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# Cultural intelligence and work-related outcomes: A meta-analytic examination of joint effects and incremental predictive validity

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## ABSTRACT

This meta-analysis provides a synthesis of 70 studies on the relationship between cultural intelligence (CQ) and six work-related outcomes. By applying the mutualism perspective and using commonality analysis, we propose a theoretical perspective and empirically explore the joint effects of two and three sets of CQ dimensions on work-related outcomes. We find that the CQ dimensions mediate the relationships between personality traits and work-related outcomes, and that they have incremental validity beyond these traits and a comprehensive set of established predictors for all outcomes. We discuss the implications of these findings for theory development and provide directions for future research.

## 1. Introduction

Cultural intelligence (CQ) is a measure of intercultural competence (Ang & Van Dyne, 2008; Leung, Ang, & Tan, 2014; Matsumoto & Hwang, 2013; Yari, Lankut, Alon, & Richter, 2020) that has received considerable theoretical and empirical attention (Earley, 2002; Earley & Ang, 2003). Most scholars define CQ as “a person’s capability to adapt effectively to new cultural contexts” (Earley & Ang, 2003, p. 59; see Andresen & Bergdolt, 2017 for an overview). CQ is a multidimensional construct (e.g., Taras, 2020). The most popular CQ model developed by Ang et al. (2006) and its accompanying 20-item CQ scale (Leung et al., 2014; Ott & Michailova, 2018) encompass four dimensions: *motivational CQ*, *cognitive CQ*, *behavioral CQ*, and *metacognitive CQ* (Ang, Van Dyne, & Koh, 2006). Considerable research has been done on the effects of CQ on work-related outcomes, with the vast majority of studies reporting positive associations between the two variables (Fang, Schei, & Selart, 2018; Ott & Michailova, 2018; Rockstuhl & Van Dyne, 2018). However, there is less theoretical clarity on the joint effects of sets of two and three CQ dimensions in explaining work-related outcomes, and on the conceptual redundancy or additional value of CQ beyond well-established

predictors. Our objective is to contribute to the theorizing of these two aspects through a meta-analytic review.

Our first contribution is to develop a better understanding of how the CQ dimensions *together* (in certain combinations) are associated with different work-related outcomes. Previous empirical studies focused either on CQ as an overall construct (e.g., the average across all dimensions) or on the individual dimensions of CQ. Both conceptualizations have limitations. Focusing on overall CQ does not uncover the unique effects of the individual CQ dimensions, considering that the effects of the individual dimensions can be weaker or stronger than the common, effect of overall CQ. By contrast, a focus on the individual CQ dimensions neglects the explanatory power shared by two or more CQ dimensions. The limited number of studies reporting the effects of the overall CQ and the individual CQ dimensions justifies the need for a more nuanced approach (Gelfand, Imai, & Fehr, 2008). Rockstuhl and Van Dyne (2018) went even further and proposed a bi-factor CQ model that allows the simultaneous analysis of both the individual and common effects of the CQ dimensions. However, in their model, they focus on the common effect of all CQ dimensions, neglecting the joint effects that sets of two or three CQ dimensions *together* can exert on an

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outcome.<sup>1</sup> The present study addresses these shortcomings.

Building on the mutualism theory of intelligence (Van der Maas et al., 2006), our argument favors the existence and relevance of the joint effects of sets of two and three CQ dimensions on different work-related outcomes. We use commonality analysis (Mood, 1969; Seibold & McPhee, 1979) to decompose the variances explained in work outcomes by CQ into unique, joint, and common effects. We examine expatriation intention, three facets of cross-cultural adjustment, job satisfaction, and job performance, and also extend Rockstuhl and Van Dyne's (2018) meta-analysis to a wider range of work-related outcomes. In doing so, we refine the recent advances in the conceptualization of CQ (Rockstuhl & Van Dyne, 2018) by revealing the contributions of sets of two or three CQ dimensions, thereby responding to calls for research on the interplay (Blasco, Feldt, & Jakobsen, 2012; Gelfand et al., 2008; Richter, van Bakel, Schlaegel, & Lemmergaard, 2020) and differential effects of CQ dimensions (Leung et al., 2014; Ng, Van Dyne, & Ang, 2012).

Our second contribution focuses on the incremental predictive validity of CQ and its relationship with other determinants of work-related outcomes. The findings on CQ's incremental predictive validity, especially regarding the scope of the examined predictors and outcomes, are inconclusive and limited, and they raise questions about CQ's marginal predictive power (Blasco et al., 2012; Fang et al., 2018). Therefore, it is important to establish incremental predictive validity, given that the utility, added value, and generality of the CQ construct as a useful measure rest on its ability to explain variance for various work-related outcomes, over and above other relevant predictors that have demonstrated empirical support and that are probably more accessible and easier to measure (Westfall & Yarkoni, 2016). More specifically, the cross-cultural relevance of personality traits for work outcomes is well-established (e.g., Harari, Reaves, Beane, Laginess, & Viswesvaran, 2018; Hechanova, Beehr, & Christiansen, 2003), and individual experiences, skills, and competencies are meaningfully related to work-related outcomes (e.g., Takeuchi, Tesluk, Yun, & Lepak, 2005). Apart from the five-factor model (FFM) of personality, language proficiency, international experience, general mental ability (GMA), and emotional intelligence (EQ), we also test the incremental predictive validity of CQ for the six work outcomes covered in our meta-analysis. Lastly, in our test of the incremental predictive validity of CQ we rely on Leung et al. (2014) proposed a conceptual model in which intercultural capabilities (e.g., CQ) mediate the relationship between traits (e.g., FFM personality traits) and outcomes. Responding to calls to explore how CQ fits into the larger nomological network (e.g., Ang & Van Dyne, 2008; Fang et al., 2018), we use meta-analytic SEM to test CQ's mediating role between personality and work outcomes. In this way, we provide a clearer picture of CQ's position within its nomological network and of the processes through which more distal predictors are related to work outcomes.

## 2. Theoretical background and development of research hypotheses

### 2.1. The relationship between CQ and work-related outcomes

When explaining the association between CQ and work-related outcomes, researchers (implicitly or explicitly) refer to the theoretical background used to develop the CQ construct, and some even contend that CQ, as such, is a theory (e.g., Sims, 2011). Although researchers studying the common CQ effect by focusing on overall CQ often refer to

<sup>1</sup> To clearly distinguish between the different effects, we use the terms 'joint effect' when we refer to the variance explained by sets of two or three CQ dimensions, 'common effect' when we refer to the explained variance accounted for by all four CQ dimensions. Finally we use the term 'shared effects' when we refer to all possible effects, i.e. joint and common effects.

the theory of successful intelligence (Sternberg, 1998) and outline a positive relationship between CQ and work-related outcomes, they also base their arguments on the unique contributions of individual CQ dimensions.

Cognitive CQ is rooted in Ackerman's (1996) intelligence-as-knowledge concept. It enables individuals to understand similarities and differences across cultures and, in this way, has positive implications for expectation alignment and work-related outcomes. Metacognitive CQ builds on the ideas of Flavell (1979) and comprises the processes that individuals use to acquire and understand cultural knowledge, such as planning, monitoring, and revising mental models of cultural norms; processes that improve work-related outcomes. Motivational CQ reflects the magnitude and direction of applied energy to learn about and function in cross-cultural situations. It generates several concepts, including intrinsic interest, self-determination (Deci & Ryan, 1985), and cross-cultural self-efficacy (building on Bandura, 1986, 1997), in combination with motivation-related theories (e.g., expectancy-value theory; Kanfer & Heggstad, 1997; Vroom, 1964). Again, the arguments include positive associations with work-related outcomes. Finally, behavioral CQ—the capability to exhibit a wide and flexible repertoire of verbal and nonverbal behaviors in culturally diverse interactions (Ang & Van Dyne, 2008; Ang et al., 2007)—builds on ideas presented in Hall (1959) and Gudykunst (1998). Likewise, this capability contributes to better work-related outcomes. In addition, various authors refer to theories and conceptual models that specifically concern the work-related outcomes under investigation. Table 1 provides the definitions, measurement items of work-related outcomes, and illustrative examples of corresponding theoretical arguments that complement our explanations. In addition, Table A1 in the Appendix provides a comprehensive overview of the theories that explain the effects of CQ on work-related outcomes.

The authors of earlier publications, in the context of *expatriation intention*, referred—slightly more than average—to two approaches: The first is Bandura's (1986), (1997) social cognitive theory and self-efficacy arguments. Self-efficacy is a belief in one's ability to perform a behavior or achieve a certain outcome (Locke, Motowidlo, & Bobko, 1986), including the ability to function under pressure or in uncertain situations, thus providing 'a good fit' for many articles in the field of cross-cultural work-outcomes. The second is the theory of planned behavior (Ajzen, 1991) or its extensions (see Table 1 for illustrative theoretical arguments).

