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Cognitive Reflection, Life Satisfaction, Emotional Balance and Job Performance

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Abstract

Background: The validity of individual difference variables for predicting important life phenomena, such as job performance, has been studied for over a century. However, the relationships between some of them have scarcely been investigated. This paper presents a study on the relationship between cognitive reflection (CR), satisfaction with life (SWL), and emotional balance (EB) with job performance. **Method:** The participants were 245 managers (140 men and 105 women) working in companies in various economic sectors. **Results:** The results showed that CR was not significantly related to job performance but that SWL and EB were valid predictors. Moreover, CR correlated significantly with SWL and EB. Multiple regression analysis showed that neither CR nor EB showed incremental validity over SWL in predicting job performance. **Conclusions:** These findings suggest that CR may not be an important variable in the workplace, at least regarding job performance, and that it is not a fully cognitive construct because some degree of its variance may be shared with motivational and personality traits.

Keywords: Cognitive reflection, job performance, satisfaction with life, emotional balance, supervisory ratings, subjective well-being.

Resumen

Reflexividad Cognitiva, Satisfacción con la Vida, Equilibrio Emocional y Desempeño en el Puesto de Trabajo. **Antecedentes:** la relación del desempeño ocupacional con variables de diferencias individuales se ha investigado durante casi un siglo, aunque su relación con la reflexividad cognitiva (RC), la satisfacción con la vida (SCV) y el equilibrio emocional (EE) ha sido escasamente estudiada, por ello, el objetivo principal de este artículo es examinar la relación entre RC, SCV y EE con el desempeño en el trabajo. **Método:** participaron 245 directivos (140 hombres y 105 mujeres) de empresas de diferentes sectores económicos. **Resultados:** SCV y EE fueron predictores válidos del desempeño en el puesto pero no RC. Análisis de regresión múltiple indicaron que ni RC ni EE añadían validez sobre la SCV para predecir el desempeño en el puesto. **Conclusiones:** los resultados sugieren que RC podría no ser una variable relevante en el lugar de trabajo, al menos en relación con el desempeño ocupacional, y que no se trata de un constructo totalmente cognitivo, ya que una parte de su varianza podría estar explicada por rasgos motivacionales y de la personalidad.

Palabras clave: reflexividad cognitiva, desempeño en el puesto, satisfacción con la vida, equilibro emocional, valoraciones de los supervisores, bienestar subjetivo.

The importance of individual difference variables for predicting important life phenomena, such as job performance, has been the focus of a great deal of research for over a century. Across the world, thousands of primary studies have estimated the predictive validity of cognitive intelligence and specific cognitive abilities (e.g., verbal and numerical abilities), memory, emotional intelligence, personality, job knowledge, job experience, and job satisfaction, among other individual difference constructs. More recently, research has also examined the predictive capacity of subjective well-being (SWB) for predicting job performance (e.g., Cropanzano & Wright, 1999, 2001; Haider et al., 2018; Salgado, Blanco et al., 2019; Wright & Bonnett, 2007). However, no studies have explored the validity of cognitive reflection (CR) for predicting job performance. Moreover, no research has investigated the relationship between CR and SWB, particularly its two components, i.e., life satisfaction and emotional balance. A third untested issue is whether CR shows incremental validity over SWB and its two components for predicting job performance.

The present study aims to contribute to the understanding of the relationships between CR, SWB, and job performance, and the relationships between CR and the cognitive and emotional components of SWB in several ways. By examining these relationships in a real work context, this study contributes to several areas of psychological research simultaneously. First, in the domain of cognitive psychology, it contributes to the clarification of the construct variance of CR. In the domain of individual differences, the study contributes by investigating some less explored relationships among three variables of individual differences. Finally, in the domain of work and organizational psychology, the study contributes by examining the role of CR, SWB, and its components in the prediction of job performance at the workplace.

In the following sections, first, we discuss the theoretical and conceptual basis of CR and the empirical evidence of its capacity

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to predict relevant life-events. Next, we discuss the literature on SWB, particularly Deiner's approach (Diener, 2000, 2006; Diener & Biswas-Diener, 2008), and we elaborate some rationale on the potential relationships between CR and SWB. Finally, we attempt to integrate these two compelling but separate lines of theoretical approaches to human cognitive and emotional domains in a predictive model of job performance.

