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Detecting causal relationships between work motivation and job performance: a meta-analytic review of cross-lagged studies

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Given that competing hypotheses about the causal relationship between work motivation and job performance exist, the current research utilized meta-analytic structural equation modeling (MASEM) methodology to detect the causal relationships between work motivation and job performance. In particular, completing hypotheses were checked by applying longitudinal data that include 84 correlations ($n = 4389$) from 11 independent studies measuring both work motivation and job performance over two waves. We find that the effect of motivation (T1) on performance (T2), with performance (T1) controlled, was positive and significant ($\beta = 0.143$). However, the effect of performance (T1) on motivation (T2), with motivation (T1) controlled, was not significant. These findings remain stable and robust across different measures of job performance (task performance versus organizational citizenship behavior), different measures of work motivation (engagement versus other motivations), and different time lags (1–6 months versus 7–12 months), suggesting that work motivation is more likely to cause job performance than vice versa. Practical and theoretical contributions are discussed.

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Introduction

Job performance is defined as "scalable actions, behavior, and outcomes that employees engage in or bring about that are linked with and contribute to organizational goals" (Viswesvaran and Ones, 2000, p. 216), is a core concept in the applied psychological field (Campbell and Wiernik, 2015; Choi et al., 2022; Giancaspro et al., 2022; Hermanto and Srimulyani, 2022; Motowidlo, 2003). Employees' job performance is important for both organization and the employee. For an organization, job performance is the vital antecedent of organizational performance (Almatrooshi et al., 2016); for an employee, job performance is a predictor of turnover (Bycio et al., 1990; Martin et al., 1981), and wellbeing (Bakker and Oerlemans, 2011; Ford et al., 2011). Considering the importance of job performance in the applied psychological field, it is not surprising that researchers have devoted significant effort to researching job performance, especially its antecedents.

Prior meta-analyses identified a series of antecedents of job performance, such as job satisfaction (Iaffaldano and Muchinsky, 1985; Judge et al., 2001; LePine et al., 2002), organizational commitment (Jaramillo et al., 2005; Mathieu and Zajac, 1990), and work motivation (Cerasoli et al., 2014; Van den Broeck et al., 2021; Van Iddekinge et al., 2018). Among these factors, motivation, which refers to the force that drives the direction, intensity, and persistence of employee behavior (Pinder, 2014), is a medium to strong predictor of performance (Cerasoli et al. 2014). Although the early meta-analyses (e.g., Cerasoli et al., 2014; Van Iddekinge et al., 2018) confirmed the significant correlations between work motivation and job performance, the accurate causal relationship between work motivation and job performance remains unclear. Does work motivation cause job performance? Does reverse causality exist? Or there is a reciprocal relationship between them? Unfortunately, previous meta-analyses (e.g., Cerasoli et al., 2014; Van Iddekinge et al., 2018), which are based on cross-temporal data rather than longitudinal cross-lagged panel data, could not address this research gap.

We propose four competing hypotheses to explain the causal relationship between them. First, work motivation causes job performance. Second, job performance causes work motivation. Third, work motivation causes job performance and vice versa (reciprocal model). Finally, work motivation and job performance are causally unrelated. In the Theory and Hypotheses part, we will describe these hypotheses in detail.

By checking all four hypotheses, the current study aims to reveal the causal relationship between work motivation and job performance. A single primary study could not accomplish our research goal due to the distorting of statistical artifacts (e.g., sampling error and measurement error; Hunter and Schmidt, 2004). For instance, the relationships of interest may vary when sampling from different organizations because of sampling error, which would harm the accuracy of the results. Fortunately, the meta-analysis methodology could help us to correct the statistical artifacts and thereby provide solid and reliable empirical evidence for the theory. As such, we utilize a meta-analysis methodology that allows us to aggregate cross-lagged panel data to test the four hypotheses.

This article provides the first meta-analysis that estimates the longitudinal effects between work motivation and job performance, contributing to both theory and practice. In terms of theory, this study will provide solid evidence for the causal relationship between work motivation and job performance, contributing to motivation and performance literature. In relation to practice, the results of our study will provide guidance for human resource management. For instance, if we find that motivation causes performance, using human resource practice (e.g., performance appraisal and training) that will influence motivation to improve performance will be reasonable; whereas if other results were found, perhaps we will reconsider the effectiveness of the current human resource practices.

Theory and hypotheses

In this part, we will review work motivation and job performance and their measurements. Then, we will develop the hypotheses between them. Finally, as a meta-analysis, we will propose a research question about the moderators that might influence the relationships between motivation and performance.

Before the 1970s, organizational psychologists primarily directed their attention toward job satisfaction, often sidelining the exploration of work performance (Organ, 2018). However, the tide turned in the 1980s, when scholars began conceptualizing individual job performance as a distinct construct (Campbell and Wiernik, 2015). Job performance is commonly characterized by two key forms: task performance and organizational citizenship behavior (OCB), providing a structured framework for evaluating employee contributions (Hoffman et al., 2007; Sidorenkov and Borokhovski, 2021; Young et al., 2021). Notably, performance should not be conflated with efficiency and productivity. While performance encompasses a broader term, often associated with achieving various levels or outcomes potentially under myriad conditions, both efficiency and productivity are intricately tied to the concept of optimizing resource utilization and maximizing output production (Campbell and Wiernik, 2015).

