

## A CONCEPTUAL FRAMEWORK INTEGRATING WORKING MEMORY CAPACITY, EFFECTIVENESS OF GOAL ATTAINMENT AND WORK ENGAGEMENT

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**Abstract.** In this paper a conceptual framework highlighting possible relationships between employee working memory capacity (WMC) and work engagement is proposed. This conceptual model integrates WMC, effectiveness of work goal attainment and work engagement and consists of five main propositions. (1) WMC is positively related to the effectiveness of work goal attainment, (2) effective work goal attainment stimulates work engagement (3) work engagement is reciprocally related to effective work goal attainment. It is also posited that a positive indirect relationship between WMC and work engagement via goal attainment might be moderated by (4) job pressure and (5) excess WMC. Conceptual model presented here might help to understand the role of cognitive functioning for employees work engagement and spark further debate on this understudied topic.

**Keywords:** work engagement, working memory capacity, goal attainment, job pressure, choking under pressure, cognitive excess.

### 1. Introduction – Work engagement

Nowadays, work engagement is among the most popular topics in the field of human resources management (Saks, & Gruman, 2014) and generally work engagement might be described as a positive work-related state of mind, characterized by combination of energy and dedication to work (Bakker, Albrecht, & Leiter, 2011). Work engagement has gained in popularity as empirical research studies have demonstrated its importance for the optimal performance of both employees and organizations (Harter et al., 2010; Reijseger et al., 2017). Engaged employees are healthier (Seppälä et al., 2012), happier (Hakanen, & Schaufeli, 2012), and organizations with employees displaying high levels of engagement outperform those in which the work engagement level is low (Harter et al. 2010). Hence, work engagement is a win-win scenario in which both employees and employers benefit. It is not surprising then that more and more organizations aim to enhance their levels of employee engagement. Some researchers even state that a focus on work engagement should be a crucial part of the performance management process (Gruman & Saks, 2011).

Thus far, a large number of research studies have investigated how different aspects of jobs are related to work engagement, most of them being conducted within the framework of the Job Demands-Resources Theory (JD-R) (Bakker & Demerouti, 2017). The JD-R theory proposes that all work characteristics can be classified into one of two dimensions: job resources or job demands. Job demands are those elements of work that require substantial physical or psychological effort, and result in psychological or physical costs. Conversely, job resources are defined as job features of all kinds that act in at least one of three ways: functional in achieving work goals, reducing job demands, and stimulating personal growth in employees. It is well documented that job resources initiate motivation processes leading to the development of a positive work-related state of mind i.e. work engagement, whereas job demands place a strain on this process, leading to exhaustion and even health problems (Bakker & Demerouti, 2017).

The role of job characteristics in predicting work engagement seems to be widely explored but there is a little as yet known about the role of employee characteristics, especially cognitive functioning, in affecting work engagement (Bakker & Demerouti, 2017). This is quite surprising when we take into account the fact that human cognitive functioning is one of the most important predictors of work performance, often used as a means of selecting and recruiting personnel (Schmidt, 2002). This study intends to present a conceptual framework linking working memory capacity (WMC), an important human cognitive characteristic, with work engagement through goal attainment. Although it is possible that WMC might be related to work engagement via other means, e.g. via job complexity and social job resources (Kulikowski & Orzechowski, manuscript submitted for publication), in this paper we concentrate solely on the relationship between WMC and the effectiveness of work goal attainment seeing as this is one of the most important aspects of every job.

This conceptual framework may be of benefit for at least four reasons. Firstly, it allows for a better understanding of the relationship between employee WMC and levels of work engagement. Secondly, it also offers an opportunity to put forward possible predictions of how employee WMC might influence work engagement via goal attainment. Thirdly, it might possibly help in the process of personnel selection so as to increase the number of work-engaged employees. Last but not least, our framework might spur future debate on the understudied and somewhat neglected topic of the effects of WMC on work engagement.