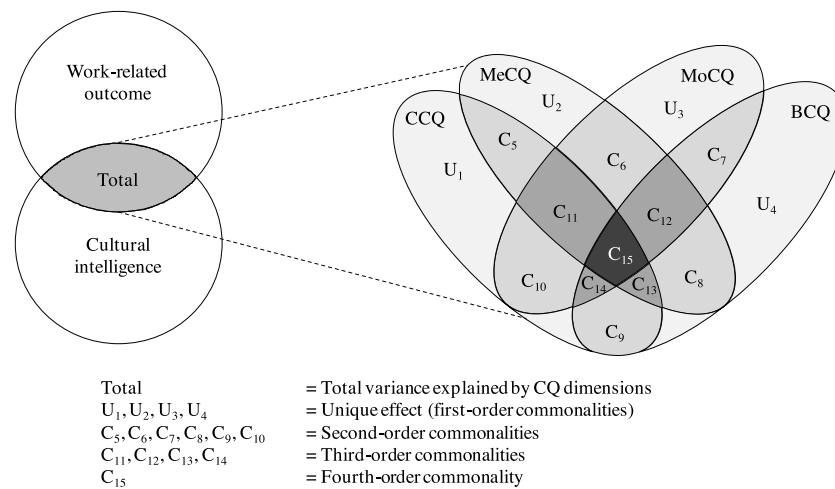
Concerning the facets of *cross-cultural adjustment*, prior research mainly referred to Black and Stephens's (1989), Black, Mendenhall, & Oddou, (1991) model of international adjustment, which differentiates between three factors associated with cross-cultural adjustment: perceptions or cognitive abilities, relational capabilities, and self-management capabilities (e.g., self-efficacy). In previous CQ studies, dominant concepts used in combination with these factors relate to Bandura's (1986), (1997) social cognitive theory and self-efficacy arguments, as well as to arguments on intrinsic and work motivation (Deci & Ryan, 1985; Kanfer & Heggstad, 1997). Authors also referred to the anxiety/uncertainty management model of Gudykunst (1998), (2005) (see Table 1).

Earlier studies of CQ effects on job satisfaction used a wide range of theoretical frameworks, including self-efficacy theory (Bandura, 1997), work adjustment theory (along with ideas on person-organization, person-job or person-environment-fit; Dawis & Lofquist, 1984), job characteristics and job satisfaction models (Hackman & Oldham, 1976), and conceptual models that viewed CQ as a dispositional cause of job satisfaction (e.g., Judge, Locke, Durham, & Kluger, 1998).

Although these theoretical frameworks—used to confirm the positive association between CQ and performance—are similarly diverse, they contain certain concepts embedded in previous research and theories. Again, these are the theories of self-efficacy (Bandura, 1997) and intrinsic motivation (Deci & Ryan, 1985), as well as theories of work motivation and goal setting (e.g., Locke & Latham, 1990) and

**Table 1**  
Summary of definitions, measurement items, and theories used to hypothesize work-related outcomes of CQ.

Construct and definition	Measurement items	Theoretical arguments for an association with CQ and illustrative examples
<b>Expatriation intention (EI)</b>	<b>Example 1 (Schlägel &amp; Sarstedt, 2016):</b> To what extent 1) have you considered working in a foreign country? 2) have you prepared yourself to accept a job in a foreign country? 3) is it likely that you will accept a job in a foreign country if offered in the next five years?	The <b>theory of planned behavior (TPB)</b> differentiates between three determinants of intention: An individual's attitude toward behavior that stems from an evaluation of positive and negative aspects related to the behavior's expected value; the perceived behavioral control, i.e., the perceived ease attached by an individual to the behavior or the perceived control that a person feels to have over the behavior; and the subjective norm, i.e., the perceived (positive) opinions of significant others about the behavior (Ajzen, 1991; Fishbein & Ajzen, 1975). Using the TPB, Richter, Schlaegel et al. (2020), Richter, van Bakel et al. (2020) assume that that cognitive and metacognitive CQ, in particular, imply the existence of higher perceived behavioral control before the cross-cultural interaction. Moreover, they assume that motivational CQ will be positively associated with EI as this implies a more positive attitude toward the behavior, higher perceived behavioral control, and a subjective norm. Guðmundsdóttir (2015), by using the <b>anxiety/uncertainty management</b> model of Gudykunst (1998, (2005)), assumes the existence of a positive relation between CQ and cross-cultural adjustment. More specifically, cognitive CQ helps to understand the similarities and differences across cultures, which, in turn, assist in their adjustment. Metacognitive CQ assists in adjusting the <b>self-concept</b> of individuals (Goffman, 1959), which facilitates adjustment. Motivational CQ is related to <b>self-efficacy</b> beliefs (Bandura, 1997), therewith improving adjustment. Finally, behavioral CQ—with its broad range of verbal and non-verbal capabilities—reflects <b>culturally flexible behaviors</b> (Hall, 1959) that will positively influence adjustment. Barakat, Lorenz, Ramsey, and Cretoiu (2015) refer to CQ as being a person's <b>self-concept</b> , specific to a cross-cultural setting. They indicate that some of the antecedents of job satisfaction overlap with the tenants of CQ and that <b>self-efficacy</b> is the key component of the self-concept that increases satisfaction. More specifically, they contend that this is due to the following aspects: First, a higher CQ entails an <b>intrinsic motivation to cope with obstacles and challenges</b> . Second, it includes a motivation to accept delayed rewards. Third, a higher self-efficacy induces an engagement in <b>goal-setting</b> , which leads to positive actions and outcomes (e.g., Judge et al., 1998; Locke & Latham, 1990) Ang et al. (2007) refer to Campbell's (1999) idea that <b>performance is a function of knowledge, skills, abilities, and motivation</b> , directed at role-prescribed behaviors; and that the evaluation of performance relies on an assessment of the extent to which individuals meet <b>role expectations</b> (Katz & Kahn, 1978). Combining this with CQ, they outline that cognitive CQ increases the accuracy of understanding role expectations, and that metacognitive CQ increases this understanding. Motivational CQ results in more energy directed at and persistence when learning role expectations and practicing behaviors to meet role expectations. Finally, high behavioral CQ entails higher behavioral flexibility that, subsequently, increases the possibility of meeting the expectations of others. What follows are positive associations of all four CQ dimensions with performance.
Expatriate intention commonly refers to one's interest in accepting an overseas job assignment.	<b>Example 2 (Engle, Schlaegel, Dimitriadis, Tatoglu, &amp; Ljubica, 2015):</b> To what extent would you be willing to accept a job requiring you to work in a country with a very different culture?	
<b>Cross-cultural adjustment</b>	<b>Example (Black &amp; Stephens, 1989):</b> Please indicate how adjusted or unadjusted you feel in the following areas: 1) Specific job responsibilities; 2) performance standards and expectations; and 3) supervisory responsibilities. 1) Socialization with host nationals; 2) interaction with host nationals on a day-to-day basis; 3) interaction with host nationals outside of work; and 4) speaking with host nationals. 1) Living conditions in general; 2) housing conditions; 3) food, 4) shopping, 5) cost of living; 6) entertainment/ recreation facilities and opportunities; and 7) healthcare facilities.	
<i>Work adjustment</i> refers to the degree of comfort with new work roles, values, expectations, and standards.		
<i>Interaction adjustment</i> refers to the level of perceived comfort in respect of interacting and socializing with foreign nationals.		
<i>General adjustment</i> refers to the degree of comfort with the new environment in respect of housing conditions, healthcare, transportation, etc. (Black & Stephens, 1989)		
<b>Job satisfaction</b>	<b>Example 1 (Henderson, Stackman, &amp; Lindekilde, 2018):</b> 1) I am satisfied with my job. 2) I enjoy working with my co-workers. 3) My efforts are appreciated.	
Job satisfaction is a positive emotional state that results from the evaluation of one's job experience (Locke, 1976).	<b>Example 2 (Barakat et al., 2015):</b> 1) I find real enjoyment in my work. 2) I like my job better than the average person. 3) I am seldom bored with my job. 4) I would not consider taking any other kind of job. 5) Most days I am enthusiastic about my job. 6) I feel fairly satisfied with my job.	
<b>Job performance</b> Job performance comprises behaviors and actions that are relevant to achieving the objectives of the organization (Campbell, McCloy, Oppler, & Sagner, 1993), or simply the extent to which individuals meet their organizational role expectations (Ang et al., 2007).	<b>Example 1 (Henderson et al., 2018):</b> 1) How would you rate your overall job performance? 2) How would you rate your ability to complete the required assignments on time? 3) How would you rate the quality of your performance? 4) I am satisfied with my performance.	
	<b>Example 2 (Lee, Veasna, &amp; Wu, 2013):</b> Task performance: 1) My overall performance during my assignment is good. 2) I have good achievements with regard to my work goals. 3) I have the capability necessary to effectively complete my tasks. 4) I have a good quality of performance. Contextual performance: 5) I have a good ability with regard to getting along with others. 6) I keep good relationships with my local co-workers. 7) I maintain relationships in and socialize with the locals in my social environment.	