Task performance refers to the effectiveness with which job incumbents perform activities that contribute to the organization's technical core (Borman and Motowidlo, 1997, p. 99). Notably, this concept is also identified as "in-role performance/behavior" in the literature (Koopmans et al., 2011; Raja and Johns, 2010). In-role performance essentially encapsulates behaviors aimed at fulfilling formal tasks, duties, and responsibilities, often detailed in job descriptions (Becker and Kernan, 2003; Williams and Anderson, 1991). Contrarily, early meta-analyses have amalgamated related concepts, acknowledging their overlapping domains (Riketta, 2008; Young et al., 2021). OCB is delineated as "individual behavior that is discretionary, not directly or explicitly recognized by the formal reward system, and that in the aggregate promotes the effective functioning of the organization" (Organ, 1988, p. 4). Contextual performance, reflecting actions extending beyond formal job descriptions and enhancing organizational effectiveness (MacKenzie et al., 1991), is frequently paralleled with OCB in meta-analytic practices (Riketta, 2008; Young et al., 2021). A noteworthy correlation between task performance and OCB ($\rho = 0.74$) is illuminated through a meta-analysis by Hoffman et al. (2007). While some scholars propose that performance can exhibit counterproductive facets (Campbell and Wiernik, 2015), meta-analysis unveils only a moderate relationship between OCB and counterproductive work behavior and reveals somewhat disparate relationship patterns with their antecedents (Dalal, 2005). Therefore, in this study, we study two fundamental dimensions of job performance: task performance and OCB.

Motivation reflects why people do something. It is widely researched in the work and educational psychological field (Anesukanjanakul et al., 2019; Christenson et al., 2012; Fishbach and Woolley, 2022; Hartinah et al., 2020; Muawanah et al., 2020). Work motivation stands distinct amidst a spectrum of related concepts. Firstly, it is imperative to differentiate motivation from personality. Personality, defined as a construct embodying a set of "traits and styles displayed by an individual, represents (a) dispositions, that is, natural tendencies or personal inclinations of the person, and (b) aspects wherein the individual deviates from

the 'standard normal person' in their society" (Bergner, 2020, p.4). Personality acts as a distal antecedent to performance, influencing it indirectly through the medium of motivation (Judge and Ilies, 2002; Kanfer et al., 2017). Secondly, while interrelated, goal pursuit and motivation are distinctive concepts. For example, if employees aim to earn money, their motivations are characterized as external. Conversely, intrinsically motivated employees engage in work for the enjoyment derived from the process itself, potentially without being driven by explicit work goals (Deci et al., 2017). Thirdly, motivation is different from attitude. Job attitudes (e.g., job satisfaction) reflect the evaluations of one's job (Judge and Kammeyer-Mueller, 2012). Motivation may not necessarily include the evaluation of the job. For instance, engaged people, who usually put a great deal of effort into their work (Bakker et al., 2014), may not include the evaluation of the job. Actually, attitudes may likely be influenced by motivations, indicating they are different concepts (Judge and Kammeyer-Mueller, 2012).

As work motivation is a very grand concept, many psychological and organizational theories try to measure motivation by using different scales. For instance, in the perspective of the Job Demands–Resources (JD-R) Theory (Bakker, 2011; Bakker and Demerouti, 2017), work engagement is regarded as the motivation factor that links job resources and job performance; in the perspective of the Self-determination Theory (SDT), motivation (e.g., intrinsic motivation and extrinsic motivation) is the antecedent of job performance (Deci et al., 2017; Deci and Ryan, 2000). In the review process, we notice that work engagement is one of the most widely-used measurements of motivation when researching the work motivation-job performance linkage.

Hypotheses between motivation and performance. The first potential causal relationship is that work motivation causes job performance. This argument is shown in Fig. 1. This Argument is supported by many well-established theories and empirical evidence. To start, in the JD-R theory (Bakker, 2011; Bakker and Demerouti, 2007; Bakker and Demerouti, 2017), engaged (well-motivated) people will accomplish job performance because they will experience more positive emotions which may increase the creation of new ideas and resources and they will be healthy and be energetic at work. The correlational relationship was confirmed by a prior meta-analysis as it found a medium correlation ($\rho = 0.48$) between engagement and job performance (Neuber et al., 2021). Then, from the perspective of SDT (Deci et al., 2017; Deci and Ryan, 2000; Gagné and Deci, 2005), motivation also influences performance. In particular, intrinsically motivated employees will be creative and productive, increasing their job performance. An early meta-analysis finds a moderate correlation between intrinsic motivation and performance ($\rho = 0.28$) (Cerasoli et al., 2014). Finally, motivation may influence performance directly by determining the level of effort and persistence an individual will exert in the face of obstacles (Kanfer, 1990). Motivation may also influence performance indirectly, as motivated individuals are more likely to set challenging goals and commit to achieving them, leading to higher performance (Locke and Latham, 2006). Together, it seems obvious that work motivation will cause subsequent job performance. When using the cross-lagged panel research design to test this hypothesis, the subsequent performance will be predicted by the previous motivation after controlling the auto-correlation effect. As such, the following hypothesis is proposed:

Hypothesis 1: Work motivation causes job performance. In particular, work motivation (T1) is the significant predictor of job performance (T2) after controlling the auto-correlation effect of job performance (T1).