Work engagement has emerged as one of the most meaningful topics in management science in the 21st century (Saks & Gruman, 2014). Attempting to understand how employee cognitive characteristics such as WMC are related to work engagement contributes to the state of knowledge in this field. Therefore, in this paper, the possible multiple influences of WMC on work engagement via effectiveness of work goal attainment have been outlined. In our opinion, the conceptual framework put forward in this article may lead to advances in human resources management theory and may enliven a debate on the role of cognitive functioning in employee's work engagement.

## 2. Introduction – Working memory capacity (WMC)

Working memory is a short-term memory system responsible for storing and maintaining information in memory for short periods of time e.g. when one tries to solve a mathematical equation such as  $2*(2-2)+(2+3)$  without a calculator or pen and paper, working memory is used to temporarily store numbers and to apply rules retrieved from long-term memory to perform the required arithmetic operations (for details see Conway, & Kovacs, 2013). The functioning of working memory maintains a person's access to information and allows operations on this information as needed for the completion of ongoing cognitive processes such as reasoning, problem solving, decision making, judgments, or even using language to communicate with others. Of course, people differ in working memory functioning in terms of how much information can be stored in short-term memory, how long this information remains active for processing, or how rapid and accurate operations on stored in memory information can be performed. Thus, the term working memory capacity (WMC) is used to refer to individual differences in working memory (Shipstead, Harrison, & Engle, 2016).

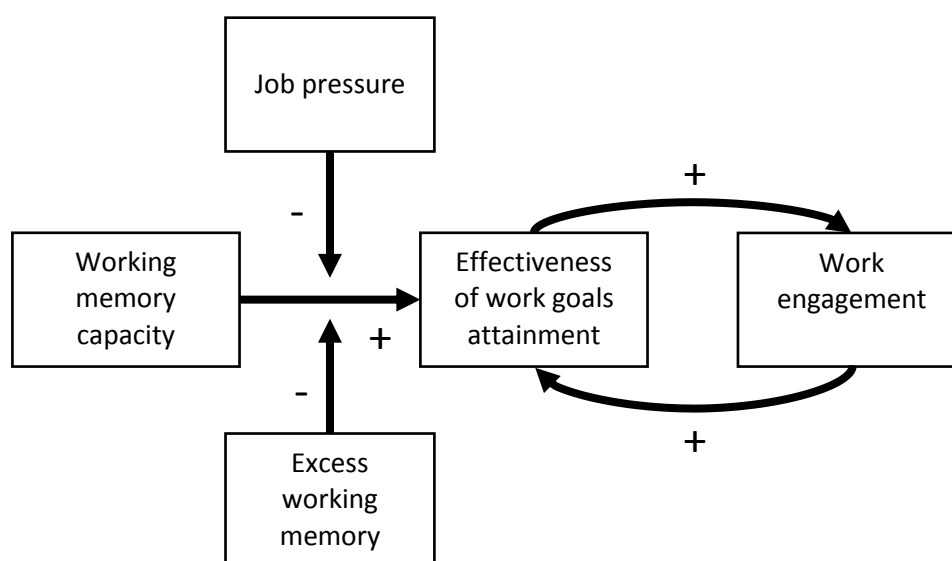
WMC is essential for human cognitive performance (Logie, & Cowan, 2015) since many jobs and everyday tasks to some extent involve temporarily stored information processing, and WMC largely determines the efficiency of this processing (Pollock, Chandler, & Sweller, 2002). It is therefore not surprising that differences in WMC are related to performance variations in a wide range of domains. To mention only a few, Colom, Martínez-Molina, Shih and Santacreu (2010) have shown that WMC is a better predictor of multitasking than intelligence, and so could be a relevant measure for personnel selection for jobs requiring multitasking. Daneman and Merikle (1996) in a meta-analysis of 77 studies have found that WMC is a good predictor of language comprehension, since the more verbal information people can temporarily store and process in working memory, the more effectively they can use language. De Dreu et al. (2012) provide evidence that working memory functioning may influence creativity, because high WMC helps to focus attention on the right task and prevent the distraction of unwanted thoughts, unrelated to the current task. Sörqvist (2010) demonstrates that WMC is an important factor contributing to individual differences in vulnerability to noise – people higher in working memory are more resistant to noise distractors. Hambrick, Kane and Engle (2005) proposed that WMC might be an important factor in the process of acquiring knowledge. Access to pre-existing knowledge and its integration with new information requires the effective maintenance of information in the short memory system. Hambrick, Kane and Engle (2005) even stated that WMC may set limits of accessibility to knowledge in cognitive performance as people's effectiveness in retrieving information from long term memory could strongly depend on their WMC.