**Fig. 1.** Partitioning CQ's explained variance in work-related outcomes.

Note: CCQ = cognitive CQ, MeCQ = metacognitive CQ, MoCQ = motivational CQ, BCQ = behavioral CQ. The visualization of the decomposition of unique and common effects is adapted from [Lomberg, Urbig, Stöckmann, Marino, and Dickson \(2017\)](#).

expectancy value theory ([Vroom, 1964](#)). Furthermore, several authors (see [Table 1](#)) referred to [Campbell's \(1999\)](#) argument that knowledge, skills, abilities, and motivation predict performance (defined as role-prescribed behavior), in combination with CQ as a facilitator of understanding and in conjunction with role expectations (e.g., [Stone-Romero, Stone, & Salas, 2003](#)).

Hence, there is neither an overarching theory nor a dominant theory of the association between CQ and work-related outcomes, although self-efficacy arguments are more popular. Despite this diversity, all the frameworks suggest a positive association and the empirical results support this notion, in respect of both the overall CQ construct and the individual dimensions. Hence, although there is a diversity of theoretical frameworks, CQ's positive implications are unambiguous.

By contrast, there is less clarity about the (relative) strengths of individual CQ effects on specific outcomes. Theoretical strength depends on the choice of the theoretical background (e.g., choosing work-motivation theories will promote a stronger effect of motivational CQ; choosing another theoretical framework will promote other effects). The combination of theories does not solve this problem. Studies that combine theoretical arguments to develop an overarching framework typically bundle work-related outcomes into categories and hypothesize associations between CQ and these outcome categories. Another approach that produces the called-for overarching model is predictor-criterion matching ([Lievens, Buyse, & Sackett, 2005](#); [Sackett & Lievens, 2008](#)). Along with the matching principle ([Ajzen, 2005](#)), it posits that the greater the match between the predictor and the criterion, the better the predictive validity of the predictor.

[Ang et al. \(2007\)](#) followed the first approach to explain the effects of CQ on cognitive outcomes. They considered decision making as an analytical process and contended that cognitive and metacognitive CQ are its best predictors. For affective outcomes (in their case, adaptation), they regarded motivational and behavioral CQ as the most relevant predictors. Finally, they outlined that performance outcomes are best predicted by the four CQ dimensions ([Ang et al., 2007](#)). However, their approach's application to our study will create ambiguity as many work-related outcomes fall into more than one of the aforesaid categories. For instance, expatriation intentions are usually classified as a cognitive-affective outcome (e.g., [Selmer & Lauring, 2013](#)). Likewise, contrasting their approach with the predictor-criterion-matching idea (e.g., that behavioral CQ would be the strongest predictor of behavioral and performance outcomes) results in contradictions of the findings/arguments of other studies. Hence, the literature does not provide a

single overarching theory on the relative effects of overall CQ and its individual dimensions. Therefore, we refrain from a priori hypothesizing the relative strengths of the CQ dimensions' individual effects on work-related outcomes. Instead, we aim to contribute to the field by providing a novel perspective that not only considers how the CQ dimensions are uniquely and commonly related to different outcomes, but also how sets of CQ dimensions *jointly* contribute to an outcome, thereby confirming the multidimensional nature of CQ and how the CQ dimensions, together in certain combinations, are associated with different outcomes.

## 2.2. The association between sets of CQ dimensions and work-related outcomes

In the studies included in our meta-analysis, scholars conceptualized CQ in two specific ways. First, 39 % of the 70 studies in our dataset focused on the effects of overall CQ (see [Table A1](#)). While specifying that CQ as an overall construct has advantages (e.g., parsimony, higher reliability, analytical simplicity, and larger bandwidth for more broadly defined, work-related outcomes), this approach's main disadvantage is that it does not allow an in-depth exploration of how individual CQ dimensions relate to specific work-related outcomes ([Johnson, Rosen, & Chang, 2011](#); [Rockstuhl & Van Dyne, 2018](#)). The strengths of associations between CQ dimensions and different work-related outcome variables can vary and studies that focus solely on overall CQ are not able to uncover these differentiated associations. For example, while three CQ dimensions could be weakly associated with an outcome, one CQ dimension might still show a strong association with it—a finding that would not be revealed if the focus is on overall CQ, potentially resulting in misleading evaluations of the theoretical value and practical relevance of CQ and its dimensions.

Second, 41 % of the studies included in the dataset tested the effects of the four CQ dimensions individually.<sup>2</sup> The individual CQ dimensions provide a more fine-grained understanding of their differentiated roles regarding different outcomes, enabling researchers to test theoretical models in more detail. However, this approach's main shortcoming is that it treats the dimensions as separate factors and, therefore, it does

<sup>2</sup> The remaining 20% of studies in our meta-analysis include studies that examined both the overall construct and the dimensions (6%) and studies that focused on a single CQ dimension (14%).



**Table 2**  
Overview of CQ's incremental predictive validity in prior studies.

Study	Predictors	CQ specification	Outcomes	Incremental predictive validity of CQ
Akhal and Liu (2019)	- Age, gender, marital status, level of education, Chinese language proficiency, international experience, length of stay in China	- CQ dimensions	- Cross-cultural adjustment dimensions, turnover intention	- General adjustment: MC (+), C (+), M (+), B (-) - Interaction adjustment: MC (+), C (+), M (+), B (+) - Work adjustment: MC (+), C (+), M (+), B (-) - Turnover intention: MC (-), C (-), M (+), B (-) (but M had a negative effect) - Cross-cultural judgment and decision making: C and MC (+), M and B (-) - Interactional adjustment: C and MC (-), M and B (+) - Well-being: C and MC (-), M and B (+)
Ang et al. (2007)	- Age, gender, general mental ability, FFM personality traits, EQ dimensions, cross-cultural experience	- CQ dimensions	- Cross-cultural judgment and decision making, well-being, interaction adjustment	- Performance: Overall CQ (+), all four CQ dimensions (+) - Culture shock: Overall CQ (+), all four CQ dimensions (+) - Career success: M (+), all other dimensions (-) - Job satisfaction: C and MC (-), M and B (+) - Cross-cultural adjustment dimensions: M (+), all other dimensions (-) - Desire to stay in the program/accept an assignment in a different country: M (+), all other dimensions (-) - Satisfaction with life and work: C and MC (-), M and B (+)
Camargo, Storme, & Çelik (2020)	- FFM personality traits, general emotional intelligence	- CQ dimensions	- Expatriate career intentions	- M (+), all other dimensions (-)
Chen, Lin, & Sawangpattanakul (2011)	- Age, high school, vocational diploma, Bachelor degree, number of visits to Taiwan, foreign experience, English ability, Chinese ability	- Overall CQ and CQ dimensions	- Performance, culture shock	- Performance: Overall CQ (+), all four CQ dimensions (+) - Culture shock: Overall CQ (+), all four CQ dimensions (+) - Career success: M (+), all other dimensions (-) - Job satisfaction: C and MC (-), M and B (+) - Cross-cultural adjustment dimensions: M (+), all other dimensions (-)
Diao and Park (2011), (2012)	- Gender, nationality, status, employment type, age, educational level, job experience, job title, cross-cultural experiences, job type	- CQ dimensions	- Career success, job satisfaction	- Desire to stay in the program/accept an assignment in a different country: M (+), all other dimensions (-) - Satisfaction with life and work: C and MC (-), M and B (+)
Huff (2013)	- Age, gender, first assignment, position, language proficiency	- CQ dimensions	- Cross-cultural adjustment dimensions, desire to stay in the program, desire to accept an assignment in a different country, satisfaction with life and work	- Satisfaction with life and work: C and MC (-), M and B (+)
Huff et al. (2014)	- Age, gender, position, length of stay, language, cultural distance, FFM personality traits	- CQ dimensions	- Cross-cultural adjustment dimensions	- Cross-cultural adjustment dimensions: M (+), all other dimensions (-)
Lin et al. (2012)	- Age, previous overseas experience, English ability, host-country language ability	- Overall CQ and CQ dimensions	- Cross-cultural adjustment	- Cross-cultural adjustment : Overall CQ (+), all four CQ dimensions (+)
Rockstuhl et al. (2011)	- Age, leadership experience, FFM personality traits, prior international experience, general intelligence, EQ	- Overall CQ	- General leadership effectiveness, cross-border leadership effectiveness	- General leadership effectiveness: Overall CQ (-) - Cross-border leadership effectiveness: Overall CQ (+)
Şahin, Gürbüz, Köksal, and Ercan (2013)	- Age, gender, EQ dimensions, cross-cultural experience	- CQ dimensions	- In-role performance (self and peer-rated)	- In-role performance (self and peer-rated): C (-), MC (+), M (-), B (+) - General adjustment: MC (+), C (+), M (+), B (-) - Interaction adjustment: MC (-), C (+), M (+), B (+) - School-related adjustment: MC (-), C (+), M (+), B (-)
Shu, McAbee, & Ayman (2017)	- Past experience, length of stay, HEXACO personality traits	- CQ dimensions	- Cross-cultural adjustment dimensions,	- All three cross-cultural adjustment dimensions: M (+)
Templer, Tay, & Chandrasekar (2006)	- Gender, age, time in host country, previous international assignment	- Motivational CQ	- Cross-cultural adjustment dimensions	- Interactional adjustment (peer and self-rated): MC (-), C (-), M (+), B (+) (results are the same for peer and self-rated measures)
Van Dyne, Ang, & Koh (2008)	- Gender, cross-cultural experience	- CQ dimensions (peer and self-rated)	- Interactional adjustment (peer and self-rated)	- Sociocultural adaption: All four CQ dimensions (-) (applies for study 2 and 3) - Cross-cultural adjustment dimensions: All four CQ dimension (-) - Contextual performance: All four CQ dimensions (-) - Task performance: M (+), all other dimensions (-) - Intention to complete the assignment: M (+), all other dimensions (-)
Ward et al. (2009)	- Study 2: Age, gender, English language proficiency, EQ - Study 3: Age, gender, English language proficiency, empathy, open-mindedness, social initiative, emotional stability, flexibility	- CQ dimensions	- Satisfaction with life, depression, sociocultural adaption, academic adaption difficulties	- Cross-cultural adjustment dimensions: All four CQ dimension (-) - Contextual performance: All four CQ dimensions (-) - Task performance: M (+), all other dimensions (-) - Intention to complete the assignment: M (+), all other dimensions (-)
Wu and Ang (2011)	- Cultural distance, time in assignment, tenure, language fluency, previous assignment, role novelty, learning goal orientation, performance goal orientation, expatriate supporting practices	- CQ dimensions	- Cross-cultural adjustment dimensions, contextual performance, task performance, intention to complete the assignment	- Cross-cultural adjustment dimensions: All four CQ dimension (-) - Task performance: M (+), all other dimensions (-) - Intention to complete the assignment: M (+), all other dimensions (-)