As illustrated in Fig. 2, the second potential causal relationship is that performance causes motivation. As SDT suggested, feedback will influence motivation (Deci et al., 1999). Employees who achieve job performance may receive positive feedback (e.g., pay and recognition) from their organizations and leaders (Riketta, 2008), increasing their work motivation. Applying longitudinal data, Presbitero (2017) provided indirect evidence that improvements in reward management yielded a positive change in the level of motivation (measured by engagement). Therefore, we hypothesize the following:

Hypothesis 2: Job performance causes work motivation. In particular, job performance (T1) is the significant predictor of work motivation (T2) after controlling the auto-correlation effect of work motivation (T1).

According to Fig. 3, the third hypothesis is that motivation causes performance and performance causes motivation simultaneously. Combining Hypotheses 1 and 2, we could conclude this reciprocal hypothesis. Utilizing cross-lagged panel data, early studies found reciprocal relationships between (a) self-efficacy and academic performance (Talsma et al., 2018) and (b) job characteristics and emotional exhaustion (Konze et al., 2017).

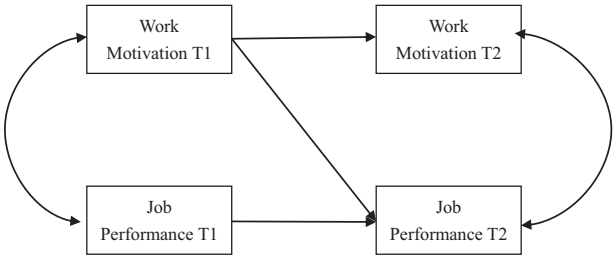

Fig. 1 The motivation-causing-performance model. An illustration of arguments for a "motivation-causing-performance" process. This figure is covered by the Creative Commons Attribution 4.0 International License.

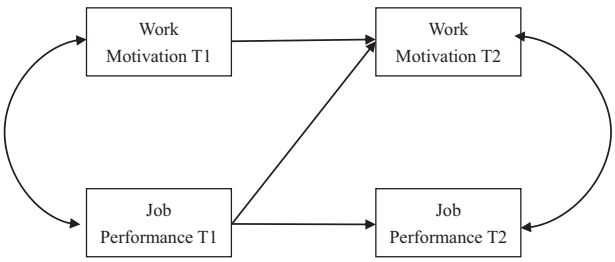

Fig. 2 The performance-causing-motivation model. An illustration of arguments for a "performance-causing-motivation" process. This figure is covered by the Creative Commons Attribution 4.0 International License.

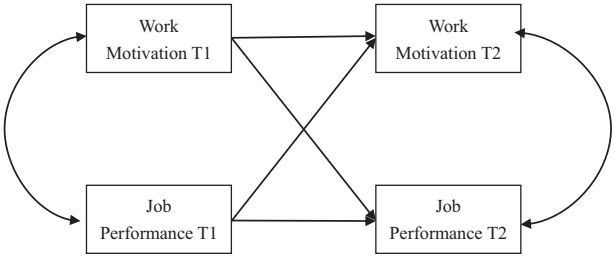

Fig. 3 The reciprocal model. An illustration of arguments for a simultaneous reciprocity between work motivation and job performance. This figure is covered by the Creative Commons Attribution 4.0 International License.

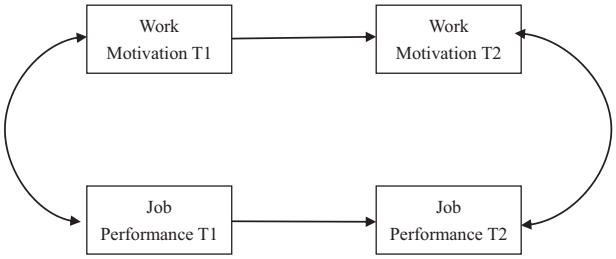

Fig. 4 The causally unrelated model. An illustration of arguments for a causally unrelated relationship between work motivation and job performance. This figure is covered by the Creative Commons Attribution 4.0 International License.

That is to say, there might be a reciprocal relationship between variables. Thus, we derive the following hypotheses:

Hypothesis 3: There is a reciprocal causal relationship between work motivation and job performance. In particular, work motivation (T1) is the significant predictor of job performance (T2) after controlling the auto-correlation effect of job performance (T1) and vice versa.

As presented in Fig. 4, the final potential causal relationship is that performance and motivation are causally unrelated. Performance and motivation may be causally unrelated due to cross-temporal research design and common method bias (Podsakoff et al., 2003). For instance, when work motivation and job performance are measured at the same time point and rated by one person, their correlation may inflate due to common method bias and thereby draw inaccurate causality. Therefore, we put the following hypothesis:

Hypothesis 4: Work motivation and job performance are causally unrelated. In particular, work motivation (T1) is not a significant predictor of job performance (T2) after controlling the auto-correlation effect of job performance (T1), whereas job performance (T1) is also not the significant predictor of work motivation (T2) after controlling the auto-correlation effect of work motivation (T1).

We also propose a research question about the potential moderators that may influence the relationship of interest. Following early longitudinal meta-analyses (Riketta, 2008; Talsma et al., 2018), three moderators are considered, namely, performance measurements, motivation measurements, and length of time lag (shorter vs. longer time lags between two waves).