Specifically, in the realm of work, WMC research has been conducted on the relationship between results in working memory tests and job performance. It was found that WMC test

results may predict performance in simulations of work types, such as a computerized production chain management simulation, or human resources department simulations (Bosco, Allen, & Singh, 2015). Working memory levels even predicted supervisor-related task performance (Bosco, Allen, & Singh, 2015). Thus, taking into account the currently available research studies, it seems reasonable to assume that WMC is positively related to effectiveness in individual work goal attainment. Employees with higher WMC might well attain their work goals more effectively. Importantly, WMC might be related not only to individual goal attainment but also to the work of entire groups, i.e. groups composed of employees with higher WMC might more efficiently attain their collective work goals than groups containing employees with lower WMC levels (Mojzisch et al., 2014).

### 3. Working memory – goal attainment – work engagement

We put forward a proposition of conceptual framework integrating working memory capacity (WMC), effectiveness of work goal attainment and work engagement, the method of creating this conceptual framework was integrative analysis of currently existing literature along with its original reinterpretation. Conceptual framework presented here consists of five main propositions. (1) WMC is positively related to the effectiveness of work goal attainment, (2) effective work goal attainment stimulates work engagement (3) and work engagement is reciprocally related to effective work goal attainment. Furthermore, it is posited that a positive relationship between WMC and work engagement via goal attainment might be moderated by (4) job pressure and (5) excess working memory capacity. A graphic illustration of the proposed conceptual framework is shown in fig. 1.



**Figure 1.** Conceptual framework linking working memory capacity, effectiveness of work goals attainment and work engagement. Source: Own work.

The second proposition is that, since WMC facilitates the effectiveness of work goal attainment, it offers potential as an indirect positive predictor of work engagement. WMC positively influences the effectiveness of work goal attainment and the increased effectiveness of work goal attainment boosts work engagement. This idea is based on the assumption arising from JD-R theory that job resources (characteristics of work facilitating work goal attainment) are positively related to work engagement (Bakker, & Demerouti, 2017). We postulate that regardless of whether the facilitation of work goal attainment occurs as a result of the job characteristics (e.g. supervisor support, work organization) or the cognitive characteristics of the employee (e.g. high WMC), it may lead to increase in work engagement. The facilitation of work goal attainment may lead to a state of work engagement characterized by energy and identification since employees might be more encouraged to invest their mental or physical energy into work at which they excel. It is also more likely for employees to identify themselves with work in which they effectively achieve desirable work goals than with a job in which they experience obstacles to or setbacks in goal attainment. An increase in the effectiveness of work goal attainment might also increase the occurrence of positive emotions experienced during work and experiencing more positive (as opposed to negative) emotional states at work may also influence the development of a positive work-related state of mind (Fredrickson, 2001), namely: work engagement. Thus, it seems sensible to assume that the effectiveness of goal attainment might be a predictor of work engagement, because the more effective work goal attainment is, the higher the potential for work engagement.

The third concept making up the framework is the idea that just as increased effectiveness of work goal attainment affects work engagement, so in turn, high engagement level may over time lead to a boost in effectiveness of work goal attainment. In other words, work engagement is reciprocally related to goal attainment. Similar reciprocal relationships between job resources and work engagement (when job resources contribute to work engagement, and vice versa) can be found in several studies within the scope of JD-R theory (for review see: Salanova, Schaufeli, Xanthopoulou, & Bakker, 2010). Xanthopoulou, Bakker, Demerouti and Schaufeli (2009) in a longitudinal study have found that job resources are positively related to work engagement and simultaneously work engagement is positively related to job resources. The authors pointed out that these two factors create an evolving cycle of mutual relationships rather than merely one-way relationships. Similarly, Simbula, Guglielmi and Schaufeli (2011) in a three-wave longitudinal study have found similar reciprocal relationships between these two, as have Reis, Hoppe and Schröder (2015). Bakker and Bal (2010) conducted a study in which they asked a group of Dutch teachers to complete a work engagement survey every Friday for 5 consecutive weeks. It showed that the level of job resources was related to work engagement, and work engagement was also related to job resources levels during consecutive weeks. Thus, available research findings allow us to conclude that resources in form of effective work goal attainment and work engagement

might be related reciprocally, creating a cycle of mutual relations rather than a one-way relationship.

