

Investigating the reversed causality of engagement and burnout in job demands-resources theory

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Orientation: Reversed causality is an area that has not commanded major attention within the South African context, specifically pertaining to engagement, burnout and job demands-resources. Therefore, this necessitated an investigation to elucidate the potential effects.

Research purpose: To investigate the reversed causal hypotheses of burnout and engagement in job demands-resources theory over time.

Motivation for the study: Organisations and researchers should be made aware of the effects that burnout and engagement could have over time on resources and demands.

Research design, approach and method: A longitudinal design was employed. The availability sample ($n = 593$) included participants from different demographic backgrounds. A survey was used to measure all constructs at both points in time. Structural equation modelling techniques were implemented with a categorical estimator to investigate the proposed hypotheses.

Main findings: Burnout was found to have a significant negative longitudinal relationship with colleague support and supervisor support, whilst the negative relationship with supervisor support over time was more prominent. Engagement showed only one significant but small, negative relationship with supervisor support over time. All other relationships were statistically non-significant.

Practical/managerial implications: This study makes organisations aware of the relationship between burnout and relationships at work over time. Proactive measures to promote relationships at work, specifically supervisor support, should be considered in addition to combatting burnout itself and promoting engagement.

Contribution/value-add: This study provides insights and information on reversed causality, namely, the effects that engagement and burnout can have over time.

Introduction

The job demands-resources (JD-R) model is supported over various occupations (Bakker, Demerouti, De Boer & Schaufeli, 2003; Bakker, Demerouti & Schaufeli, 2003; Bakker, Demerouti & Verbeke, 2004; Bakker & Geurts, 2004; Lewig, Xanthopoulou, Bakker, Dollard & Metzger 2007). The dual process underlying the JD-R model consists of two main parts: the *energetic process*, also known as the *health impairment process*, indicates that chronic job demands (i.e. work overload) lead to burnout and eventual ill-health; and the *motivational process* indicates that job resources lead to work engagement and that in turn leads to organisational commitment (Bakker, Demerouti & Schaufeli, 2003; Schaufeli & Bakker, 2004). De Beer, Rothmann Jr., and Pienaar (2012) have also confirmed a JD-R model in a sample aggregated from a variety of sectors in South Africa, including the mediating role of burnout and work engagement in their respective roles in the process. Moreover, recent research studies have also tested the JD-R model longitudinally and found favourable results (cf. Boyd, Bakker, Pignata, Winefield, Gillespie & Stough, 2011; Hakanen, Schaufeli & Ahola, 2008; Schaufeli, Bakker & Van Rhenen, 2009).

In the past, work-related well-being research has mainly focused on normal causal relationships, namely, hypotheses that investigate the relationship of variable A with variable B, in both cross-sectional and longitudinal studies. For example, in job demands-resources (JD-R) theory, a normal causal relationship would include job demands and its direct path to burnout, therefore, high job demands lead to burnout (Bakker & Demerouti, 2007; Hakanen, Bakker & Schaufeli, 2006; Robbins, Odendaal & Roodt, 2004; Schaufeli & Bakker, 2004). On the other hand, studies that investigate reversed effects or reversed hypotheses have been more limited (i.e. in research involving the endogenous variable causing, either directly or indirectly, one of its causes (Kenny, 2011). Drawing again from JD-R theory, an example of a reversed causal longitudinal investigation or reversed causal hypothesis would be investigating initial burnout (the original

outcome of high-job demands) having a causal relationship with subsequent job demands (the original hypothesised cause of burnout). Research such as this is important as the one-directional viewpoint in work-stress investigations may not necessarily capture the complex relations between work characteristics and well-being over time.

Defining engagement and burnout

Work engagement can be defined as a 'positive, work-related state of mind in employees characterised by vigour, dedication, and absorption' (Schaufeli, Salanova, Gonzalez-Roma & Bakker, 2002, p. 74). The core components of engagement are considered as vigour and dedication (Schaufeli & Bakker, 2004) but absorption, which is more related to the concept of 'flow' (Csikszentmihalyi, 1990), can be seen as resultant of being engaged at work (cf. Langelaan, 2007).

Recent research has found that engaged employees care for their own engagement by shaping their work environments, thereby not only making full use of their job resources but also creating their own resources in order to remain engaged (Bakker, Demerouti & Xanthopoulou, 2011). Furthermore, engagement has been shown to mediate the effect between job resources and organisational commitment (Bakker & Demerouti, 2007). The South African data displays this with a large effect (De Beer *et al.*, 2012). Therefore, engagement leads to more productive and committed employees in the organisation, given sufficient job resources.