Firstly, as we illustrated in the Introduction part, there are two measurements of work performance, namely, task performance and OCB. We would like to explore the potential moderating role of job performance measurements (task performance versus OCB). This exploration is pivotal. Theoretically, performance should envelop two dimensions: task performance and OCB (Koopmans et al., 2011). However, a disparity exists in organizational recognition and reward systems, wherein task performance is formally acknowledged, while OCB is not (Organ, 2018). The impact of such discrepancies on their respective relationships with performance remains nebulous. Undertaking a meta-analysis to probe into these moderating variables will not only deepen our understanding of the nexus between motivation and performance but also furnish supplementary evidence to buttress their interconnection.

Secondly, the motivation measurement is taken into consideration. In particular, many longitudinal studies (e.g., Shimazu et al., 2018; Nawrocka et al., 2021) use work engagement to measure motivation. Although theoretical frameworks suggest that these measures might reflect motivation, various measures of motivation may exhibit distinct relationships with performance. Despite the absence of cross-lagged meta-analyses, insights can potentially be derived from cross-temporal meta-analyses. For example, Cerasoli et al. (2014) identified a correlation of 0.26 between intrinsic motivation and performance, while Corbeanu and Iliescu (2023) observed a correlation of 0.37 between work engagement and performance. Consequently, we question whether the measurement of motivation exerts a significant moderating effect. Given that work engagement is the most prevalently utilized measure, we draw comparisons between the results pertaining to work engagement and those associated with other forms of motivation.

Finally, it is unclear how long the time lag process (i.e., the length of time between two measurement waves) will influence the relationship of interest. In the present study, time lags varied from 1 to 12 months (refer to the coding information for details). On the one hand, the relationship between motivation and performance may depend on time. For instance, even with strong motivation, employees may require time to learn and adapt to new tasks, affecting performance enhancement. Furthermore, the delay in receiving feedback or recognition, especially in long-term projects, may decelerate the positive influence of performance on motivation.

On the other hand, there may exist an optimal time lag interval in cross-lagged analysis, as suggested by Dormann and Griffin (2015). When the time lag falls short of this optimal point, the cross-lagged effect size diminishes sharply; inversely, if the time lag exceeds it, the effect size likewise declines. Aligning with prior meta-analysis efforts (Riketta, 2008), we categorize the time lag into two groups, namely, 1–6 months and 7–12 months, to explore the possible moderating influence of the time lag. The efficacy of a 6-month time lag design remains uncertain. Nevertheless, a design that maintains a 6-month interval at each end—presenting a symmetrical six-month span—prompts a subgroup analysis within the meta-analysis, increasing the likelihood of discerning potential moderating impacts. To sum up, we seek to answer the following research question:

Research Question 1: Do the causal relationship between work motivation and job performance vary due to (a) job performance measurement (task performance versus OCB), (b) work motivation measurement (work commitment versus other motivations), and (c) time lag (1–6 months versus 7–12 months)?

Method

Literature search. To locate the studies that might include the cross-lagged data about work motivation and job performance, following early meta-analyses (Neuber et al., 2021; Riketta, 2008; Van Iddekinge et al., 2018), the authors searched the following keywords: (a) motivation (*motivation* or *engagement*), (b) performance (*performance*, *job performance*, *task performance*, or *organization citizenship behavior*), and (c) cross-lagged (*longitudinal or cross-lagged)* utilizing Web of Science and Google Scholar databases. The authors (W and L) seek to include studies published from 2000 to 2022. The search was conducted in January 2023 and encompassed English-language research materials. We did not restrict the types of research sources, including journal articles, book chapters, and dissertations. Authors W and L performed the search using the Title, Abstract, and Keywords. After removing duplicates, the authors initially obtained 120 potential articles that used longitudinal data.

Inclusion criteria and coding. After reviewing some early published longitudinal meta-analyses (Maricuțoiu et al., 2017; Riketta, 2008; Talsma et al., 2018), the authors made the following inclusion criteria. First, samples should come from organizations because the current study focuses on work motivation and job performance. As such, students' or athletes' samples were removed.