Cognitive reflection is a construct proposed by Kahneman and Frederick (2002) to refer to the capacity of an individual to annulate the first impulsive response, frequently wrong, that our mind offers and to activate the cognitive mechanisms that allow us to find a response, make a decision, or carry out a specific behavior more reflexively and correctly. The CR is consistent with the view that the human mind operates through two types of highly differentiated cognitive processes, System 1 (S1) and System 2 (S2). S1 encompasses processes that imply affective (emotional) responses, related to unconscious experiences and learning, and with rules and principles that have been automatized (because S2 introduced them). Furthermore, S1 tends to operate using heuristics, biases, and shortcomings that help it to function quickly and without effort. On its part, S2 is slow, purposeful, reflective, and operates with effort and concentration. S2 is mainly serial, controlled, works linearly, and one of its most important functions is to override S1 (Kahneman, 2011; Kahneman & Frederick, 2002). However, S2 runs with great attention and concentration. It is capable of solving complex problems with high accuracy but is computationally expensive. Therefore, individuals tend to process with S1, i.e., using cognitive shortcomings that require less effort and concentration, although this can cause less accurate and much more biased responses.

Kahneman and Frederick (2002; Frederick, 2005; Kahneman, 2011) developed the well-known 3-item CR test to assess the individual differences in the activation of the two systems of processing. The items are three apparently simple arithmetical problems that can provoke an immediate and wrong response. Individuals have to suppress this answer in favor of an alternative one, which is reflective, deliberative, and correct.

The predictive validity of CR has been examined in very different situations and criteria. For instance, some research tested the relationship between CR and academic outcomes (Corgnet et al., 2015; Insler et al., 2015; Salgado, Otero et al., 2019; Toplak et al., 2014), reasoning and decision-making tasks (Finucane & Gullion, 2010; Frederick, 2005; Guthrie et al., 2008), risky behavior in real and hypothetical contexts (Reyna et al., 2018; Reyna & Wilhelms, 2017; Taylor, 2013, 2016), use of heuristics and cognitive biases (Cesarini et al., 2012; Toplak et al., 2011, 2014), the moral judgments (Baron et al., 2015; Pennycook et al., 2014b), religious beliefs (Gervais et al., 2018; Pennycook et al., 2014a), and political orientation (Piazza & Sousa, 2014; Yilmaz & Saribay, 2016, 2017), among others.

Regarding the relationship between CR and job performance, Salgado, Otero, et al. (2019) found that CR correlated significantly with job performance as assessed by simulation exercises. However, no study has examined the relationship between CR and job performance in a real workplace. This is important because job performance is the primary dependent variable in organizational settings, and it is typically assessed using supervisory ratings. Until now, no published research has checked the relationship between CR and supervisory ratings of job performance.

Due to the moderately high relationship between CR and general mental ability (GMA) found in primary studies and meta-analyses (Frederick, 2005; Otero, 2019; Otero et al., 2020) and that GMA is the best predictor of job performance ratings (Salgado & Moscoso, 2019a), one can expect that CR shows some correlation with job performance ratings.

On the other hand, according to Diener and his colleagues, subjective well-being (SWB) refers to how people evaluate cognitively and emotionally their life (Diener, 2000, 2006; Diener & Biswas-Diener, 2008; Diener et al., 2003; Larsen, 2009). In Diener's model, SWB has been conceptualized as a construct consisting of three primary elements: a cognitive component referred to the judgments of the satisfaction with life, and two emotional components, one positive and another negative, that results in an emotional balance between the levels of positive and negative feelings experienced by the individual (Diener & Biswas-Diener, 2008; Diener et al., 2009). A recent meta-analysis by Busseri (2018) found robust support for this three-element model. Therefore, high SWB would be the combination of two specific factors: (1) the presence of positive affective states and the absence of negative affective states, and (2) global life satisfaction. In Diener's approach, life satisfaction is considered as the judgmental component of subjective well-being (Busseri, 2015, 2018; Busseri & Sadava, 2011; Diener, 2000; Diener & Biswas-Diener, 2008; Diener et al., 1985).

