamil, 2012). As proposed by Fornell and Lacker (1981) the criterion for convergent validity is the average variance extracted (AVE). An AVE value > 0.50 indicates sufficient convergent validity (Fornell & Lacker, 1981). This means that a latent variable can explain at least half of the variance of its indicators on average (Jamil, 2012).

Discriminant validity concerns the degree to which the measures of different constructs differ from each other. In this study discriminant validity was measured using the Fornell and Lacker method. The Fornell and Lacker (1981) criterion requires a latent variable to share more variance with its assigned indicators than with any other variable. The value of discriminant validity must be greater than the value of AVE of convergent validity for each construct (Fornell & Lacker, 1981).

According to Jamil (2012,) structural model assessment can only be done once the measurement model has successfully been validated. When evaluating the appropriateness of the overall model in partial least square structural equation modelling (PLS-SEM) the SRMR and the NFI values are the most used indicators (Huang, 2021). The SRMR value ranges from 0 to 1. According to Hu and Bentler (1998) when the SRMR value is less than 0.08 it can be regarded as a good fit of the model. The NFI value ranges from between 0 and 1 and as such when the NFI value is > 0.90 it is an indication that the model fits well (Bentler & Bonett, 1980). According to Huang (2021), path analysis using t values is another criterion for the assessment of PLS-SEM. A t value > 1.96 means that a significant level of 0.05 has been attained, > 2.58 it means a significant level of 0.01 has been attained while values > 3.29 means that a significant level of 0.001 has been attained. The coefficient of multiple determination (R²) is another criterion used for assessing

PLSSEM. The R2 value also ranges between 0 and 1. The higher the value the high the explanatory power (Huang, 2021). R2 values of 0.67, 0.33 and 0.19 in PLS-SEM path models as substantial, moderate and weak (Chin, 1998).

RESULTS

Construct reliability and validity

The shift work scale recorded a cronbach alpha of 0.77, a composite reliability (rh_s) of 0.845 and the composite reliability (rh_c) of 0.884 all above the 0.70 benchmark indicating good reliability and internal consistency (Pallant, 2010). The psychological well-being scale obtained a Cronbach alpha of 0.924, the Composite reliability (rho_s) of 0.937 and Composite reliability (rh_c) of 0.934. The work engagement scale recorded a Cronbach alpha of 0.911, a Composite reliability (rho_s) of 0.912 and a Composite reliability (rh_c) of 0.922 as shown in table 1.

Factor loadings for all the three scales were significantly large > .50 set for this study as shown in table 2. To check convergent validity each latent variable's average variance extracted (AVE) is evaluated. Only the shift work scale obtained an AVE value larger than 0.50 (0.682) while the psychological well-being (0.471) and the work engagement (0.426) had AVE values below the acceptable threshold. This means that convergent validity for the work engagement and psychological well-being is not established although it can be argued that although the AVE value for psychological well-being falls short of the standard yet it is slightly close to 0.50. The convergent validity results are considered to be one of the limitation of this study. In terms of discriminant validity, Table 2 shows that the square root value of the diagonal AVE is greater than other correlations coefficient values in the matrix. Moreover, all the values for discriminant validity were greater than the value of AVE of convergent validity.

PLS-SEM Analysis

Mixed results for the outer model were obtained. Although the NFI value of 0.502 is less than 0.90 yet it is slightly above half and can reasonably be acceptable. The SRMR value of 0.103 is above the benchmark of

0.08 as shown in table 3. In terms of the path analysis hypothesis 3 was confirmed. The path coefficient between shift work and psychological well-being was statistically significant with a t value of 3.831 and a p value of 0.000. For hypothesis 4 (mediation effect) a statistically significant t values of 3.138 was recorded with a p value less than 0.05 as shown in table 5. The path between shift work and work engagement was also significant with a t value of 3.035 and a p value of 0.002 confirming hypothesis 2. A greater than 1.96 t value of 6.303 and a p value of less than 0.05 was established hence confirming hypothesis 1 as seen in table 4. Table 6 shows that the overall explanatory power of the structural model was weak. Work engagement recorded an R square value of 0.230, psychological well-being 0.071 while shift work 0.000.

The PLSSEM path analysis model is shown in figure 2.