In contrast, Schaufeli and Enzmann (1998) define burnout as:

a persistent, negative, work-related state of mind in 'normal individuals' that is primarily characterized by exhaustion, which is accompanied by distress, a sense of reduced effectiveness, decreased motivation, and the development of dysfunctional attitudes and behaviours at work. (p. 36)

As discussed in Schaufeli and Taris (2005), and Schaufeli (2003), burnout as a work-related phenomenon can be seen as comprised of two main components that form its core: exhaustion and cynicism. The first, exhaustion, can be characterised by a lack of energy (mental and emotional) and therefore inability. Exhaustion represents an energy-depleting process (Moore, 2000a; 2000b), and occurs when employees feel that they no longer have the resources required to deal with their work demands. Furthermore, exhaustion has been connected with, *inter alia*, the following symptoms: low energy, feelings of restlessness and difficulty to concentrate (Weiss, 1983). The second component of burnout, cynicism, can be characterised by a lack of motivation, unwillingness and mental distancing. The Maslach Burnout Inventory manual (Maslach, Jackson & Leiter, 1996) explains cynicism as characteristic of having a distant or indifferent attitude towards one's work. Moreover, it has also been argued that cynicism develops in response to exhaustion (Leiter, 1993; Van den Broeck, Vansteenkiste, De Witte & Lens, 2008).

Acute, work-related, stressful experiences contribute to depression and enduring occupational factors, which may

also contribute to psychological disorders, but differ from occupation to occupation (Tennant, 2001). Distress, without sufficient coping mechanisms or buffers, leads to burnout (Alsoofi, Al-Heeti & Alwashli, 2000). Burnout therefore reflects a process of deteriorating energetic resources and it is therefore reasonable to assume that it will predict decrements in an individual's perceived health status (Shirom, 2009).

Moreover, research has also found evidence for links between burnout and various objective health conditions, such as cholesterol (Shirom, Westman, Shamai & Carel, 1997), cardiovascular events (Melamed, Shirom, Toker, Berliner & Shapira, 2006), Type 2 diabetes (Melamed, Shirom, Toker & Shapira, 2006), musculoskeletal problems (Armon, Melamed, Shirom, Berliner & Shapira, 2010) and insomnia (Armon, 2009).

Job demands and job resources

Job demands are strongly associated with burnout and eventual ill-health outcomes through what has been coined the health impairment process (Bakker & Demerouti, 2007; Demerouti, Bakker, Nachreiner & Schaufeli, 2001; Schaufeli & Bakker, 2005; Schaufeli & Salanova, 2007).

In contrast, job resources are strongly associated with engagement and are defined as:

those physical, psychological, social, or organisational aspects of the work context that (1) can reduce the health-impairment effect of job demands, (2) are functional in achieving work goals and (3) stimulate personal growth, development and learning. (Schaufeli & Bakker, 2004, p. 296)

Engaged employees have a sense of energetic and effective connection with their work activities and they see themselves as capable of dealing with the demands of their job (Montgomery, Peeters, Schaufeli & Den Ouden, 2003). De Beer *et al.* (2012) found that engagement was positively associated with organisational commitment.

In a study of primary school educators in the North West Province of South Africa, it was found that if high job demands are experienced without sufficient job resources to cope with these demands, burnout will develop, which in turn could result in physical and/or psychological ill-health (Montgomery, Mostert & Jackson, 2005). This finding, of course, is again a description of the health impairment process in the JD-R model and Hakanen, Bakker and Schaufeli (2006) also substantiate this finding.

Reversed causal research

According to Kenny (2011), reversed causation can be explained where the endogenous variable causes, either directly or indirectly, the exogenous variable. An example of this would be burnout (endogenous) having a causal relationship with job demands (exogenous), as opposed to the normal causation that is theorised (i.e. chronic job demands leading to burnout (Hakanen *et al.*, 2006; Schaufeli & Bakker, 2004).

Most of the studies concerning the JD-R model have been one-directional in their assumptions concerning the relationship between burnout, engagement, job demands and job resources. However, within the context of the complex psychosocial work environment, an increasing amount of research suggests that the one-directionality of models alone may be inadequate to explain the dynamics of work stress and mental well-being (Bakker & Demerouti, 2007; De Lange, Taris, Kompier, Houtman & Bongers, 2005; Frese, Garst & Fay, 2007; Hakanen, Schaufeli & Ahola, 2008), suggesting that an investigation into the reversed causal hypotheses is necessary.