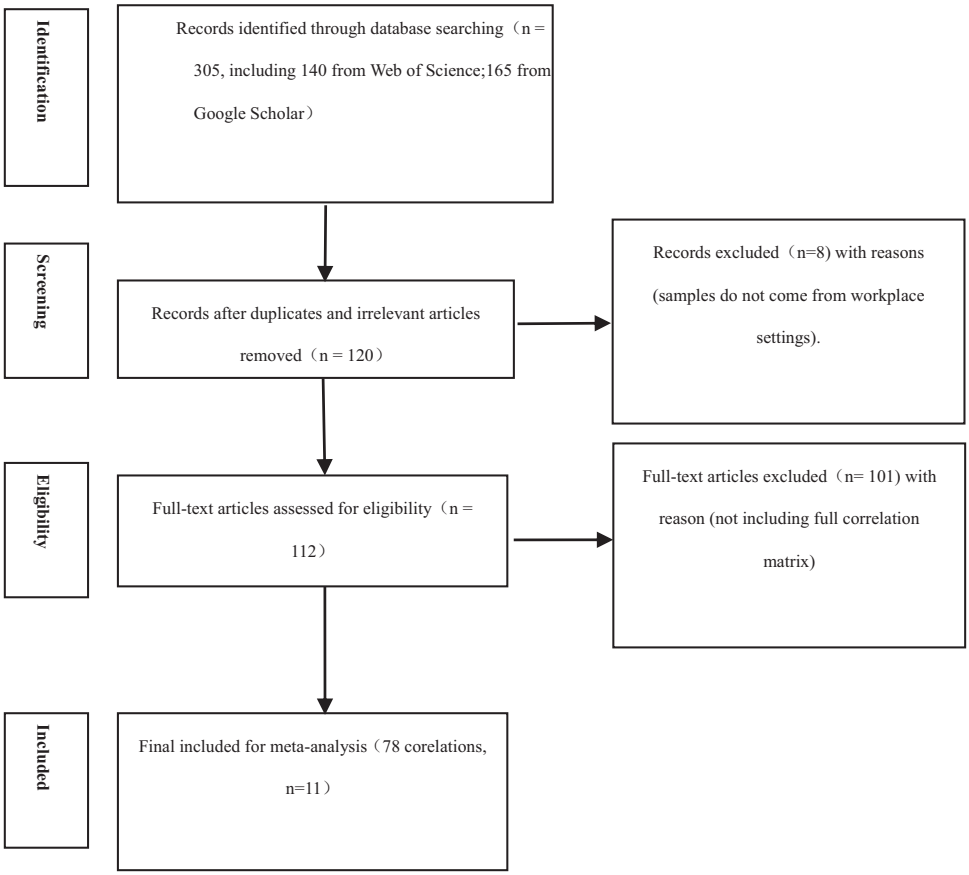

Fig. 5 PRISMA Flow Chart. An illustrative demonstration of literature search procedures and inclusion criteria. This figure is covered by the Creative Commons Attribution 4.0 International License.

Second, studies should provide a full correlation matrix that includes six correlations and measure motivation and performance at two (or more) measurement waves. Six correlations are two synchronous correlations, the two cross-lagged correlations, and the two stabilities correlations (Kenny, 1975). In particular, two synchronous correlations are correlations (a) between motivation (T1) and performance (T1) and (b) between motivation (T2) and performance (T2). Two cross-lagged correlations are correlations (a) between motivation (T1) and performance (T2) and (b) between performance (T1) and motivation (T2). Two stabilities correlations are correlations (a) between motivation (T1) and motivation (T2) and (b) between performance (T1) and performance (T2).

After reading all potential studies ($k = 120$) and excluding studies that were not able to meet the inclusion criteria, the final database contained 11 studies that included 84 correlations ($n = 4389$). Considering the challenges in obtaining samples and findings from early meta-analyses (Riketta, 2008, with 16 studies; Talsma et al., 2018, with 11 studies), a sample of 11 studies is likely sufficient for conducting a cross-lagged meta-analysis. Two authors coded the following information: bibliographic references (authors and publication year), sample description (sample size and country), research design (interval between two measurement waves), effect sizes, and the reliabilities (i.e., Cronbach's α) of all scales. The authors discussed the differences in the coding information until the intercoder agreement was researched 100%. Among the examined studies, 8 utilized a self-reported method for measuring performance, 2 adopted a leader-reported method, and 1 study employed an objective indicator, specifically the results of performance appraisals. The majority of these studies ($k = 10$) originated from companies, with only one emanating from an educational organization. The samples in the 11 studies encompass a wide range of industries, including banking, auditing, and social services. The diversity in this study stems from the primary authors' intentional strategy to collect data from a variety of industries. This approach enables a comprehensive insight into the nature of professional settings and employee motivation across different sectors. Geographically, most samples were drawn from Europe ($k = 9$), while the remaining were from East Asia ($k = 2$). A PRISMA flowchart (see Fig. 5) presents the process of literature search.

Analysis. Before analyzing, publication bias is taken into consideration. We used the Trim-and-Fill method and Eggs' Regression method to detect potential publication bias. This analysis was conducted utilizing ***metafor*** package (Viechtbauer, 2010) in R. The results were shown in Table 1.

Generally speaking, there are two steps in a meta-analytic structural equation modeling analysis (Bergh et al., 2016; Viswesvaran and Ones, 1995). The first one is to build a meta-analytic correlation matrix. The second one is to use this matrix to conduct path analysis. In the current study, to build a meta-analytic correlation matrix, we employed the Hunter-Schmidt methods' meta-analysis technology to aggregate effect sizes (Hunter and Schmidt, 2004). In particular, reliabilities (i.e., Cronbach's α) were used to correct measurement errors. The random effect meta-analysis method was utilized to correct sampling errors. This analysis was accomplished using the ***psychmeta*** package (Dahlke and Wiernik, 2019) in R. The results

Table 1 Publication Bias Analysis.

		Trim-and-Fill				Egg's regression		
variable	Observed k	Unadj. r+	Imputed k	Adj. r+	Change	t	df	p
M1M2	11	0.73	0	0.73	0	−0.58	9	0.575
P1P2	11	0.51	1	0.49	−0.02	0.57	9	0.576
M1P1	11	0.30	0	0.30	0	−0.51	9	0.625
M2P2	11	0.34	0	0.34	0	−0.29	9	0.778
M1P2	11	0.28	0	0.28	0	−0.25	9	0.803
P1M2	11	0.22	0	0.22	0	−0.51	9	0.622

Observed k = number of aggregated effect sizes included in analyses, Unadj. $r+$ = unadjusted effect size estimate, imputed k = number of additional effect sizes added by trim-and-fill analyses, Adj. $r+$ = adjusted effect size estimate (i.e., including imputed studies). M1 = Motivation (T1); M2 = Motivation (T2); P1 = Performance (T1); P2 = Performance (T2).