The fourth conceptual strand is the notion that the positive effect of WMC on work engagement via effectiveness of work goals attainment might be further moderated by job pressure i.e. high job pressure conditions might differently affect the effectiveness of goal attainment and work engagement of two types of employees: those with high and low WMC. There is evidence suggesting that high WMC employees, who typically perform in a superior manner, might, under pressure, experience paradoxical performance and higher impairments in carrying out tasks than employees with low WMC. It is a well-known observation that pressure induces paradoxical performance, also called choking under pressure. This is performance below one's expectations and skill level despite striving to succeed and despite receiving incentives for better performance (e.g. Baumeister & Showers, 1986). Such an individual possesses both high levels of motivation and capabilities seemingly conducive to performing well, but performs sub-optimally when pressure prevails. Pressure might be caused by various factors, such as (1) competition – when a person's performance is implicitly or explicitly compared with the performance of others, (2) reward contingent on performance – when in order to receive a reward somebody must demonstrate superior performance, (3) punishment contingent on performance – when to avoid punishment somebody must perform well, and (4) ego relevance to performance – when optimal performance is important to oneself in order to maintain positive self-esteem (Baumeister, & Showers, 1986). Of relevance for our conceptual framework is the pivotal role that WMC might play in paradoxical performance. It has been posited that pressure might impair cognitive performance because it largely reduces working memory available for information processing (Markman, Maddox, & Worthy, 2006). In a similar vein, DeCaro, Thomas, Albert and Beilock (2011) have shown that outcome pressure, e.g. monetary reward, particularly impairs performance in tasks that rely on working memory. Crucially, Beilock and Carr (2005) and Gimmig, Huguet, Caverni and Cury (2006) in their experimental studies have shown that, for individuals with high WMC, performance is more impaired by high pressure than in individuals with low WMC. Facing pressure might be especially harmful for people with high WMC because of their anxious perception of high-stakes situations (Gimmig, Huguet, Caverni, & Cury, 2006). High WMC individuals, who are accustomed to perform well, may be prone to feel a heightened level of anxiety in high-stakes situations where the risk of failure is increased, because any failure could be a serious threat to self-esteem to a person used to succeed. Increased anxiety in turn might engender worries and intrusive thoughts (e.g. what will my colleagues say if I fail to accomplish this goal?) and such intrusive thoughts might occupy and reduce available working memory. Thus, as previously mentioned, the impairment of work goal attainment is strongly linked to limitations in the available working memory. The conclusion is *that the individuals who are the most likely to fail under performance pressure are those who, in the absence of pressure, have the highest*

*potential for success (i.e. high-WMC individuals)* (Gimmig, Huguet, Caverni, & Cury, 2006, p.1005). This is an intriguing insight showing that performance pressure hinders those who are typically the most apt to succeed, because it consumes the WMC they usually rely on to achieve superior performance; ironically, increased pressure takes their most valuable assets away.

The fifth theoretical line of thought within the framework relates to the idea that the positive relationship between WMC and work engagement via goal attainment might be weakened by excess working memory capacity. This notion is drawn from the Philips Model of the Cognitive Task Engagement (2008). Excess working memory capacity might refer to a situation in which employees cannot use all of their working memory capacity when attaining work goals due to certain work tasks' characteristics (such as task consistency, task complexity or the level of skill acquisition). The upshot is that their WMC is not fully exploited. This mismatch between work task characteristics and WMC might lead to boredom, task disengagement, negative emotions (Philips, 2008) and as a consequence, may negatively influence the positive relation between WMC and effectiveness of work goal attainment and thus diminish overall level of work engagement. An instance of this is a situation in which an assembly line worker with high WMC has been forced to carry out monotonous, low cognitively complex tasks leading to under-exploitation of working memory, is such a situation proposed positive relation between WMC and work goal achievement might be weakened. On the one hand, employees high in WMC have more resources to effectively process work-related information during work tasks; on the other hand, given these greater cognitive resources, they are more likely to experience excess WMC. When excess WMC occurs in high WMC employees, it might undermine the positive relationship between working memory and effectiveness of work goal attainment.