Two hypotheses have been set forth to explain the occurrence of reversed causation processes. The first is the 'perceptual' hypothesis, which holds that an individual's perception of job conditions may change over time because of increasing strain or commitment although working conditions themselves have not changed. In the dual process commitment is a positive outcome of engagement and burnout is negatively related to commitment. Therefore, because of the presence of resources, committed employees could perceive their job conditions more favourably (the motivational process). On the other hand, the 'selection' or 'drift' hypothesis argues that the opposite or reverse of the perceptual hypothesis can also occur – increased levels of strain might cause employees to perform worse as a result of the impairment and therefore drift into jobs and situations with more demands and fewer resources (cf. De Lange, 2004). This is consistent with findings that indicate that people have a tendency to find themselves in situations that are more similar to one another than they are to situations experienced by others. Furthermore, the degree to which an individual will perform similar behaviours at two different times is largely a function of two factors, namely, the similarity between the two situations and the personality of the individual (Sherman, Nave & Funder, 2010).

Bakker and Schaufeli (2007) hypothesised that job stress and motivation can both be predictors and outcomes of job demands and job resources. Furthermore, their explanation for why this could occur coincides with the above-mentioned drift and perceptual hypotheses. De Lange, De Witte and Notelaers (2008) investigated longitudinal relationships amongst job resources and work engagement that included reversed causal hypotheses and found that work engagement had a small, positive reversed causal relationship with social support (colleague and supervisory).

The present study

In the current study, the aim was to investigate, longitudinally, the hypothesised reversed relationship of burnout and work engagement, with job demands and job resources over time.

The JD-R model does not require a matching of the job demands with the job resources in its specification, as is required in the Demand Induced Strain Compensation (DISC) model (cf. Bakker, Hakanen, Demerouti & Xanthopoulou, 2007; De Jonge & Dormann, 2003). Demerouti *et al.* (2001, p. 21) describe the chronic job demands of the energetic and/

or health impairment process in the JD-R model as work overload. In the present study as well, the indicator used for job demands was work overload containing quantitative (mental) load, pace and amount of work items. Emotional load was not included as it has been shown to be more prevalent in specific occupations, such as teaching, nursing and healthcare sectors, but basically absent in others (cf. Bakker & Demerouti, 2007). Furthermore, work overload is used in conformity with the results of De Beer *et al.* (2012) who successfully tested and confirmed a JD-R model with the same survey used in this study and that was applied to a large and diverse South African sample aggregated from various sectors, including the one under investigation in the present study (i.e. the mining sector).

Bakker and Demerouti (2007) specify that job resources are located at the level of the organisation at large, the level of interpersonal and social relations, the level of organisation of work and at the task level. This research included at least one of the resources from each of the formerly indicated levels, namely, supervisor support and colleague support (interpersonal and social relations), role clarity (organisation of work), growth opportunities (task level) and communication (organisation at large).

This study did not investigate a reversed causal relationship of engagement to overload as there is no direct normal causal path in JD-R theory from overload to engagement. Therefore, investigating such a path would not be in accordance with a reversed causal hypothesis in the traditional sense. This study therefore proposes the following reversed causal hypotheses:

- **Hypothesis 1:** Burnout will be negatively related to job resources over time, namely:
 - colleague support
 - communication
 - growth opportunities
 - role clarity
 - supervisor support.
- **Hypothesis 2:** Engagement will be positively related to job resources over time, namely:
 - colleague support
 - communication
 - growth opportunities
 - role clarity
 - supervisor support.
- **Hypothesis 3:** Burnout time 1 (T1) will have a positive relationship to overload time 2 (T2).

Therefore, the research model can be illustrated as follows.

Research design

Research approach

To help achieve the research aims, a survey design was used (Shaughnessy, Zechmeister & Zechmeister, 2003), whilst to investigate the changes caused by the passage of time, a longitudinal approach was taken (Huysamen, 2001). The same survey was therefore implemented twice and completed by the respondents with a mean time lag of 12 months (SD = 2).

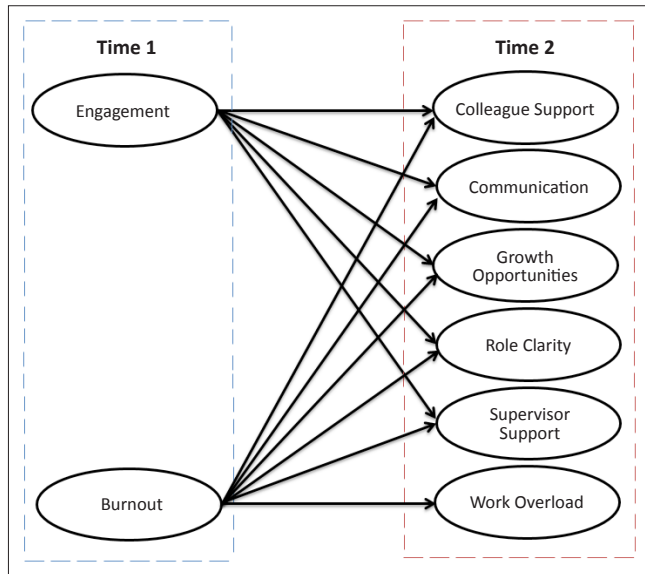


FIGURE 1: Illustration of reversed causal hypotheses under investigation.