In recent years, some studies examined the relationship between SWB and job performance using a variety of measures and designs. Although the majority of the studies showed a positive relationship between SWB and job performance (Salgado, Blanco et al., 2019), their results also showed substantial variability in the correlation. For instance, Moradi et al. (2014), and Singh et al. (2011) found a negative relationship; Staw and Barsade (1993) and Walker (2013) found no relationship; and Ahmed and Malik (2019), Haider et al. (2018), and Wright and Bonnett (2007) found high correlations (over .45). In part, the discrepancies might be explained by the fact that some studies used less well-construct valid measures of job performance (e.g., Moradi et al., 2014; Singh et al., 2011; Staw & Barsade, 1993). Therefore, additional research on the relationship between SWB and its cognitive and emotional components with job performance seems to be necessary.

A relevant and unexplored issue is the relationship between CR and SWB. To the best of our knowledge, no study has examined whether or not CR and SWB correlate. About this relationship, because of low CR encompasses mainly processes that imply emotional and affective responses (Kahneman, 2011; Kahneman & Frederick, 2002), it can be speculated that there is a relationship between low CR and the emotional component of SWB (see also Castellano et al., 2019; Hernández et al., 2020). On the other hand, high CR requires reasoning, judgment, and reflection mechanisms, similar to the required one to make judgments about life satisfaction. It can also be speculated that high CR will correlate with the cognitive component of SWB. Therefore, for both practical (e.g., joint prediction of job performance) and theoretical reasons (e.g., the nomological network of CR), it seems appropriate to research the potential relationship between CR and SWB components.

Another no investigated issue is whether or not life satisfaction and emotional balance, the cognitive and emotional components of SWB, show incremental validity one over the other to predict job performance. Until now, only the study by Salgado, Blanco, et al. (2019) examined this issue. They found that the emotional component of SWB showed incremental validity over life satisfaction, and also that a compound of the two variables is a

better predictor of job performance than any of the two alone. Because this is the only study on this issue, and despite its finding, it seems necessary to conduct new studies.

In summary, this research has five main objectives. The first objective is to evaluate whether CR predicts job performance. The second objective is to examine whether satisfaction with life and emotional balance predict job performance as assessed by supervisor ratings. The third objective is to examine the relationship between CR and satisfaction with life and emotional balance, i.e., the cognitive and emotional components of SWB. The fourth objective is to determine the joint capacity of CR, satisfaction with life, and emotional balance for predicting job performance. Finally, the fifth objective is to know whether emotional balance shows incremental validity over the satisfaction with life validity for the prediction of job performance. Figure 1 represents the theoretical model of this joint relationship.

Method

Participants

The participants were 245 managers (140 men and 105 women) working in Spanish companies. By economic and industrial sectors, 16.30% of the sample worked in the chemical and mechanical industry, 12.12% worked in the industry of information and communication technologies (ICT), 16.30% in the sector of legal, financial and human resources consulting, 7.70% worked in the commerce sector, 6.90% in education, 6.10% in the public administration, 6% worked in tourism, leisure, and sports services. The remainder of the sample worked in health, transport, and energetic sectors. The individuals participated voluntarily in the study. They were recruited through the LinkedIn social network of the authors. The average age was 42.2 (*SD* = 12), and the average job experience was 17.2 years (*SD* = 11.9).

Instruments

Cognitive Reflection (CR). This variable was assessed with 13 items taken from the 3-item CRT of Frederick (2005) and the 10-item CRT of Salgado (2014). Each item consists of a small arithmetical problem that is solved by simple calculations. An item example is: "A bat and a ball cost $1.10 in total. The bat costs $1.00 more than the ball. How much does the ball cost?". To answer each, the employees had to choose between two alternatives (5 cents or 10 cents), one of them correct. The right answer represents the reflexive and correct one offered by S2, and the wrong answer would represent the fast and impulsive one offered by S1. The employees did not have a time limit to complete the test. The scores could range from 0 (no item answered correctly) to 13 (all items answered correctly). High scores in the CRT-13 indicate high cognitive reflection. In this study sample, the internal consistency reliability of the CRT-13 was .79 (Cronbach's alpha).