Table 2 Meta-analytic correlation matrix for path analysis.

				M1M2	P1P2	M1P1	M2P2	M1P2	P1M2
analysis		k	n	(r, ρ)	(r, ρ)	(r, ρ)	(r, ρ)	(r, ρ)	(r, ρ)
Overall		11	4386	(0.73, 0.80)	(0.49, 0.54)	(0.31, 0.34)	(0.34, 0.37)	(0.28, 0.31)	(0.23, 0.26)
performance	TP	9	4021	(0.74, 0.80)	(0.49, 0.53)	(0.30, 0.33)	(0.32, 0.35)	(0.27, 0.29)	(0.23, 0.25)
measure	OCB	5	1337	(0.75, 0.84)	(0.54, 0.66)	(0.29, 0.34)	(0.33, 0.38)	(0.25, 0.30)	(0.20, 0.24)
motivation	WE	8	3599	(0.76, 0.82)	(0.49, 0.53)	(0.29, 0.32)	(0.32, 0.35)	(0.27, 0.29)	(0.23, 0.25)
measure	other	4	1145	(0.62, 0.73)	(0.48, 0.60)	(0.33, 0.41)	(0.34, 0.43)	(0.26, 0.33)	(0.19, 0.24)
time lag	1–6 months	7	1728	(0.72, 0.83)	(0.53, 0.62)	(0.33, 0.40)	(0.36, 0.42)	(0.29, 0.35)	(0.27, 0.32)
	7–12 months	4	2658	(0.74, 0.79)	(0.46, 0.49)	(0.29, 0.31)	(0.32, 0.34)	(0.27, 0.29)	(0.21, 0.22)

k = number of effect sizes; n = number of sample; r = uncorrected effect size; ρ = corrected effect size; TP = Task performance; WE = work engagement; M1 = Motivation (T1); M2 = Motivation (T2); P1 = Performance (T1); P2 = Performance (T2).

Table 3 Results of the path analysis.

				Estimate					
analysis		k	n	M1 → M2	P1 → P2	M1 ~ P1	M2 ~ P2	M1 → P2	P1 → M2
Overall		11	4386	0.805**	0.491**	0.340**	0.128**	0.143**	−0.014
performance measure	TP	9	4021	0.805**	0.487**	0.330**	0.248**	0.129**	−0.016
	OCB	5	1337	0.858**	0.631**	0.340**	0.388**	0.085**	−0.052**
motivation measure	WE	8	3599	0.824**	0.487**	0.320**	0.118**	0.134**	−0.014
	other	4	1145	0.759**	0.559**	0.410**	0.411**	0.101**	−0.071**
time lag	1–6 months	7	1728	0.836**	0.571**	0.400**	0.136**	0.121**	−0.014
	7–12 months	4	2658	0.799**	0.443**	0.310**	0.232**	0.153**	−0.028*

**$p < 0.01$; *$p < 0.05$; M1 → M2 = path coefficient from Motivation (T1) to Motivation (T2); P1 → P2 = path coefficient from Performance (T1) to Performance (T2); M1 → P2 = path coefficient from Motivation (T1) to Performance (T2); P1 → M2 = path coefficient from Permanence (T1) to Motivation (T2); M1 ~ P1 = coefficient of Motivation (T1) with Performance (T1); M2 ~ P2 = coefficient of Motivation (T2) with Performance (T2).

of the meta-analytic correlation matrix for path analysis were shown in Table 2. To answer research question 1, Table 2 also includes correlations that are grouped by performance measurements, motivation measurements, and time lags.

Then, this meta-analytic correlation matrix was used to conduct path analysis, the results were shown in Table 3. This analysis was accomplished using ***MPLUS*** software (Muthén and Muthén, 2017). Specifically, to conduct path analysis, the maximum likelihood estimation (MLE) was used. Besides, the sum of the sample sizes was employed as the inputted sample size (Riketta, 2008).

Results

As Table 1 shows, the results suggest there is not a significant publication bias. First, using the Trim-and-Fill method, only one asymmetric effect size was located (i.e., the correlation between performance T1 and performance T2). After inputting this "missed" correlation, the averaged correlation only decreased by 0.02, suggesting the publication bias is not serious. Second, utilizing the Eggs' Regression method, all the p-values are bigger than 0.05, confirming the publication bias is not significant. Together, the overall publication bias is not serious.

Table 2 depicts the averaged correlation (r) and true score correlation (ρ) of interest. For instance, the ρ between motivation (T1) and motivation (T2) is 0.80, whereas the ρ between performance (T1) and performance (T2) is 0.54.