Research method

Participants

Data from a random sample of individuals ($n = 593$) from a South African mining organisation was collected and used. Employees of all ages and occupational levels were sampled and participation was entirely voluntary. The majority of the participants were white-collar workers in the mining environment in rather 'typical' office jobs with internet and computer access. The anonymity for all participants and the organisation was assured. All ethical guidelines in the treatment of human subjects in the research were observed during this study.

The vast majority of participants were men (501; 84.5%) whilst 92 (15.5%) were women participants. The most prevalent home languages were Afrikaans, with 255 (43%) participants, and English, with 170 (28.7%) participants. Employees who were married numbered 450 or 76%, and those who were single 99 (16.7%). The majority of participants, that is, 323 (54.5%), had a general high school education (Grade 12). Furthermore, 179 (30.2%) participants' highest level of education was Grade 8 and 78 people had at least a university degree. In terms of experience or years in the job, data was stratified relatively closely but the biggest strata of participants (28.7%) had been in the job for two to five years.

Measuring instrument

The South African Employee Health and Wellness Survey (SAEHWS) (Rothmann & Rothmann, 2007) was developed as a web-based, or paper-and-pencil, self-administered survey to be applied in employee health and wellness assessments by the Research Unit of which the researchers form part. The SAEHWS comprises different sections collecting wellness, work and health information from the respondents.

The SAEHWS fuses organisational climate assessment with other important variables influencing the climate, in order

TABLE 1: Characteristics of participants ($n = 593$).

Item	Category	<i>f</i>	%
Gender	Male	501	84.50
	Female	92	15.50
Age	20–29	58	9.0
	30–39	163	27.50
	40–49	228	38.50
	50–59	131	22.00
	>60	13	2.20
Race	African	203	34.23
	White	270	45.53
	Coloured	5	0.84
	Indian	2	0.34
	Unanswered	113	19.06
Marital status	Single	99	16.70
	Engaged	10	1.70
	Married	450	75.90
	Divorced	29	4.90
	Widow	3	0.50
	Widower	2	0.30
Home language	Afrikaans	255	43.00
	English	170	28.70
	Sepedi	19	3.20
	Sesotho	56	9.40
	Setswana	31	5.20
	SiSwati	9	1.50
	isiZulu	8	1.40
	isiNdebele	1	0.20
	isiXhosa	37	6.20
	Xitsonga	6	1.00
	Other	1	0.20
Highest qualification	Grade 8	179	30.20
	Grade 9	1	0.20
	Grade 10	5	0.80
	Grade 11	7	1.20
	Grade 12	323	54.50
	3-year degree or diploma	60	10.10
	4-year degree or diploma	13	2.20
	Master's degree	5	0.80
Years in job	2 to 5 years	170	28.70
	6 to 10 years	115	19.40
	11 to 15 years	69	11.60
	16 to 20 years	80	13.50
	21 to 25 years	83	14.00
	26 to 30 years	53	8.90
	31 to 35 years	16	2.70
	36 and more years	4	0.70
	Unanswered	3	0.50

f, frequency.

to achieve maximum management information whilst implementing one measurement and/or assessment only. The internal consistency of all the subscales of the SAEHWS is acceptable compared to the generally accepted guideline (i.e. $\alpha \geq 0.70$) (Nunnally & Bernstein, 1994).

In line with Schaufeli and Taris (2005), burnout was measured and constructed by two core components: exhaustion and mental distance (cynicism). Subsequently, the following subscales were measured for this study:

- Exhaustion: ($\alpha = 0.83$) by means of four items (e.g. 'I feel tired before I arrive at work.')