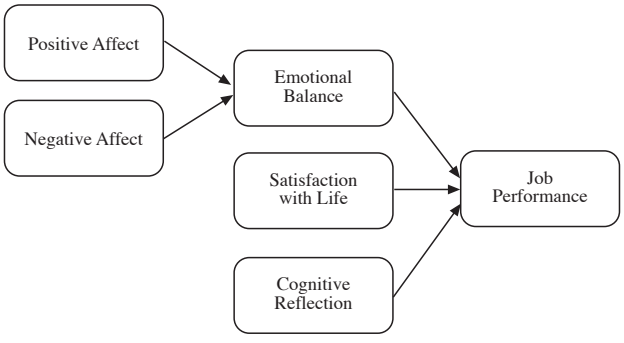

Figure 1. Predictive Model of Job Performance

Satisfaction with Life (SWL). The 5-item scale of Satisfaction with Life (Diener et al., 1985) was used for assessing this variable. Many studies examined the psychometric properties of the SWL scale (e.g., Busseri, 2018). This scale uses a 7-point Likert format. In this study sample, the internal consistency reliability of the SWL scale was .88 (Cronbach's alpha).

Emotional Balance (EB). The Scale of Positive and Negative Affective Experience (SPANE; Diener & Biswas-Diener, 2008; Diener et al., 2009) was used to evaluate EB. The scale consists of 14 items, seven positive and seven negative adjectives, which reflect feelings and emotions. Examples of items are happy, joyful, angry, and sad. The items were responded using a 5-point scale, where 1 = *very rarely* and 5 = *very often*. The SPANE provides three scores: positive affect (PA), negative affect (NA), and emotional balance (EB). Emotional balance is obtained discounting NA from PA.

The internal consistency reliability (Cronbach's alpha) in this study sample was .87, .82, and .95 for PA, NA, and EB, respectively. Vigil-Colet et al. (2020) examined the potential negative effects of reversing the items when a scale or questionnaire contains both positive and negative written items. Also, they advise when and when to not reverse the Likert-type items. In the present case, we reversed the scores for the seven negative adjectives only. Next, we estimated the EB reliability.

Job Performance. The scale developed by Black and Porter (1991) was used to assess job performance in this study. This scale asks the participants to remember the last performance appraisal in their current job. Next, the participants specify where the score would place them relative to their colleagues on a 5-point scale, where 1 = *lower than to 25% of employee*, and 5 = *higher to 90% of employees*. The scale contains five dimensions: (1) overall performance, (2) ability to get along with others, (3) completing tasks on time; (4) quality (as opposed to quantity) of performance; and (5) achievement of work goals. The internal consistency reliability was .90 (Cronbach's alpha) in this current study. Interrater reliability is the most appropriate reliability coefficient in the case of the supervisory rating of job performance (Salgado, 2015; Salgado & Moscoso, 1996, 2019a; Viswesvaran et al., 1996). However, we were not able to obtain an interrater coefficient as the participants did not know this information.

Procedure

A form containing the assessment scales was electronically administered through the software Google Forms. The participants completed the form in about 15 minutes. The form contained four sections. The first one consisted of an explanation of the objectives of the study and some socio-demographic questions (e.g., sex, age, job experience, education, company type, and industrial sector). The second section contained the 13-items of the CR test, the third one included the five items of the SWL scale, and the fourth section was the 14 items of the SPANE. No personal identification information was collected; therefore, the participants could answer the measures honestly as they could not be identified.

Data Analyses

To carry out the first three objectives, we computed the observed correlations among the variables. Next, we corrected these correlations by measurement error in both dependent and independent variables to obtain the true correlation estimates. Finally, we carried out multiple regression analyses to achieve the fourth and fifth objectives. We report the R, R^2, *R adjusted*, Δ (incremental validity), Beta, and p. Besides, we report the statistical estimate of the squared population cross-validated multiple correlation (R^2_{cv}), obtained with the formula of Browne (1975; see also, Lautenschlager, 1990), as R, R^2, and *adjusted* R^2 are biased estimates due to the fact that multiple regression analysis capitalizes on chance. R^2_{cv} is an unbiased estimator of the multiple square correlation (Cattin, 1980; Cotter & Raju, 1982; Kromrey & Hines, 1996; Lautenschlager, 1990).