Note: '+' represents statistically significant incremental predictive validity, and '-' represents a lack of incremental predictive validity. MC = metacognitive CQ, C = cognitive CQ, M = motivational CQ, B = behavioral CQ.

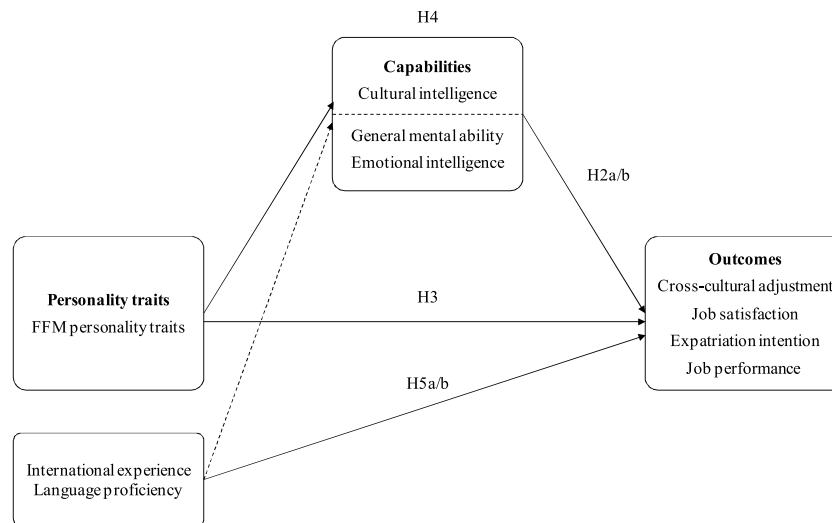


Fig. 2. A framework of work-related outcomes in an intercultural context.

not reveal how *together* (in certain combinations) they are associated with different outcomes.

Prior research has almost entirely ignored the role of the interrelation of CQ dimensions in theorizing and testing. As noted by Gelfand et al. (2008, p. 379-380), although the CQ dimensions were developed to “to act in concert in influencing behavior [...] very little research has examined how the dimensions interact in predicting outcomes” and “uncovering distinct CQ facet profiles might provide a more nuanced look at facets that is not captured when looking at them in isolation.” Recognizing the value of combining both conceptualizations, Rockstuhl and Van Dyne (2018) proposed and meta-analytically tested a bi-factor model of CQ for a set of work outcomes (sociocultural adjustment, intercultural judgment, and decision making, and four facets of performance). Bi-factor models provide information on the common effect of a general factor and the individual effects of its sub-domains (Reise, 2012). Hence, the model provides information on the individual effect of each CQ dimension and on the common effect of all four CQ dimensions (through overall CQ). In this manner, Rockstuhl and Van Dyne’s (2018) bi-factor model offers more fine-grained insights into the differentiated roles of the individual CQ dimensions in and the common effect of all four CQ dimensions on different outcomes.

Ang et al. (2007) conceptualize CQ as an aggregate multidimensional construct in which the CQ dimensions are conceptually on the same level as the overall construct and “...may or may not correlate with each other” (p. 338). Rockstuhl and Van Dyne’s (2018) meta-analysis found a moderate correlation between the CQ dimensions (.51–.63; mean = .57). Given this moderate correlation, the dimensions’ explanation of the variance in an outcome can in part be attributed to the unique effects of the individual CQ dimensions and in part to their common effect, more specifically the joint effects of sets of two and three CQ dimensions (Nimon & Oswald, 2013). Fig. 1 illustrates these effects.

The total variance explained (Total) refers to the sum of all unique effects, all joint effects of sets of two and three CQ dimensions, and the common effect of all four CQ dimensions. Joint and common effects represent the amount of variance in a work-related outcome that is collectively explained by CQ dimensions (Nimon & Oswald, 2013; Schoen, DeSimone, & James, 2011). The four CQ dimensions form four unique effects, ten joint effects, and the common effect of all four CQ dimensions. Although Rockstuhl and Van Dyne’s (2018) bi-factor model

of CQ provides information on the unique effects and the common effect of *all* CQ dimensions, it does not do so on the ten sets of possible joint effects of CQ dimensions. Identifying these joint effects would, however, present a more holistic understanding of the role of each CQ dimension in combination with the other CQ dimensions. For example, the joint effect of a set of two CQ dimensions might contribute more to the explained variance for a work-related outcome than would the common CQ effect.

We believe that these joint effects are theoretically relevant. Research on intelligence highlights the relevance of joint effects; a relevance which is substantiated by the mutualism theory of intelligence (Van der Maas et al., 2006). This theory explains the positive correlations between different cognitive abilities through positive, beneficial relationships among cognitive processes. As a cognitive ability increases, so do other abilities in a mutually beneficial manner through bidirectional or reciprocal relations. Van der Maas et al. (2006) refer to the relationships between cognition and metacognition and between metacognition and motivation (Sternberg, 1998). In respect of metacognition and motivation, Sternberg (1998), p. 129) notes that “...when you don’t know you don’t know something, you are scarcely motivated to learn it!” and, therewith, delineates beneficial mutual relations. Van der Maas et al. (2006) point out that these reciprocal relations are not limited to the intellectual domain but also apply to other reinforcing processes.

Similarly, CQ scholars conceptually contend that the CQ dimensions influence each other and jointly affect relevant cross-cultural outcomes. Thomas et al. (2008) define CQ as a system of interacting abilities. As people engage in cross-cultural interactions, they reflect on their cultural knowledge and behaviors, which in turn influence their cross-cultural interactions, which subsequently induce further reflection, etc. Hence, metacognitive CQ can reinforce cognitive CQ and behavioral CQ can reinforce specific outcomes of the cross-cultural encounter (see also Thomas, 2006). In line with the mutualism perspective, Thomas et al. (2008, p.135) stress that the relations among the CQ dimensions “...occur simultaneously and sequentially, and in virtually any order.” Along a similar line of thought, reinforced by Van der Maas et al.’s (2006) mutualism perspective, Ang et al. (2006), p. 5) identify reciprocal relationships between CQ dimensions when describing metacognitive CQ as individuals with high metacognitive CQ