TABLE 1. Factor loadings, Reliability and Convergent Validity Test

Dimension	items	λ	cronbach α	CR	AV	
SHIFTWORK	SH1	0.700	0.77	0.884	0.682	
	SH2	0.839				
	SH3	0.904				
PSY-WELL	PSW1	0.535	0.924	0.934	0.471	
	PSW2	0.726				
	PSW3	0.700				
	PSW4	0.621				
	PSW5	0.630				
	PSW6	0.500				
	PSW7	0.548				
	PSW8	0.501				
	PSW9	0.663				
	PSW10	0.560				
	PSW11	0.636				
		PSW12	0.717			
		PSW13	0.760			
		PSW14	0.756			
		PSW15	0.816			
		PSW16	0.786			
ENG	ENG1	0.704	0.911	0.922	0.426	
	ENG2	0.660				
	ENG3	0.640				
	ENG4	0.679				
	ENG5	0.692				
	ENG6	0.721				

ENG7 0.679
 ENG8 0.631
 ENG9 0.836
 ENG10 0.576
 ENG11 0.624
 ENG12 0.656
 ENG13 0.581
 ENG14 0.667
 ENG15 0.635
 ENG16 0.630

TABLE 2. Discriminant Validity Test (Fornell-Larcker)

Dimensions	SHI	PSW	ENG
SHI	0.653		
PSW	0.470	0.687	
ENG	0.215	0.266	0.826

TABLE 3. Model Fit

	SRMR	NFI
MODEL	0.103	0.502

DISCUSSION

This study aimed at finding out whether psychological well-being mediated the relationship between shift work and work engagement.

TABLE 4. Path Analysis Verification

Path Analysis	T value	P value	Hypothesis
SHI → PSW	3.831	0.000	H3 valid
SHI → WE	3.035	0.002	H2 valid
PSW → WE	6.303	0.000	H1 valid

TABLE 5. Mediation effect verification

Ind var	Intevar	Dep Var	T value	P-V
Hypothesis				
Shift WK	PSW	WE	3.138	0.002

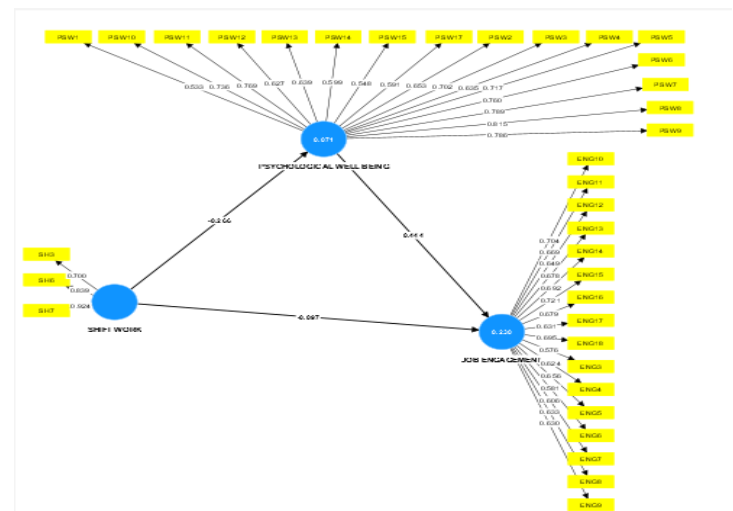


Figure 2. Path Diagram-PLS-SEM path analysis

TABLE 6. R2 value

Construct	R2	R2 Adjusted
Work Eng	0.230	0.222
Psy Wellbeing	0.071	0.066
Shift Work	0.000	0.000

Engagement. All the three scales registered cronbach alphas above the .70 threshold hence reliability was established. Discriminant validity was established for all the scales but convergent validity was only established for shift work. Mixed results for Model fit were obtained. In terms of the structural model it was established that one's psychological well-being mediates the effect of shift work on how one is engaged at work. Results have also shown that shift work influences work engagement and that one's psychological well-being influences how one will be engaged at work. However the limitation cited above means that results need to be used with caution.

Theoretical and practical implications

Practical implications

Theoretically the study makes a contribution to psychology, health science and human resource management by providing empirical support to the preposition that psychological well-being is an important latent variable in regulating the relationship between shift work and work engagement. To foster work engagement human resources practitioners

would practically need to come up with interventions that promote psychological well-being such as employee wellness programs.

CONCLUSION

PLS-SEM was used to evaluate the postulated conceptual model. Research results for this study have shown that all

Availability of data and materials

The data used and analysed during the current study is available from the corresponding author on reasonable request.

Abbreviations

PLS: Partial Least Square
PWB: Psychological Well-Being
WE: Work Engagement

SRMR: Standardized Root Mean Residual

Appendices

None

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Limitations of the study and suggestions for future research

Lack of convergent validity for some scales plus a bigger SRMR value compromising outer model fit and smaller R squared values are some of the acknowledged limitations in this study. Future studies should replicate the study using bigger and culturally diverse samples.

hypothesized paths were significant hence providing empirical evidence that shift work influences work engagement through psychological well-being.

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Author's contributions

M.S. was responsible for Data collection and writing of the article

V.C. was responsible for Statistical analyses, interpretation of results and writing of the article.

P.R.N was responsible for writing the article

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All respondents in this study consented before attempting items from the three measures. Ethical clearance was obtained from Mulungushi University ethical clearance committee.

Consent for publication No images, individual details or videos for clients' data are part of this paper.

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Not applicable

Submission declaration and verification

We declare that this paper has not been submitted to any journal besides this one.

Use of inclusive language

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