#### **4. Conclusions**

In this paper a conceptual framework for integrating WMC functioning, effectiveness of work goal attainment and work engagement has been proposed. This framework encompasses a host of interlinked propositions, but primarily focuses on the notion that employees with high WMC might be more effective in work goal attainment and, based on JD-R theory, facilitation in effective work goal attainment may, in turn, stimulate work engagement. Significantly, an additional consideration is that the relationship between work goal attainment and work engagement might be reciprocal. Conversely, it has been proposed that two additional processes might actually undermine the positive relationships between WMC and work engagement via effectiveness in goal attainment, chiefly: job pressure (Baumeister, & Showers, 1986) and excess of working memory (Philips, 2008). One process is that under

pressure to perform well, sub-optimal performance can be the eventual outcome, especially among individuals with high level of WMC. Thus, high level of pressure might impair rather than enhance the positive influence of WMC on effectiveness of work goal attainment and thus, decrease work engagement. The second process comes about as the result of a poor fit between work task characteristics and available working memory resources; employees with high level of WMC might be prone to exceed working memory capacity leading to boredom and decreasing positive relation between WMC and work engagement.

From a theoretical perspective, the proposed conceptual framework may draw attention to a possible role of working memory functioning for work goal attainment and work engagement. Although working memory has slowly emerged as an important construct in human resource management science (Mojzisch et al., 2014; Bosco, Allen, & Singh, 2015), its relation to employees' behaviours and attitudes is still understudied. Thus, the model presented here might spark further debate and create fertile ground for empirical research in this field. It is worth noting that this model not only points to an important problem but also attempts to devise potential solutions. Our conceptual framework could contribute to our understanding in this area, enabling us to predict how employee WMC might influence work engagement through facilitation of work goal attainment and what kind of factors might be associated with this process. The other important theoretical proposition is focused on the reciprocal relationships between effectiveness of work goal attainment and work engagement. It has been suggested that we cannot provide a clear answer to the question: what comes first - work engagement or effective work goal attainment? It seems that looking for a one-way cause and effect relationship might be misguided and we should consider the relationship to be a mutually interconnected cycle rather than a strictly unidirectional cause and effect.

The conceptual model presented here endeavours to integrate the current state of knowledge in order to not only broaden our sense of understanding of the relationships between working memory, work goal attainment and work engagement on theoretical grounds, but also to discover the implications for human resource management. One area with practical application is the research on the 'choking under pressure' phenomenon mentioned earlier (see e.g. Baumeister, & Showers, 1986; Beilock, & Carr, 2005). We explore how job pressure might undermine the positive influence of WMC on effectiveness of work goal attainment and how this might have a negative influence on work engagement especially among employees with high levels of WMC. This proposition is counterintuitive since human resource specialists might generally expect the opposite pattern to arise i.e. that when high WMC employees, who usually perform effectively, are designated to attain work goals efficiently, they would naturally be assumed to also be fully engaged under pressure. Such a belief might lead human resources specialists to delegate high WMC employees to work in high pressure conditions, and this paradoxically might diminish the effectiveness of goal attainment and reduce work engagement. Therefore, following our framework, if we want to promote work engagement, employees with high levels of WMC should not be exposed to



high pressure situations. However, this does not mean that employees with high WMC cannot be delegated to carry out difficult and demanding work tasks, but that they should not be exposed to pressure stemming from competition, reward or punishment contingencies or ego relevance.