- Mental distance (cynicism): ($\alpha = 0.79$) by means of four items (e.g. 'I have become less interested in my work.')
- Overload: ($\alpha = 0.79$) by means of four items (e.g. 'Do you have too much work to do?').
- Supervisor support: ($\alpha = 0.84$) by means of three items (e.g. 'Can you count on your direct supervisor when you come across difficulties in your work?').
- Colleague support: ($\alpha = 0.74$) by means of three items (e.g. 'Can you count on your colleagues when you come across difficulties in your work?').
- Role clarity: ($\alpha = 0.70$) by means of three items (e.g. 'Do you know exactly what your responsibilities are?').
- Communication: ($\alpha = 0.81$) by means of three items (e.g. 'Is it clear whom you should address within the department or organisation for specific problems?').
- Growth opportunities: ($\alpha = 0.75$) by means of three items (e.g. 'Does your job offer you opportunities for personal growth and development?').
- Work engagement: ($\alpha = 0.89$) by means of seven items, namely, three vigour and four dedication items (e.g. 'I am full of energy in my work.') (vigour) and ('I find my work full of meaning and purpose.') (dedication).

Concerning the ordinal scales, the job resources and job demands items were all measured on 4-point Likert scales ranging from *never* to *always*. Burnout and engagement items were measured on 7-point Likert scales, also ranging from *never* to *always*.

Research procedure

Data was collected at two points in time (2009–2010) over a 12-month mean ($SD = 2$) in the mining sector and was used for this longitudinal study. The survey was web-based and all participants received hyperlinks via e-mail. Informed consent was obtained from all the participants and all the participants received a link to the computer-based survey via e-mail. The system was then set up to send an e-mail to all previous participants reminding them to complete another survey after the specified period. The system and connection were secured with the American Encryption Standard (AES) so that data could not be compromised even if illegally obtained. The response rate for year one was 84%, and for year two 82%.

Statistical analyses

Structural equation modelling (SEM) methods as implemented by Mplus 6.1 (Muthén & Muthén, 2010) were used to investigate the hypotheses. Mplus was chosen because of its unique ability to specify continuous and/or categorical latent variables in analyses.

In the behavioural sciences, response variables are often non-continuous and therefore psychological constructs are measured on Likert scales. To test the hypotheses, a cross-lagged model was investigated using a categorical estimator. According to Newsom (2012), there is growing consensus that categorical variables should be analysed with the weighted least squares. The default estimator for models that

contain categorical data in Mplus is the mean and variance-adjusted weighted least-squares method (WLSMV) (Muthén & Muthén, 2010; Muthén, du Toit & Spisic, 1997), and was used in the analyses. In the cross-lagged modelling approach, each variable in the model is regressed on all of the variables that precede it in time to control for effects. This was also applied in the analysis of this research but not drawn in the figure (Figure 1) in order to keep the representation of the hypotheses simple to the reader. A table will be provided in the results section with control path variable results.

The following fit indices were considered: Comparative Fit Index (CFI), Tucker-Lewis Index (TLI) and the Root Mean Square Error of Approximation (RMSEA). These indices are the default in the Mplus package; the rationale and philosophy behind this is to provide one well-performing fit statistic from several different families of fit statistics rather than many fit statistics from one family (cf. Hu & Bentler, 1998; Muthén, 2009). For the CFI and TLI, acceptable fit is considered at a value of 0.90 and above (Hoyle, 1995). According to Cudeck and Browne (1993), for the RMSEA, a value of 0.05 or less indicates a good fit but values of 0.08 or less are also to be considered an acceptable model fit. However, the above cut-off points should only be considered as rough guidelines (Marsh, 2007; Marsh, Hau & Grayson, 2005). Furthermore, a correlation matrix from Mplus for the latent variables was also included for analyses and discussion.

Results

The hypothesised model was specified based on the hypotheses, as well as all variables set as *categorical* in Mplus, and the model was found to fit the data acceptably (see Table 2).

The chi-square statistic was relatively high ($\chi^2 = 4687.24$) but there are severe limitations in its use, for example, sensitivity to sample size in that the statistic almost always rejects a model if a large sample is used. It also assumes multivariate normality and severe deviations could lead to model rejection even when correctly specified (cf. Hooper, Coughlan & Mullen, 2008). However, the CFI (0.94) and TLI (0.93) both surpassed the rule of thumb of 0.90 for indication of good model fit (Hoyle, 1995). Furthermore, the RMSEA value of 0.04 is below the guideline of 0.08, which confirms a good model fit (Cudeck & Browne, 1993).

Table 3 provides a summary of the various control paths in the model (i.e. all variables' relationships with themselves over time).

As the results for the control paths of the research model show, all variables had a statistically significant effect with

TABLE 2: Results of the Structural equation modelling (SEM) analysis ($n = 593$).

Description	χ^2	df	CFI	TLI	RMSEA	p -Value
Research model	4687.24	2695	.94	.93	.04	.001

χ^2 , chi-square; df , degrees of freedom; CFI, comparative Fit Index; TLI, tucker-Lewis Index; RMSEA, root mean square error of approximation.
 $p < .001$

themselves over time. Furthermore, all these relations were positive. The largest effect was engagement (T1) on engagement (T2), which indicated a path coefficient of 0.69 ($p < .001$). The smallest effect was for Supervisor support over time, which showed a path coefficient of 0.38 ($p < .001$).