As Table 3 presents, overall, work motivation appears to be a predictor of job performance, whereas job performance appears to be a predictor of work motivation. In particular, the path coefficient (i.e., M1 → P2) from motivation (T1) to performance (P2) is positive and significant ($\beta = 0.143$, $p < 0.001$). However, the path coefficient (i.e., P1 → M2) from performance (T1) to

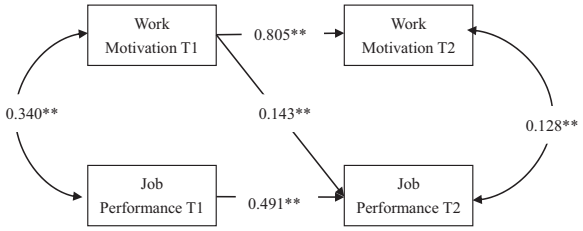

Fig. 6 The causal relationship between work motivation and job performance. An illustration of estimated causal relationship between work motivation and job performance following MASEM analysis. This figure is covered by the Creative Commons Attribution 4.0 International License.

motivation (P2) is not significant ($\beta = -0.014$, $p > 0.050$). As such, H1 was supported, whereas H2, H3, and H4 were rejected. We draw Fig. 6 to explain the causal relationship between work motivation and job performance.

To answer research question 1, as Table 3 shows, neither the performance measure, motivation measure, nor time lag influence the causal relationship between motivation and performance. In particular, all the path coefficients (i.e., M1 → P2) from motivation (T1) to performance (P2) are positive and significant. However, the path coefficients (i.e., P1 → M2) from performance (T1) to motivation (P2) are negative or insignificant, supporting H1. The moderating effect was determined using z-tests to compare the two effect sizes. For example, when examining the moderating role of the performance measure, there was no significant difference in path coefficients for M1 → P2 ($\beta1 = 0.129$, $\beta2 = 0.085$; $z = 1.4$, $p = 0.08$). Similarly, for path coefficients P1 → M2, no significant difference was observed ($\beta1 = -0.016$, $\beta2 = -0.052$; $z = 1.14$, $p = 0.13$). Additionally, we did not observe any significant moderating effect for either motivation measures or time lag. Together, the causal relationship is motivation causes subsequent performance rather than vice versa. Besides, this relationship is not influenced by the three potential moderators.

Discussion

In this part, we will first discuss our findings. Then, we will discuss the theoretical and practical implications. Finally, the limitations and future directions will be discussed.

Findings. To start, we will discuss the magnitude of correlations. Cohen (2013) suggested that a correlation at 0.1 is small, at 0.3 is medium, whereas at 0.5 is large. Applying this standard, we find that the magnitudes of correlations of interest are from medium to large. For instance, the ρ between motivation (T1) and motivation (T2) is 0.80 which is large, whereas the ρ between performance (T1) and performance (T2) is 0.54 which is medium. Besides, the correlation ($\rho = 0.34$) between motivation (T1) and performance (T1) is bigger than the correlation ($\rho = 0.31$) between motivation (T1) and performance (T2). One plausible explanation is that the former is measured at the same time point whereas the latter is measured at different time points. Two constructs measuring at the same time point may suffer from common method bias and their correlation may inflate (Podsakoff et al., 2003). Besides, early meta-analyses also found the correlations between motivation and performance are medium. For instance, Cerasoli et al. (2014) found a correlation between intrinsic motivation and performance is 0.26. Similarly, Borst et al. (2019) found medium correlations between engagement and in-role performance and ex-role performance (range from 0.31 to 0.46). To sum up, the overall correlations between motivation and performance are medium.

Then, we found that work motivation causes job performance rather than vice versa. This finding rejects the reciprocal and causally unrelated model. This finding is in line with many experiment studies (e.g., Amabile, 1985; Hendijani et al., 2016; Kovjanic et al., 2013) which found that motivation influenced performance. Combining the findings of both longitudinal and experimental studies, evidence suggests that work motivation appears to be a predictor of job performance.

However, what makes us surprised is that job performance cannot predict work motivation based on cross-lagged data. One possible explanation is there might be mediators that fully mediate the relationship between job performance and subsequent work motivation. For instance, in the perspective of SDT (Deci et al., 2017; Deci and Ryan, 2000), basic psychological needs (i.e., competence, autonomy, and relatedness) are the antecedents of motivation. Employees who accomplished their job performance are likely to fulfill the need for competence and thereby influence motivation. Thus, job performance (T1) may not directly influence work motivation (T2) but through the mediating role of basic psychological needs. In the JD-R theory (Bakker, 2011; Bakker and Demerouti, 2017), there could also have mediators between performance and motivation. These mediators are job resources (e.g., leader support). Employees who achieve performance may influence job resources (e.g., leader support) and thereby influence their motivation. In the current cross-lagged panel meta-analysis, these potential mediators (e.g., basic psychological needs and leader support) could not be tested. Therefore, we do not find job performance (T1) causes work motivation (T2).

Finally, three moderators (i.e., performance measure, motivation measure, and time lag) do not influence the causal relationship between motivation and performance. First, for performance measures, one explanation is that both task performance and OCB captured the nature of job performance. Second, for motivation measures, one explanation is that different measures of motivation both reflect the definition of motivation (Pinder, 2014). For instance, employees could work hard by being driven by both work engagement (Bakker, 2011) and intrinsic motivation (Deci et al., 2017). In other words, despite different measures of motivation being used, these concepts all capture the characteristics of motivation, indicating a consensus conclusion.