The second practical potential of this framework arises from the notion that excess WMC (Philips, 2008) impairs the positive relationship between WMC and the effectiveness of work goal attainment leading to decreases in work engagement. Surplus WMC might appear as a result of the mismatch between work tasks characteristics and WMC when employees are not fully exploiting their working memory resources in job tasks. This WMC excess causes boredom and task disengagement leading to decreases in positive relation between WMC and effectiveness of work goal attainment. Therefore, our model provides a practical implication: a job task should not only fit employee attitudes, or personality traits, but also employee WMC in order to maintain work engagement. Person-job fit seems to be an important aspect of employee well-being, and so a similar principle may operate regarding the fit between working memory and task characteristics. Our model based on Philips (2008), postulate that in order to maximize work engagement, employees should have the opportunity to take full advantage of their available cognitive potential in job tasks and employee WMC should not exceed the cognitive demands of the job.

To sum up, our model suggests that WMC may lead to work engagement via work goal attainment especially under circumstances of low job pressure and the absence of any excess WMC.

A possible use of WMC as a predictor of goal attainment and work engagement might also provide human resource specialists with a robust and easy-to-implement assessment tool allowing for the improved selection of personnel for the appropriate job positions. WMC might be measured using easily administered and objective computerized performance tests based on memory functioning, thus, largely independent of cultural background or previous knowledge. WMC tests, in contrast to self-descriptive measures, are also difficult to inflate by biased self-presentation strategies. Still more empirical research is needed to test the predictive validity of working memory in terms of effectiveness of work goal attainment and work engagement but our conceptual framework initially outlines the possible utility of such a measure in predicting work engagement.

Our conceptual framework might also foster understanding as to why, in some situations, high WMC employees might be characterized by low work engagement. An illustrative example here might be the case of medical doctors, among whom we can observe an epidemic of job burnout (West, Dyrbye, Erwin, & Shanafelt, 2016). We may assume that medical doctors are employees possessing high levels of WMC and thus, they should effectively attain their work goals and this in turn should increase their work engagement. However, high levels of job burnout among medical doctors have been observed (West, Dyrbye, Erwin, & Shanafelt, 2016). Considering our conceptual framework, there could be two reasons based on

how we see high levels of WMC undermining work goal attainment and then work engagement. Firstly, medical doctors often work under high performance pressure caused by high social expectations, ego relevance of performance and/or risk of serious punishment in case of failure. This might lead to the occurrence of paradoxical performance (Baumeister, & Showers, 1986) leading to a decrease in positive relation between WMC and effectiveness of work goal attainment and negatively influencing work engagement, thus giving the potential for job burnout development. Secondly, some physicians might be forced to complete noncomplex, low cognitively demanding tasks such as monotonous paper work or the repetitive treatment of patients with very similar and easily diagnosed conditions. Therefore, in many cases, work characteristics might not be well suited to the doctors' cognitive functioning levels leading to excessive WMC, causing job boredom (Philips, 2008) and, as a result, lowering positive relations between WMC and work engagement. Therefore, our conceptual framework might be useful in understanding low engagement among employees with high levels of WMC, and may be possibly a starting point for the design of interventions aiming to improve employee work related well-being. Such interventions should concentrate on reducing job pressures for high WMC employees and tailoring the complexity of work tasks to the WMC of employees.

## **5. Limitation and further research**

Although the conceptual framework presented here is based on the analysis and integration of published research studies, it should be rigorously tested in further empirical research to confirm its validity. It is also worth noticing that WMC, as an important aspect of human cognitive functioning, might be potentially related to work engagement not only via effectiveness of work goal attainment but also via other means, e.g. in other research study, we proposed a possible working memory effect on work engagement via job complexity and social job resources (Kulikowski & Orzechowski, submitted for publication). However, in our opinion it might be fruitful to propose a separated, straightforward and heuristic conceptual framework linking work goal attainment effectiveness, WMC and work engagement, as effectiveness of work goal attainment is typically the most germane of topics for human resources management specialists.

We are aware that all conceptual models are mistaken to some degree as they never represent the entire complexity of the real world, but we believe that despite its limitations, the conceptual framework presented here might be useful for the theory and practice of human resources management.

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