Table 4 below reports the results for the investigated hypotheses for the study.

The results supported Hypothesis 1a and Hypothesis 1e. Interestingly, Hypothesis 2e was found to be significant but the result was opposite to the direction expected.

Subsequently, all other hypotheses were rejected because of statistical non-significance at the 0.05 level (although, Hypothesis 1b and Hypothesis 1d approached significance at the 0.05 level). The strongest longitudinal effect was the negative relationship between burnout (T1) and supervisor support (T2).

Table 5 reports on the results of the correlations for all of the variables at time 1 and all the variables at time 2, respectively. Furthermore, all correlations were statistically significant at the 99% level of significance.

TABLE 3: Summary of control paths with relevant statistics reported.

Latent variable	β	SE	p	Result
Burnout (T1) → Burnout (T2)	0.66	0.06	.001	Significant
Engagement (T1) → Engagement (T2)	0.69	0.04	.001	Significant
Job demands (T1) → Job demands (T2)	0.61	0.07	.001	Significant
Colleague support (T1) → Colleague support (T2)	0.49	0.06	.001	Significant
Communication (T1) → Communication (T2)	0.40	0.05	.001	Significant
Growth opportunities (T1) → Growth opportunities (T2)	0.63	0.07	.001	Significant
Role clarity (T1) → Role clarity (T2)	0.50	0.07	.001	Significant
Supervisor support (T1) → Supervisor support (T2)	0.38	0.06	.001	Significant

T1, time 1; T2, time 2; β , path coefficient; SE, standard error; p , statistical significance.

TABLE 4: Hypotheses summary with relevant statistics and results reported.

Hypothesis	Reversed relationship	β	SE	p	Result
1a	Burnout (T1) → Colleague support (T2)	-0.27	0.13	0.033	Supported
1b	Burnout (T1) → Communication (T2)	-0.27	0.14	0.053	Not significant
1c	Burnout (T1) → Growth opportunities (T2)	-0.10	0.07	0.467	Not significant
1d	Burnout (T1) → Role clarity (T2)	-0.23	0.12	0.057	Not significant
1e	Burnout (T1) → Supervisor support (T2)	-0.56	0.15	0.000	Supported
2a	Engagement (T1) → Colleague support (T2)	-0.04	0.10	0.688	Not significant
2b	Engagement (T1) → Communication (T2)	-0.06	0.11	0.550	Not significant
2c	Engagement (T1) → Growth opportunities (T2)	-0.08	0.11	0.463	Not significant
2d	Engagement (T1) → Role clarity (T2)	-0.18	0.10	0.084	Not significant
2e	Engagement (T1) → Supervisor support (T2)	-0.29	0.11	0.009	Significant
3	Burnout (T1) → Overload (T2)	-0.02	0.07	0.722	Not significant

T1, time 1; T2, time 2; β , path coefficient; SE, standard error; p , statistical significance.

TABLE 5: Correlation matrix (r) of the latent variables ($n = 593$).