Results

Table 1 presents the descriptive statistics and correlations among CR, SWB, the components of SWB, and job performance. The observed correlations appear below the diagonal, and the correlations corrected for measurement error in both variables appear above the diagonal. Also, Table 1 reports the reliability coefficient of the instruments. As can be seen, the reliability coefficients ranged from .79 for CR to .95 for EB.

Regarding CR, the results show that CR was not a valid predictor of job performance in this sample (r = .04, p > .10). Therefore, Hypothesis 1 was not supported in this study.

Concerning the SWB measures (i.e., life satisfaction, positive affect, negative affect, and emotional balance), the four measures correlated significantly with job performance. Therefore, the results supported Hypothesis 2. The magnitude of the observed correlations ranged from -.19 for the relationship between negative affect and job performance, to .35 to the relationships of job performance with satisfaction with life. The magnitude of the correlations showed that the cognitive component of SWB was a better predictor of job performance in this sample than the emotional component, independently of whether this last component is assessed as positive affect and negative affect, or as emotional balance. The magnitude of the correlation between the cognitive SWB component and job performance is moderate.

Table 1
Descriptive Statistics and Correlations Among Cognitive Reflection, Satisfaction with Life, Emotional Balance, and Job Performance

Variable	Mean	SD	JP	CR	SWL	PA	NA	EB
JP	21.06	2.51	(.80)	.05	.42**	.34**	-.23**	.30**
CR	8.67	3.11	.04	(.79)	.16*	.08	-.21**	.15*
SWL	26.20	5.15	.35**	.13*	(.88)*	.70**	-.54**	.65**
PA	26.15	4.56	.28**	.07	.61**	(.87)	-.80**	1.00**
NA	15.27	4.37	-.19**	-.17**	-.46**	-.65**	(.82)	-1.00**
EB	10.88	8.11	.26**	.13*	.59**	.91**	-.90**	(.95)

Note: JP = job performance; CR = cognitive reflection; SWL = satisfaction with life; PA = positive affect; NA = negative affect; EB = emotional balance. Observed correlation are below the diagonal and corrected correlation are above the diagonal. Reliability coefficients appear in the diagonal (N = 245)
* p < .05; ** p < .01

About the relationship of CR with the SWB components, CR correlated significantly with life satisfaction and emotional balance (r = .13, p < .05, in both cases), although the magnitude of the correlations was small in the two cases. This finding supported Hypothesis 3.

Tables 2 and 3 report the multiple regression analyses carried out to test whether EB showed incremental validity over SWL, and whether the three variables (i.e., CR, emotional balance, and satisfaction with life) added validity to predict job performance.

As can be seen in Table 2, SWL plus EB showed an R^2 equal to .358, which means that EB added less than 1% of variance over SWL to predict job performance (.358-.350 = .008). Consequently, Hypothesis 4 was supported, although the magnitude of the effect was minimal.

Table 3 shows that when the three variables of the model (i.e., CR, SWL, and EB) enter together in the multiple regression analysis, satisfaction with life, i.e., the cognitive component of SWB, is the unique, valid predictor of job performance. The amount of incremental validity of EB remains very small (Δ_{EB} = .008), and the incremental validity of CR is zero. Consequently, Hypothesis 5 was partially supported in connection with EB, but it was not supported concerning CR. Therefore, CR did not show to be a useful predictor of job performance neither alone nor in combination with the SWB components.