It's important to acknowledge that various studies have employed distinct measures to gauge motivation, including psychological capital and self-efficacy, among others. Psychological capital can indeed serve as a reflection of motivation. Comprising four subdimensions—self-efficacy, hope, resilience, and optimism—psychological capital embodies the internal forces (motivation) that drive individuals to confront challenges (Newman et al., 2014). These components collectively capture the essence of motivation by epitomizing the underlying reasons that initiate and direct behavior. Therefore, they are integral in understanding the multifaceted nature of motivation. Additionally, our moderation analysis contributes further insights, suggesting that despite the nuanced complexities of motivation measures, they didn't exhibit a substantial moderating impact on the outcomes. This finding underscores the importance of considering these motivational aspects not just as isolated factors but as integral components that interact with other elements in human behavior and response mechanisms.

For time lag, an early meta-analysis study finds a significant moderating role in the length of time lag (Riketta, 2008) which is different from the current study. In the current study, we noticed that the length of time lag is between 1 month and 12 months. However, we still lack the knowledge of whether this causal relationship will change over a longer period of time (e.g., more than 12 months). Together, three moderators do not influence the

causal relationship between work motivation and job performance, strengthening the confidence in our findings.

Theoretical and practical implications. The current study is the first meta-analysis that uses longitudinal data to test the causal relationship between work motivation and job performance, making some theoretical implications. First, utilizing meta-analysis methodology, we reconciled four competing hypotheses about the causal relationship between work motivation and job performance, contributing to work motivation and job performance literature. Second, the current study contributes to SDT literature. SDT suggests that work motivation will influence human behavior and job performance (Deci et al., 2017). The current study provides solid evidence for the argument of SDT by using longitudinal data. Besides, the current study collected data from multiple organizations, making the findings have high external validity. Finally, the current study provided evidence for the JD-R theory, as we found engagement causes job performance rather than vice versa using a cross-lagged research design. Drawing on this finding, some results (e.g., Yu et al., 2020; Almawali et al., 2021), in JD-R literature using a cross-temporal research design, should be explained with caution.

The current study is also essential to practice. First, as the current study provides solid causal evidence for the motivation-performance linkage, it provides knowledge for human performance management. That is, human performance practices (e.g., compensation management and performance management) that influence employee motivation, will influence employee performance. Second, our knowledge suggests that some motivation-based leadership (e.g., empowering leadership) is useful as motivation predicts job performance in the long run. Finally, since we do not find job performance could predict subsequent work performance, practitioners should try to find some try practices to strengthen feedback mechanisms between them, making employees increase their performance continuously.

Limitations and future directions. There are some limitations in the current study. First, in the current study, both motivation and performance are measured by self-reported scales, which may trigger common method bias (Podsakoff et al., 2003). This effect is stronger when two constructs are measured at the same time point. For instance, the ρ between job performance (T1) and work motivation (T1) may inflate due to common method bias. Future studies could try to measure performance utilizing more objective indicators. Second, due to the cross-lagged research design, it allows for only tentative causal conclusions and cannot rule out some alternative causal explanations (Riketta, 2008). Future studies could try to use instrumental variables to rule out alternative causal explanations (Saridakis et al., 2020). Third, the present study employed the MASEM method to carry out path analyses. However, the generalizability of this method to other populations may be limited when dealing with heterogeneous correlation matrices (Cheung, 2018). Upon the accumulation of more homogeneous evidence, future research could replicate this study. Fourth, during our search process, we did not impose geographical constraints on the origin of primary studies. However, we observed that the majority of the samples predominantly come from Europe ($k = 9$). This brings to light the potential influence of culture on the relationship between motivation and performance. In countries characterized by high individualism, values such as personal achievement and autonomy are emphasized (Hofstede et al. 2010). In such cultures, motivation is frequently linked to personal goals and achievements, which may intensify the association between personal-focused motivation and performance. Nonetheless, our current dataset limits our ability to definitively assess these cultural effects. Future research should aim to explore the impact of cultural factors on the motivation-performance dynamics. Finally, our study faced certain constraints regarding data availability, particularly concerning specific motivation metrics such as extrinsic motivation, which were not obtainable from the primary studies. Future research could enhance and validate the findings of this study by employing a broader range of motivation measures. This expanded approach will not only reinforce the comprehensiveness and reliability of the results but also provide a more nuanced understanding of motivational dynamics.

Conclusions

This meta-analysis is the first one to detect the accurate causal relationship between work motivation and job performance using longitudinal data. The evidence supports the effects of work motivation on job performance and does not support the reverse effects. The reciprocal model and causally unrelated model are also not supported. The results appear reasonably robust, as the finding that work motivation predicts job performance was consistent across the examined moderators of job performance measure, motivation measure, and time lag length. This study contributes to motivation and performance literature. Besides, our findings are important for human resource management and leadership. Future studies could try to use instrumental variables to get a more accurate causal relationship.

Data availability

All data used to conduct the meta-analytic review are included in the supplemental file.

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Author contributions

NW and YL: idea and design; NW and YL: introduction, hypotheses, and coding; YL and RM: method and results; NW, YL and RM: discussion and conclusion. All authors contributed to the article and approved the submitted version.

Competing interests

The authors declare no competing interests.

Ethical approval

This study does not contain any interaction with human participants performed by any of the authors.

Informed consent

No human subjects are involved in this study.

Additional information

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