Variable name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Burnout (T1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2. Engagement (T1)	-0.81 ^b	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3. Overload (T1)	0.55 ^b	-0.23	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4. Colleague support (T1)	-0.45 ^a	0.24	-0.23	-	-	-	-	-	-	-	-	-	-	-	-	-
5. Communication (T1)	-0.47 ^a	0.47 ^a	-0.15	0.30 ^a	-	-	-	-	-	-	-	-	-	-	-	-
6. Growth opportunity (T1)	-0.60 ^b	0.58 ^b	-0.24	0.43 ^a	0.63 ^b	-	-	-	-	-	-	-	-	-	-	-
7. Role clarity (T1)	-0.53 ^b	0.54 ^b	-0.18	0.50 ^b	0.67 ^b	0.62 ^b	-	-	-	-	-	-	-	-	-	-
8. Supervisor support (T1)	-0.53 ^b	0.32 ^a	-0.14	0.57 ^b	0.71 ^b	0.63 ^b	0.72 ^a	-	-	-	-	-	-	-	-	-
9. Burnout (T2)	0.68 ^b	-0.55 ^b	0.38 ^a	-0.30 ^a	-0.32 ^a	-0.41 ^a	-0.36 ^a	-0.36 ^a	-	-	-	-	-	-	-	-
10. Engagement (T2)	-0.52 ^b	0.64 ^b	-0.15	0.27	0.30 ^a	0.37 ^a	0.54 ^a	0.34 ^a	0.84 ^b	-	-	-	-	-	-	-
11. Overload (T2)	0.35 ^a	-0.16	0.62 ^b	-0.15	-0.10	-0.16	-0.12	-0.09	0.55 ^b	-0.27	-	-	-	-	-	-
12. Colleague support (T2)	-0.39	0.33 ^a	-0.21	0.57 ^b	0.30 ^a	0.31 ^a	0.34 ^a	0.37 ^a	0.54 ^b	0.52 ^b	-0.25	-	-	-	-	-
13. Communication (T2)	-0.35 ^a	0.31 ^a	-0.16	0.25	0.50 ^b	0.36 ^a	0.25	0.38 ^a	0.59 ^b	0.56 ^b	-0.24	0.59 ^b	-	-	-	-
14. Growth opportunity (T2)	-0.37 ^a	0.33 ^a	-0.17	0.26	0.38 ^a	0.60 ^b	0.37 ^a	0.26	0.60 ^b	0.58 ^b	-0.24	0.56 ^b	0.68 ^b	-	-	-
15. Role clarity (T2)	-0.37 ^a	0.30 ^a	-0.18	0.30 ^a	0.39 ^a	0.37 ^a	0.57 ^b	0.41 ^a	0.63 ^b	0.57 ^b	-0.23	0.64 ^b	0.78 ^b	0.69 ^b	-	-
16. Supervisor support (T2)	-0.41 ^a	0.28	-0.22	0.31 ^a	0.36 ^a	0.35 ^a	0.37 ^a	0.49 ^a	0.63 ^b	0.57 ^b	-0.25	0.68 ^b	0.79 ^b	0.64 ^b	0.80 ^d	-

T1, time 1; T2, time 2.

^a, Medium practical significance.

^b, Large practical significance.

$p < 0.01$ for all values

Burnout (T1 & T2) had a negative correlation with all the time 1 and time 2 resources and a positive correlation with overload. The highest correlations were the negative correlations between burnout and engagement at time 1 and time 2 (-0.81; -0.84). The lowest negative correlation at time 1 was between overload and supervisor support (-0.14) at time 1. The lowest correlation at time 2 was between overload and role clarity (-0.23). As for the positive correlations, the lowest was between engagement and colleague support (0.24) at time 1. The highest positive correlation was between supervisor support and role clarity (0.80) at time 2.

Discussion

The current study set out to investigate the reversed causal hypotheses of burnout and engagement on overload and job resources (colleague support, communication, growth opportunities, role clarity and supervisor support) over time. The results would elucidate the possible consequences that burnout could have on subsequent experiences of overload and job resources, and the possible effects of engagement on resources over time. The hypotheses were investigated by means of SEM analysis and the resulting model was found to be a good fit to the sample data. Control variable paths were also specified and all of the variables had a significant relationship with their counterparts over time.

Burnout had significant negative relationships with colleague support and supervisor support over time. However, no significant paths were found for communication, role clarity and growth opportunities. The former findings indicate that burnout leads to a deterioration of relationships at work, specifically supervisor support, which had the larger effect. Therefore, burnout has a negative reversed causal relationship on the interpersonal and social relations level of job demands. Leiter and Durup (1996) also found a reversed relationship between work overload and supervisor support. The affected individual might feel that they do not receive the necessary support from colleagues or supervisors and that this leads to a general degradation of perception of these relationships for the employee. This is in line with the argument presented by De Lange, Taris, Kompier, Houtman, and Bongers (2004) that fatigued employees perceive their work environment more negatively over time and as a consequence the unhealthy workers report lower levels of supervisor support over time.

Interestingly, there was no significant path from burnout to overload over time, as it might be expected that an already burned-out individual would perceive their future workload as more demanding. Therefore, this result shows that there is no reversed causal effect from burnout to overload over time. A possible explanation for this result could be found in the literature on presenteeism. Presenteeism can be defined as 'being at work when you should be at home either because you are ill or because you are working such long hours that you are no longer effective' (Cooper, 1996, p. 15). Therefore, employees are present at work but are not being productive, investing the minimum effort and thereby avoiding general demands and any additional demands by applying a conservation of resources strategy to adapt

to the environment and protect themselves (Hobfoll, 2001). Another interpretation may be that the burnt-out individual is already experiencing such high levels of perceived overload that any additional future demands cannot be perceived as significantly more demanding within the context of the current demands. In other words, the health impairment process has *already* done major damage. Of course, it could also be that demands with regard to overload remained relatively constant over the period of the study. However, the control path of overload upon itself over time indicated that there was a significant effect. Employees who do not have the necessary workplace support (supervisor and colleague) may feel more overworked. Additionally, overworked employees are more likely to make bad decisions (Galinsky, Kim & Bond, 2001), which might very well include taking on more duties when they should be saying 'no'.