**Table 3**  
Results of the bivariate meta-analysis.

Relationship	Before outlier removal										After outlier removal													
	k	N	$\bar{r}$	$\rho$	SD ( $\rho$ )	80 % CV	95 % CI	Q	$I^2$	# TF	Side	$\rho_{TF}$	95 % CI <sub>TF</sub>	# out	k	n	$\rho$	80 % CV	95 % CI	# TF	Side	$\rho_{TF}$	95 % CI <sub>TF</sub>	
Expatriation intention																								
Overall CQ	3	1163	.45	.53	.21	-.41/.92	.09/.80	34.64	***	94	na													
Cognitive CQ	15	3880	.25	.33	.13	.11/.51	.26/.39	75.20	***	81	0			0										
Metacognitive CQ	15	3787	.27	.36	.14	.14/.54	.28/.42	77.37	***	82	5	right	.43	.35/.49	0									
Motivational CQ	16	3938	.36	.47	.20	.17/.70	.39/.55	160.42	***	91	7	right	.57	.49/.63	1	15	3420	.45	.30/.58	.39/.50	3	right	.49	.43/.54
Behavioral CQ	14	3727	.20	.25	.15	.00/.48	.17/.33	90.16	***	86	3	right	.31	.22/.38	0									
General adjustment																								
Overall CQ	11	2860	.36	.45	.26	.03/.73	.31/.56	181.25	***	95	0			1	10	2635	.39	.08/.64	.29/.50	2	left	.34	.22/.46	
Cognitive CQ	17	3685	.28	.36	.19	.06/.61	.28/.44	139.91	***	88	0			0										
Metacognitive CQ	16	3429	.27	.36	.21	.01/.63	.25/.45	158.11	***	91	5	right	.43	.33/.51	1	15	3204	.32	.11/.50	.25/.38	4	right	.37	.30/.44
Motivational CQ	19	4188	.41	.55	.26	.17/.79	.46/.63	284.71	***	94	0			0										
Behavioral CQ	17	3685	.22	.29	.23	-.08/.60	.19/.39	188.59	***	92	0			0										
Interaction adjustment																								
Overall CQ	11	2860	.36	.44	.15	.20/.62	.35/.51	68.286	***	85	0			0										
Cognitive CQ	20	4669	.26	.34	.20	.02/.60	.26/.42	186.77	***	90	0			0										
Metacognitive CQ	19	4413	.28	.35	.13	.14/.53	.29/.41	87.67	***	80	0			0										
Motivational CQ	22	4549	.39	.51	.29	.08/.79	.42/.60	413.75	***	.95	0			2	20	4549	.45	.23/.63	.39/.51	3	left	.42	.35/.48	
Behavioral CQ	20	4669	.26	.34	.21	-.01/.61	.25/.43	213.17	***	91	0			0										
Work adjustment																								
Overall CQ	8	2051	.31	.38	.22	-.15/.74	.20/.54	90.81	***	93	na			na										
Cognitive CQ	17	3494	.27	.36	.27	-.08/.68	.24/.47	246.86	***	94	0			0										
Metacognitive CQ	16	3238	.28	.36	.21	.02/.62	.26/.45	142.96	***	90	0			0										
Motivational CQ	19	4277	.28	.45	.25	.06/.72	.36/.54	268.09	***	92	0			1	19	4086	.42	.16/.62	.35/.48	1	left	.40	.32/.47	
Behavioral CQ	17	3494	.23	.30	.25	-.11/.62	.18/.41	214.26	***	93	0			0										
Job satisfaction																								
Overall CQ	5	1278	.27	.36	.22	-.28/.78	.09/.59	50.88	***	92	na			na										
Cognitive CQ	8	1567	.23	.29	.14	-.05/.57	.16/.42	31.23	***	78	na			na										

(continued on next page)



Table 3 (continued)

Relationship	Before outlier removal										After outlier removal													
	k	N	r	ρ	SD (ρ)	80 % CV	95 % CI	Q	I <sup>2</sup>	# TF	Side	ρ <sub>TF</sub>	95 % CI <sub>TF</sub>	# out	k	n	ρ	80 % CV	95 % CI	# TF	Side	ρ <sub>TF</sub>	95 % CI <sub>TF</sub>	
Metacognitive CQ	7	1349	.34	.46	.19	-.03/	.26/	47.36	***	87	na			na										
Motivational CQ	8	1567	.40	.51	.10	.30/.68	.43/	20.40	**	66	na			na										
Behavioral CQ	9	1850	.30	.40	.29	-.29/	.18/	143.15	***	94	na			na										
Job performance																								
Overall CQ	24	5884	.37	.47	.18	.20/.68	.41/	207.55	***	89	3	right	.50	.43/.55	0									
Cognitive CQ	22	4082	.25	.31	.15	.07/.53	.25/	109.11	***	81	0			0										
Metacognitive CQ	20	3730	.29	.37	.18	.09/.60	.30/	123.88	***	84	1	right	.39	.31/.46	0									
Motivational CQ	24	4921	.33	.43	.28	-.01/	.33/	383.13	***	94	3	left	.35	.23/.46	1	23	4821	.40	.01/.68	.31/	2	left	.35	.24/.45
Behavioral CQ	22	4337	.31	.39	.22	.03/.66	.30/	222.34	***	91	5	right	.45	.36/.53	0									

Note: k = number of independent samples cumulated, N = cumulative sample size (number of individuals), r = sample-size weighted correlation (not corrected for measurement error), ρ sample-sizes weighted and measurement error corrected correlation, CI = 95 % confidence interval. ‘# TF’ denotes the number of estimated missing effect sizes imputed in trim-and-fill procedure. ‘Side’ provides information on which side of the mean effect size the estimated missing effect sizes are imputed in the trim-and-fill procedure. \* p < .05; \*\* p < .01; \*\*\* p < .001.