Discussion

This research has made three unique contributions. First, it is the first study that has examined the potential value of cognitive reflection for predicting job performance. The second unique contribution is that it is the first one that has tested the relationships

Table 2
Multiple Regression Analysis of Satisfaction with Life, Emotional Balance, and Job Performance

Variable	Beta	p
Satisfaction with Life (SWL)	.301	.000
Emotional Balance (EB)	.086	.249
$R_{SWL + EB}$	.358	
$R^2_{SWL + EB}$	.128	
$R^2_{adjusted}$	.121	
R^2_{cv}	.120	
Δ EB over SWL	.008	

Table 3
Multiple Regression Analysis of Cognitive Reflection, Satisfaction with Life, Emotional Balance, and Job Performance

Variable	Beta	p
Cognitive Reflection (CR)	-.008	.893
Satisfaction with Life (SWL)	.301	.000
Emotional Balance (EB)	.086	.247
$R_{SWL + EB + CR}$	.358	
$R^2_{SWL + EB}$	.128	
$R^2_{adjusted}$	.117	
R^2_{cv}	.110	
Δ EB over SWL	.008	
Δ CR over SWL + EB	.000	

between cognitive reflection and SWB and its two components. The third unique contribution has been to examine the incremental validity of CR over SWB to predict job performance.

Concerning the first contribution, our findings indicated that CR was not a valid predictor of job performance. This finding is relevant in connection with the studies that showed that CR shares a large amount of variance with cognitive intelligence (Otero, 2019; Otero, Salgado et al., 2020) and the meta-analyses that showed that cognitive intelligence is the main predictor of job performance (Ones et al., 2017; Salgado, 2017; Salgado & Moscoso, 2019b). Our study suggests that cognitive intelligence does not operate indirectly through cognitive reflection to predict job performance. Besides, the current results suggest that the non-cognitive intelligence variance of cognitive reflection seems to be non-relevant to predict job performance.

Regarding the second unique contribution, cognitive reflection shares some variance with both the cognitive and the emotional components of SWB, although the amount of the shared variance is small. This finding suggests that cognitive reflection is not a fully cognitive construct, as suggested by Teovanović et al. (2015) and Welsh et al. (2013), because some degree of its variance may be shared with motivational and personality traits.

About the third unique contribution, the study showed that CR did not show incremental validity over and beyond the two components of SWB. Therefore, neither directly nor in combination with SWB, CR was a valid predictor of job performance. Then, CR does not seem to be a relevant variable at the workplace, at least regarding job performance.

The study made three additional contributions, although they are not unique, as previous research explored the relationships and showed some similar findings. In agreement with the findings of previous research (e.g., Salgado, Blanco et al., 2019), the fourth contribution has been to show that satisfaction with life is a relevant predictor of job performance. The magnitude of its validity is similar or larger than the validity of many common predictors of job performance, such as personality, assessment centers, and situational judgment tests (see, Moscoso et al., 2017, for a review). The fifth contribution has been to show that the cognitive and emotional components of SWB are moderately correlated, which agrees with the findings of the meta-analysis of Busseri (2018). Finally, the sixth contribution has been to show that the incremental validity of EB over SWB was small (less than 1%) to predict job performance. This finding contrast with the evidence reported by Salgado, Blanco, et al. (2019), who found the EB added around 4% of the variance in the explanation of job performance.

Theoretical and Practical Implications

The results of this study have implications for the theory and practice of performance at work. Concerning CR, the first theoretical implication is that this cognitive variable does not appear to be an explanatory factor of the work-related behaviors implied in job performance. On the practical side, CR cannot be suggested as a relevant alternative to cognitive intelligence tests in hiring processes. The results also have implications for SWB at work. From the theoretical point of view, the results support the hypothesis that employees who score higher in satisfaction with life show comparatively better performance than less satisfied with life employees. From a practical point of view, the results suggest that organizations supporting employee well-being might improve their overall effectiveness. Besides, organizations can improve employee performance by creating conditions that allow them to increase their satisfaction with life and positive emotions, and reducing their negative emotions, for instance, providing positive feedback and using programs to reduce stress at work.

Limitations and Suggestions for Future Studies

Like all studies, this one also has some limitations that should be mentioned. First, the cross-sectional design does not permit to establish a causal link between SWB and job performance. It might be possible that job performance can operate to reinforce satisfaction with life and to experience positive emotions if performance is high and, otherwise, if performance is low, it might lower satisfaction with life and positive emotions and increases negative emotions. A second limitation is the job performance measure. Although the study used supervisory job performance, the participants were the informants, and it might exit some discrepancy between the current view of the supervisor concerning the employee performance and their previous performance appraisal, which was reported by the employees. Future studies should examine this potential factor.

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