Engagement showed only one significant reversed causal effect and that was the negative relation to supervisor support. This result is opposite the effect of what was hypothesised and to what previous research has found on this topic, for example, Bakker and Bal (2010) address the issue of how and why engagement can influence resources over time. Concerning this research, one would think that if such a reversed causal relationship existed at all, that engagement would lead to positive perceptions of supervisor support over time. However, it should be borne in mind that this effect is small and that it may only be a sample-specific phenomenon. Furthermore, De Lange, De Witte, and Notelaers (2008) found a small but positive reversed effect for work engagement in predicting social support of supervisors and colleagues in their study, which is more in line with what was expected. According to Macey, Schneider, Barbera and Young (2009), social support does not always have a positive effect. This negative impact occurs when employees receive support they do not want or think that they would not need if they were more competent, that is, actual received support can be a negative experience when it comes at the cost of lost self-esteem. Moreover, a case could also be made that an engaged employee 'evolves' into a more independent employee over time and whom the supervisor now sees as needing less managing than non-engaged employees. Therefore, the respondents could have indicated a lower rating for supervisor support on the survey than the year before although levels of supervisor support are acceptable to the engaged employee.

Implications and recommendations for management

Based on the results of this study, it is recommended that researchers, managers and psychologists in the workplace take note of the evidence for reversed causality and the negative effect of burnout on supervisor and colleague support (relationships at work) over time. Importantly, the effect on supervisor support has previously been found in other contexts (De Lange, De Witte & Notelaers, 2008; Leiter & Durup, 1996). Strategies should be considered to equip supervisors with the necessary skills by providing adequate training to offset possible implications for employees. This could be achieved by informing supervisors of the important

benefits that their support can have on their subordinates' well-being which in turn could lead to more acceptable outcomes for all stakeholders. Additionally, interpersonal skills training may be part of a management development or induction programme for new supervisors.

Limitations and recommendations for future research

The strength of this study was its longitudinal design. However, it is recommended for future studies that researchers allow for a third wave of longitudinal investigation, spanning another year, thereby having more data points separated by a reasonable amount of time to investigate reversed causal effects to draw conclusions from. Researchers could also consider shortening the time span between data collection, for example, three samples spanning three-month intervals each. Future researchers should also investigate the negative longitudinal relationship between engagement and supervisor support over time to confirm if this was a sample-specific occurrence or if it also occurs in other work contexts. Furthermore, this study did not include a reversed causal hypothesis from engagement to job demands over time, considering there was no traditional causal path in the JD-R model. However, it is possible that engagement could affect the perception of demands over time and this warrants future investigation in South African context. Moreover, after careful consideration of the results it is important to mention to future researchers the variables that this study did not assess, for example, internal movement within the organisation, restructuring, life at home, pay raises, new leadership and other changes in personal life circumstances. In hindsight, the researchers should have included questions in the second measurement about participants moving between teams or reporting to new supervisors. This study also did not test the moderating and mediating effect of perceived overload.

Mention should further be made of the correlations (see Table 5). Burnout time 1 and all the time 1 variables were correlated with a medium effect. However, burnout time 2 and all the time 2 variables were correlated with a large effect. This could be because participants have become aware of the variables caused by factors such as the survey itself over time, creating a sensitisation effect.

Attention should also be drawn to the fact, again, that the majority of participants of this study were men. A possible reason for this is that the participation of the sample was entirely voluntary on all occupational levels. Furthermore, the mining industry has traditionally been perceived as a more male dominant environment. Future researchers should therefore consider a stratified approach to collect a more gender representative sample.

Conclusion

Despite some limitations, the findings of this study have important implications that begin to illuminate the reversed causality of burnout and engagement in the South African context. Specifically, the results show that burnout leads to a deterioration of relationships at work, namely, supervisor

and colleague support over time. Furthermore, engagement had no significant effects on job resources but one, namely, a small negative effect to supervisor support which was opposite to the hypothesised direction. The Health and Safety Executive (HSE) in the United Kingdom has published a document, which is available as an online resource, regarding management competencies for reducing stress at work that may be useful material to the reader (HSE, 2007).

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Competing interests

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Authors' contributions

L.T. de B. (North-West University) wrote the manuscript, J.P. (North-West University) was the project leader and promoter of the first author's PhD thesis. S.R. (Afriforte) prepared the sample and performed statistical analyses.

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