**Table 4**  
Meta-analytic correlation matrix.

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Overall CQ	(.86 <sup>a</sup> )	–	–	–	–	15/ 3674	8/ 1581	5/853	6/977	5/853	5/853	26/ 5670	11/ 2691	7/1460	3/ 1163	5/1278	11/ 2860	11/ 2860	8/ 2051	24/ 5884
2. Cognitive CQ	–	(.81 <sup>a</sup> )	115/ 24769	117/ 25640	117/ 25459	15/ 3395	28/ 5115	19/3634	24/4513	17/3486	18/3818	49/ 11060	18/ 3944	8/1610	15/ 3880	8/1567	16/ 3685	20/ 4669	17/ 3494	22/ 4082
3. Metacognitive CQ	–	.56 <sup>n</sup>	(.79a)	116/ 25413	115/ 24769	15/ 3395	28/ 5115	19/3634	24/4513	17/3486	18/3818	55/ 11934	19/ 4132	9/1660	15/ 3787	7/1349	17/ 3429	19/ 4413	16/ 3238	20/ 3730
4. Motivational CQ	–	.54 <sup>n</sup>	.63 <sup>n</sup>	(.80a)	118/ 26091	15/ 3395	28/ 5986	18/3545	25/5153	16/3397	18/4285	57/ 13330	20/ 4805	9/1716	16/ 3983	8/1567	19/ 4188	22/ 4549	19/ 4277	24/ 4921
5. Behavioral CQ	–	.51 <sup>n</sup>	.61 <sup>n</sup>	.57 <sup>n</sup>	(.82 <sup>b</sup> )	15/ 3395	27/ 5026	18/3545	23/4424	16/3397	17/3729	51/ 11534	18/ 3944	8/1610	14/ 3727	9/1850	17/ 3685	20/ 4669	17/ 3494	22/ 4337
6. Emotional intelligence	.53 <sup>a</sup>	.32 <sup>n</sup>	.37 <sup>n</sup>	.39 <sup>n</sup>	.36 <sup>n</sup>	(.86 <sup>c</sup> )	19/ 4940	21/5343	21/5343	19/4792	22/5663	8/2016	1/295	12/ 1986	1/241	66/ 20116	6/ 1570	8/ 2140	5/ 1047	7/1134
7. Openness	.35 <sup>a</sup>	.32 <sup>n</sup>	.40 <sup>n</sup>	.41 <sup>n</sup>	.33 <sup>n</sup>	.30 <sup>l</sup>	(.76 <sup>c</sup> )	212/ 144117	212/ 144117	212/ 144117	212/ 144117	16/ 3671	13/ 2163	46/ 13182	10/ 3053	50/ 15196	14/ 3626	14/ 3743	14/ 3982	35/ 5525
8. Conscientiousness	.17 <sup>a</sup>	.05 <sup>n</sup>	.22 <sup>n</sup>	.19 <sup>n</sup>	.16 <sup>n</sup>	.38 <sup>l</sup>	.20 <sup>h</sup>	(.81 <sup>c</sup> )	212/ 144117	212/ 144117	212/ 144117	13/ 2854	12/ 2499	56/ 15429	7/ 1742	79/ 21719	12/ 2735	13/ 2917	13/ 2743	45/ 8083
9. Extraversion	.28 <sup>a</sup>	.17 <sup>n</sup>	.26 <sup>n</sup>	.35 <sup>n</sup>	.21 <sup>n</sup>	.32 <sup>l</sup>	.43 <sup>h</sup>	.29 <sup>h</sup>	(.81 <sup>c</sup> )	212/ 144117	212/ 144117	15/ 2980	12/ 2499	61/ 21602	10/ 2688	75/ 20184	16/ 2661	18/ 2977	14/ 2378	39/ 6453
10. Agreeableness	.12 <sup>a</sup>	.06 <sup>n</sup>	.20 <sup>n</sup>	.23 <sup>n</sup>	.18 <sup>n</sup>	.26 <sup>l</sup>	.21 <sup>h</sup>	.43 <sup>h</sup>	.26 <sup>h</sup>	(.77 <sup>c</sup> )	212/ 144117	13/ 2854	12/ 2499	38/ 11190	7/ 1742	38/ 11856	10/ 2215	12/ 2414	9/ 1906	40/ 6447
11. Emotional stability	.06 <sup>a</sup>	.04 <sup>n</sup>	.10 <sup>n</sup>	.21 <sup>n</sup>	.04 <sup>n</sup>	.40 <sup>l</sup>	.17 <sup>h</sup>	.43 <sup>h</sup>	.36 <sup>h</sup>	.36 <sup>h</sup>	(.83 <sup>c</sup> )	13/ 2854	12/ 2499	61/ 21404	8/ 1942	92/ 24527	13/ 2452	14/ 2634	14/ 2881	37/ 5671
12. International experience	.17 <sup>a</sup>	.17 <sup>n</sup>	.14 <sup>n</sup>	.19 <sup>n</sup>	.12 <sup>n</sup>	.09 <sup>a</sup>	.10 <sup>a</sup>	.09 <sup>a</sup>	.16 <sup>a</sup>	.08 <sup>a</sup>	.06 <sup>a</sup>	–	20/ 5484	5/867	15/ 2558	2/520	9/ 2145	11/ 2690	10/ 2318	9/2793
13. Language proficiency	.21 <sup>a</sup>	.28 <sup>a</sup>	.17 <sup>a</sup>	.19 <sup>a</sup>	.18 <sup>a</sup>	.10 <sup>a</sup>	.04 <sup>a</sup>	.04 <sup>a</sup>	.07 <sup>a</sup>	.03 <sup>a</sup>	.02 <sup>a</sup>	.12 <sup>a</sup>	–	1/50	15/ 2988	2/357	8/ 2140	7/ 1950	9/ 2313	11/ 3040
14. General mental ability	.07 <sup>a</sup>	.07 <sup>n</sup>	.08 <sup>n</sup>	.02 <sup>n</sup>	.04 <sup>n</sup>	.08 <sup>l</sup>	.22 <sup>k</sup>	–.04 <sup>k</sup>	.02 <sup>k</sup>	.00 <sup>k</sup>	.09 <sup>k</sup>	.00 <sup>a</sup>	.13 <sup>a</sup>	(.78 <sup>b</sup> )	4/565	38/ 29971	3/655	3/655	4/824	425/ 32124
15. Expatriation intention	.53 <sup>a</sup>	.33 <sup>a</sup>	.36 <sup>a</sup>	.47 <sup>a</sup>	.25 <sup>a</sup>	.20 <sup>a</sup>	.16 <sup>a</sup>	.00 <sup>a</sup>	.17 <sup>a</sup>	.02 <sup>a</sup>	.07 <sup>a</sup>	.20 <sup>a</sup>	.22 <sup>a</sup>	.15 <sup>a</sup>	(.86 <sup>b</sup> )	–	–	–	–	–
16. Job satisfaction	.36 <sup>a</sup>	.29 <sup>a</sup>	.46 <sup>a</sup>	.51 <sup>a</sup>	.40 <sup>a</sup>	.32 <sup>m</sup>	.01 <sup>d</sup>	.20 <sup>d</sup>	.19 <sup>d</sup>	.13 <sup>d</sup>	.24 <sup>d</sup>	.20 <sup>a</sup>	–.01 <sup>a</sup>	.05 <sup>j</sup>	–	(.84 <sup>c</sup> )	–	–	–	–
17. General adjustment	.34 <sup>a</sup>	.36 <sup>a</sup>	.32 <sup>a</sup>	.55 <sup>a</sup>	.29 <sup>a</sup>	.38 <sup>a</sup>	.19 <sup>b</sup>	.16 <sup>b</sup>	.27 <sup>b</sup>	.22 <sup>b</sup>	.18 <sup>b</sup>	.12 <sup>a</sup>	.22 <sup>a</sup>	.03 <sup>i</sup>	–	–	(.84 <sup>b</sup> )	–	–	–
18. Interaction adjustment	.44 <sup>a</sup>	.34 <sup>a</sup>	.35 <sup>a</sup>	.42 <sup>a</sup>	.34 <sup>a</sup>	.41 <sup>a</sup>	.22 <sup>b</sup>	.24 <sup>b</sup>	.24 <sup>b</sup>	.19 <sup>b</sup>	.16 <sup>b</sup>	.14 <sup>a</sup>	.24 <sup>a</sup>	.05 <sup>i</sup>	–	–	–	(.87 <sup>b</sup> )	–	–
19. Work adjustment	.38 <sup>a</sup>	.36 <sup>a</sup>	.36 <sup>a</sup>	.40 <sup>a</sup>	.30 <sup>a</sup>	.51 <sup>a</sup>	.22 <sup>b</sup>	.23 <sup>b</sup>	.26 <sup>b</sup>	.29 <sup>b</sup>	.25 <sup>b</sup>	.07 <sup>a</sup>	.13 <sup>a</sup>	.11 <sup>i</sup>	–	–	–	–	(.87 <sup>b</sup> )	–
20. Job performance	.47 <sup>a</sup>	.31 <sup>a</sup>	.37 <sup>a</sup>	.35 <sup>a</sup>	.39 <sup>a</sup>	.30 <sup>l</sup>	.07 <sup>f</sup>	.14 <sup>f</sup>	.06 <sup>f</sup>	.07 <sup>f</sup>	.09 <sup>f</sup>	.09 <sup>a</sup>	.18 <sup>a</sup>	.51 <sup>k</sup>	–	–	–	–	–	(.79 <sup>c</sup> )

Note: Meta-analytic correlation coefficients are presented below the diagonal. The cumulative number of samples and the cumulative sample size are presented above the diagonal. Meta-analytically derived generalized reliabilities are presented in the diagonal in parentheses. The interrelations of the outcome variables are not included in the matrix as each outcome is examined separately.

<sup>a</sup> Own meta-analysis.

<sup>b</sup> Harari et al. (2018).

<sup>c</sup> Joseph & Newman (2010).

<sup>d</sup> Judge et al. (2002).

<sup>f</sup> Hertz & Donovan (2000).

<sup>g</sup> Van Rooy & Viswesvaran (2004).

<sup>h</sup> Mount et al. (2005).

<sup>i</sup> Hechanova et al. (2003).

<sup>j</sup> Gonzalez-Mulé, Carter, & Mount (2017).

<sup>k</sup> Judge et al. (2007).

<sup>l</sup> Literature stream 2 in O'Boyle et al. (2011).

<sup>m</sup> Miao et al. (2018).

<sup>n</sup> Rockstuhl & Van Dyne (2018).

<sup>o</sup> Greco et al. (2018).

**Table 5**  
Results of the commonality analysis.

Variable	Expatriation intention		General adjustment		Interaction adjustment		Work adjustment		Job satisfaction		Job performance	
	CC	%	CC	%	CC	%	CC	%	CC	%	CC	%
<i>Unique effect</i>												
Cognitive CQ (CCQ)	.006	(.001/.014)	.009	(.002/.019)	.008	(.003/.022)	.016	(.006/.030)	.003	(.000/.014)	.003	(.000/.011)
Metacognitive CQ (MeCQ)	.006	(.002/.017)	.002	(.000/.007)	.002	(.000/.009)	.006	(.001/.015)	.022	(.011/.036)	.009	(.001/.019)
Motivational CQ (MoCQ)	.084	(.057/.108)	.159	(.119/.197)	.037	(.017/.056)	.028	(.013/.043)	.066	(.045/.092)	.006	(.001/.015)
Behavioral CQ (BCQ)	.005	(.000/.015)	.001	(.000/.005)	.005	(.000/.015)	.000	(.000/.003)	.006	(.001/.015)	.025	(.012/.042)
<i>Second-order commonalities</i>												
CCQ & MeCQ	.004	(.001/.008)	-.002	(-.004/.000)	.003	(.000/.007)	.007	(.003/.011)	-.003	(-.007/.000)	.003	(.001/.007)
CCQ & MoCQ	.016	(.009/.024)	.028	(.014/.042)	.011	(.006/.020)	.013	(.007/.019)	-.003	(-.010/.002)	.003	(.000/.006)
CCQ & BCQ	-.002	(-.004/.000)	-.001	(-.003/.001)	.003	(.001/.006)	.001	(-.001/.004)	-.001	(-.003/.000)	.004	(.001/.008)
MeCQ & MoCQ	.030	(.018/.045)	.007	(.004/.019)	.012	(.004/.022)	.015	(.008/.025)	.042	(.026/.053)	.008	(.003/.012)
MeCQ & BCQ	-.003	(-.007/.000)	.002	(.000/.003)	.003	(.000/.006)	.001	(-.001/.005)	.012	(.007/.018)	.015	(.008/.023)
MoCQ & BCQ	-.005	(-.012/.003)	.003	(.005/.013)	.010	(.004/.015)	.003	(-.001/.009)	.015	(.007/.024)	.008	(.004/.015)
<i>Third-order commonalities</i>												
CCQ & MeCQ & MoCQ	.029	(.019/.042)	.025	(.015/.036)	.016	(.010/.025)	.022	(.015/.030)	.013	(.005/.021)	.008	(.004/.013)
CCQ & MeCQ & BCQ	.000	(-.002/.001)	-.001	(-.002/.000)	-.005	(.002/.009)	.005	(.002/.009)	.001	(-.002/.005)	.010	(.006/.015)
CCQ & MoCQ & BCQ	.003	(.000/.007)	.011	(.007/.015)	.009	(.005/.013)	.006	(.003/.010)	.003	(.000/.006)	.006	(.003/.009)
MeCQ & MoCQ & BCQ	.012	(.002/.021)	.009	(.003/.019)	.020	(.012/.028)	.014	(.008/.022)	.053	(.041/.063)	.025	(.015/.033)
<i>Fourth-order commonality</i>												
CCQ & MeCQ & MoCQ & BCQ	.052	(.037/.067)	.060	(.044/.078)	.062	(.049/.082)	.059	(.047/.079)	.071	(.051/.092)	.059	(.043/.073)
<i>Total effect</i>												
Unique plus all common effects	.237	100	.313	100	.204	100	.197	100	.300	100	.191	100

Note: The table reports the commonality coefficients, which represent the respective explained variance for the unique and common effects. The relative explained variance (% of total effect) is reported in parentheses. Numbers in parentheses may not add to 100 % due to rounding. CCQ = cognitive CQ, MeCQ = metacognitive CQ, MoCQ = motivational CQ, BCQ = behavioral CQ.

who "...consciously question their own cultural assumptions, reflect during interactions, and adjust their cultural knowledge when interacting with those from other cultures."

Hence, we argue that the CQ dimensions may, at least to some degree, be beneficially related in the sense that the individual dimensions could support the development of other dimensions in a mutually reinforcing manner. This would also explain (a part of) the intercorrelations of the dimensions. These mutually beneficial relationships and, consequently, intercorrelations of dimensions have implications for the association of CQ dimensions with an outcome. If two CQ dimensions influence each other and thus covary, they are also interrelated in their respective association with an outcome.

For example, the part of the variance of metacognitive CQ that covaries with cognitive CQ and that is associated with an outcome in more traditional analytical approaches is fully attributed to metacognitive CQ. However, what could be a unique effect of metacognitive CQ is in fact at least partially the joint effect of metacognitive and cognitive CQ. As metacognitive and cognitive CQ develop to some degree in a mutually beneficial way, they are also interrelated in their association with the outcome. This specific part of the variance is related to the presence of both CQ dimensions. If researchers hypothesize on and analyze only a single CQ dimension (e.g., motivational CQ) without assessing the other CQ dimensions, their efforts may result in misleading conclusions. The reason is that it could be incorrectly concluded that all of the explained variance in the outcome is attributed to this specific dimension, when at least part of this variance results from a joint effect with other CQ dimensions. In this way, the mutually beneficial relationships between the CQ dimensions contribute to each other and, through these relationships, also to the potential of each dimension to explain an outcome.

Considering job performance, prior research suggests that performance is a function of knowledge, skills, abilities, and motivation directed at role-prescribed behaviors (Katz & Kahn, 1978). Combining this with CQ, Ang et al. (2007) argue that cognitive CQ enhances accuracy in understanding role expectations, and that metacognitive CQ increases this understanding as it results in more energy directed at and persistence when learning of role expectations and practicing behaviors that fulfil role expectations. Finally, a high behavioral CQ entails higher level of flexibility of behaviors that, in turn, improves meeting the expectations of others; the result is positive joint associations between CQ dimensions and performance. Based on this logic, we assume that apart from the unique effect of each CQ dimension and in addition to the common effect of all four CQ dimensions, there are joint effects of sets of two and three CQ dimensions that play a role in explaining work-related outcomes:

**Hypothesis 1.** *Sets of two and three CQ dimensions account for a substantive share of explained variance in a) expatriation intention, b) the three facets of cross-cultural adjustment, c) job satisfaction, and d) job performance.*

2.3. The association of CQ, other predictors, and work-related outcomes

Our literature search identified 15 articles that tested the incremental predictive value of CQ and its dimensions, over and above other variables, in predicting work-related outcomes (see Table 2). Most of these studies (9 out of 15) examined the incremental validity of CQ for overall cross-cultural adjustment or the three cross-cultural adjustment dimensions. For example, Lin, Chen, and Song (2012) confirmed the incremental predictive validity of all four CQ dimensions for all three cross-cultural adjustment dimensions. Huff, Song, and Gresch (2014) only confirmed the incremental validity of motivational CQ for the three adjustment dimensions, and Ward, Fischer, Zaid Lam, and Hall (2009) found no incremental validity of the CQ dimensions for socio-cultural adaptation. The findings on job performance are also inconclusive (4 of 15 studies). Moreover, there has been no systematic effort to test the

**Table 6**  
Results of the incremental predictive validity tests.

Variable	General adjustment <sup>a</sup>			Interaction adjustment <sup>b</sup>			Work adjustment <sup>c</sup>											
	M1	M2a	M2b	M1	M2a	M2b	M1	M2a	M2b									
<i>Step 1</i>																		
General mental ability	-.03	(.319)	-.02	(.350)	.02	(.375)	-.01	(.772)	-.01	(.872)	.01	(.489)	.06	(.012)	.06	(.009)	.08	(.000)
Emotional intelligence	.31	(.000)	.24	(.000)	.21	(.000)	.33	(.000)	.19	(.000)	.24	(.000)	.44	(.000)	.37	(.000)	.36	(.000)
Agreeableness	.12	(.000)	.12	(.000)	.10	(.000)	.05	(.052)	.06	(.038)	.04	(.137)	.17	(.000)	.17	(.000)	.16	(.000)
Conscientiousness	-.06	(.056)	-.06	(.060)	-.02	(.503)	.07	(.013)	.08	(.008)	.09	(.000)	-.03	(.284)	-.03	(.301)	-.01	(.601)
Extraversion	.13	(.000)	.12	(.000)	.08	(.000)	.07	(.012)	.05	(.086)	.05	(.039)	.08	(.006)	.06	(.022)	.06	(.007)
Openness	.02	(.425)	-.01	(.933)	-.10	(.000)	.06	(.026)	.02	(.586)	-.03	(.263)	.01	(.698)	-.02	(.569)	-.08	(.000)
Emotional stability	-.02	(.530)	.01	(.732)	-.04	(.056)	-.07	(.025)	-.01	(.699)	-.05	(.028)	-.01	(.703)	.02	(.500)	.00	(.995)
Language proficiency	.18	(.000)	.16	(.000)	.10	(.000)	.19	(.000)	.15	(.000)	.14	(.000)	.07	(.004)	.05	(.044)	.01	(.677)
International experience	.04	(.082)	.03	(.209)	-.01	(.676)	.06	(.011)	.04	(.100)	.03	(.122)	-.01	(.950)	-.01	(.554)	-.04	(.078)
<i>Step 2a</i>																		
Overall CQ		.14	(.000)					.26	(.000)					.14	(.000)			
<i>Step 2b</i>																		
Cognitive CQ				.10	(.000)					.08	(.000)						.16	(.000)
Metacognitive CQ				-.09	(.001)					.01	(.621)						.06	(.044)
Motivational CQ				.50	(.000)					.20	(.000)						.14	(.000)
Behavioral CQ				-.08	(.001)					.04	(.105)						-.04	(.117)
R <sup>2</sup>	.215		.227		.375		.237		.278		.291		.303		.315		.355	
M1 vs. M2a incremental R <sup>2</sup>		.012	(.000)					.041	(.000)					.012	(.000)			
M1 vs. M2b incremental R <sup>2</sup>				.160	(.000)					.054	(.000)						.052	(.000)
Harmonic mean N <sub>HM</sub>	1258		1285		1821		1269		1294		1841		1259		1282		1821	

Note: Standardized coefficients are presented. Exact *p* values are shown in parentheses.

<sup>a</sup> While metacognitive CQ and behavioral CQ are positively correlated with general adjustment, in M2b both variables are negatively associated with general adjustment. The exclusion of metacognitive CQ and behavioral CQ reduces the explained variance to 36.4 % in M2b.

<sup>b</sup> While emotional stability is positively correlated with interaction adjustment, emotional stability is negatively associated with interaction adjustment in M1 and M2b. The exclusion of emotional stability reduces the explained variance to 23.4 % in M1 and to 28.9 % in M2b.

<sup>c</sup> While openness is positively correlated with work adjustment, openness is negatively associated with work adjustment after the inclusion of the four CQ dimensions in M2b. The exclusion of openness reduces the explained variance to 35.1 % in M2b.

**Table 7**  
Results of the incremental predictive validity tests (continued).

Variable	Job satisfaction <sup>d</sup>			Expatriation intention <sup>e</sup>			Job performance <sup>f</sup>											
	M1	M2a	M2b	M1	M2a	M2b	M1	M2a	M2b									
<i>Step 1</i>																		
General mental ability	.07	(.011)	.07	(.004)	.11	(.000)	.07	(.023)	.07	(.005)	.10	(.000)	.52	(.000)	.53	(.000)	.55	(.000)
Emotional intelligence	.27	(.000)	.09	(.007)	.07	(.000)	.16	(.000)	-.03	(.259)	.05	(.070)	.28	(.000)	.04	(.142)	.13	(.000)
Agreeableness	.00	(.908)	.01	(.825)	-.06	(.004)	-.03	(.311)	-.03	(.289)	-.07	(.007)	.01	(.785)	.01	(.628)	-.04	(.052)
Conscientiousness	.05	(.083)	.06	(.054)	.05	(.013)	-.11	(.001)	-.12	(.000)	-.09	(.000)	.11	(.000)	.12	(.000)	.12	(.000)
Extraversion	.11	(.000)	.07	(.011)	.05	(.023)	.09	(.005)	.04	(.212)	.04	(.092)	.01	(.660)	-.03	(.141)	-.02	(.246)
Openness	-.17	(.000)	-.24	(.000)	-.38	(.000)	.06	(.047)	-.05	(.110)	-.08	(.002)	-.15	(.000)	-.24	(.000)	-.30	(.000)
Emotional stability	.08	(.007)	.16	(.000)	.13	(.000)	-.01	(.973)	.09	(.002)	-.01	(.909)	-.11	(.000)	-.01	(.834)	-.06	(.005)
Language proficiency	-.07	(.006)	-.12	(.000)	-.17	(.000)	.17	(.000)	.09	(.000)	.10	(.000)	.08	(.000)	.01	(.573)	-.01	(.800)
International experience	.17	(.000)	.14	(.000)	.12	(.000)	.16	(.000)	.11	(.000)	.11	(.000)	.06	(.004)	.02	(.259)	.02	(.196)
<i>Step 2a</i>																		
Overall CQ		.35	(.000)					.53	(.000)					.48	(.000)			
<i>Step 2b</i>																		
Cognitive CQ				-.02	(.406)					.04	(.135)						.05	(.013)
Metacognitive CQ				.25	(.000)					.13	(.000)						.11	(.000)
Motivational CQ				.38	(.000)					.41	(.000)						.20	(.000)
Behavioral CQ				.14	(.000)					-.09	(.001)						.21	(.000)
R <sup>2</sup>	.175	.250	.451			.135	.336	.287		.369	.509	.514						
M1 vs. M2a incremental R <sup>2</sup>		.075	(.000)				.201	(.000)			.140	(.000)						
M1 vs. M2b incremental R <sup>2</sup>			.276	(.000)			.052	(.000)									.145	(.000)
Harmonic mean N <sub>HM</sub>	1254	1269	1761			1157	1124	1670		1356	1374	1934						

Note: Standardized regression coefficients are presented. Exact *p* values are shown in parentheses.

<sup>d</sup> While openness and agreeableness are positively correlated with job satisfaction and language proficiency did not correlate with job satisfaction, the variables are negatively associated with job satisfaction in the path analysis. The exclusion of openness and language proficiency reduces the explained variance to 14.9 % in M1 and to 20 % in M2a. the exclusion of all three variables reduces the explained variance to 33.8 % in M2b.

<sup>e</sup> While agreeableness, conscientiousness, openness, and behavioral CQ are positively correlated with expatriation intention, the variables are negatively associated with expatriation intention in the path analysis. The exclusion of the variables in the respective models reduces the explained variance to 12.7 % in M1, to 32.9 % in M2a, and to 26.4 % in M2b.

<sup>f</sup> While openness and emotional stability are positively correlated with job performance, the variables are negatively associated with job performance in the path analysis. The exclusion of the variables reduces the explained variance to 34.2 % in M1, to 46 % in M2a, and to 44.9 % in M2b.

incremental predictive validity of overall CQ and the CQ dimensions over and above a comprehensive set of established variables and work-related outcomes—a shortcoming that we address. First, following Ang and Van Dyne's (2008) and Leung et al.'s (2014) line of thought, we argue that the CQ dimensions explain variance in work-related outcomes over and above related capabilities. Second, we argue that the CQ dimensions partially mediate the relationship between traits and our set of work-related outcomes. Fig. 2 presents our conceptual model.

Researchers consider EQ—an individual's ability to assess, control, and use emotions (Law, Wong, & Song, 2004)—and GMA as correlates of CQ (e.g., Crowne, 2009; Moon, 2010) that also measure capabilities (see Fig. 2). They also assume that in contrast to CQ, both GMA and EQ will most likely not translate into cross-cultural effectiveness. Ang, Van Dyne, and Tan, 2011, p. 583) state that “since the norms for social interaction vary from culture to culture, it is unlikely that cognitive intelligence, [or] emotional intelligence [...] will translate automatically into effective cross-cultural adjustment, interaction, and effectiveness.” Thomas et al. (2015) argue that CQ could have incremental predictive value beyond related constructs such as EQ.

Meta-analytic evidence indicates that GMA is an important determinant of various work outcomes (Schmidt & Hunter, 2004), as is EQ (e.g., Miao, Humphrey, & Qian, 2018; O'Boyle, Humphrey, Pollack, Hawver, & Story, 2011). Moreover, research demonstrates that EQ and CQ are correlated (e.g., Moon, 2010). This raises the question whether and to what extent CQ predicts work outcomes over and above GMA and EQ. We argue that, in addition to more general predictors (i.e., GMA and EQ) that do not account for the majority of particularities of a cross-cultural work environment, the CQ dimensions predict additional variance for different work outcomes.

**Hypothesis 2.** *The four CQ dimensions account for significant incremental validity over and above (a) GMA and (b) EQ in the prediction of work-related outcomes.*

In the CQ literature, researchers regard the FFM personality traits as antecedents of CQ (Ang et al., 2006; Johnson, Lenartowicz, & Apud, 2006), bearing in mind that these traits are likewise strong predictors of cross-cultural adjustment (Harari et al., 2018), job satisfaction (Judge, Heller, & Mount, 2002), and job performance (Barrick, Mount, & Judge, 2001). Personality traits are genetically heritable (e.g., Jang, Livesley, & Vernon, 1996; Vukasović & Bratko, 2015). Research also indicates that this heritability is near universal across countries (e.g., Yamagata et al., 2006) and that adults' FFM traits are relatively stable over time (Bazana & Stelmack, 2004). Therefore, we assume that personality traits precede and predict CQ dimensions. Leung et al. (2014) suggested that intercultural capabilities mediate the relationship between intercultural traits and intercultural effectiveness. Following this line of thought, we assume that, in a cross-cultural context, personality traits influence work-related outcomes through CQ because these traits are more distal antecedents of work outcomes, and also that CQ and its underlying dimensions are more proximal antecedents of work-related outcomes. To test this mediating effect, we will likewise test the incremental predictive validity of CQ over and above the FFM. Thus:

**Hypothesis 3.** *The four CQ dimensions account for significant incremental validity over and above FFM personality traits in the prediction of work-related outcomes.*

**Hypothesis 4.** *The four CQ dimensions partially mediate the relationship between the FFM personality traits and work-related outcomes.*

A similar question can be asked about international experience (i.e., the extent to which an individual has gained experience in foreign countries; Takeuchi et al., 2005) and language proficiency (i.e., the extent to which an individual can use a language, and is able to speak several languages; Selmer & Lauring, 2015). Both are deemed important predictors of work-related outcomes in a cross-cultural context (e.g., Mol, Born, Willemssen, & Van Der Molen, 2005). Meta-analytic evidence

also indicates that both are associated with the adjustment and success of expatriates (Bhaskar-Shrinivas, Harrison, Shaffer, & Luk, 2005; Hechanova et al., 2003). Moreover, international experience and language proficiency influence the development of CQ (e.g., Michailova & Ott, 2018; Ott & Michailova, 2017; Raver & Van Dyne, 2018). However, international experience, language proficiency, and CQ can also co-develop and involve some conceptual redundancy, e.g., the cognitive dimension of CQ includes an item that relates to the knowledge of other languages. The association of international experiences with work-related outcomes is influenced by individuals' capabilities to learn from these experiences (e.g., Ng, Van Dyne, & Ang, 2009). Hence, an understanding of the predictive validity of CQ, over and above international experiences and language proficiency is of value to further understand these potential redundancies. We argue that the CQ dimensions predict variance over and above language proficiency and international experience, as they represent rather broad proxies for the intercultural competence that an individual may or may not possess. The cross-sectional data used in the primary studies and included in our meta-analysis do not make provision for a clear causal ordering. Therefore, in the mediation model, we include international experience and language proficiency as predictors of both CQ and the respective outcomes. We therefore posit:

**Hypothesis 5.** *The four CQ dimensions account for significant incremental validity over and above (a) international experience and (b) language proficiency in the prediction of work-related outcomes.*

### 3. Method

#### 3.1. Identification and selection of relevant studies

The present study focuses on existing studies that used the 20-item CQ scale (Ang & Van Dyne, 2008) to examine the relationships between CQ and work-related outcomes. Our meta-analysis of the existing literature (i.e., in at least five studies) covers the most-often investigated outcome variables at the individual level of analysis. We applied a multi-step procedure to identify the relevant studies. First, we searched the reference sections of extant literature reviews (e.g., Ang, Van Dyne, & Rockstuhl, 2015; Leung et al., 2014; Matsumoto & Hwang, 2013; Ng et al., 2012) and of an existing meta-analysis (Rockstuhl & Van Dyne, 2018), as well as articles that included a detailed overview of prior research (Bücker, Furrer, & Lin, 2015). Second, we searched different electronic databases (ABI/Inform Global, EBSCO, Google Scholar, Proquest, Scopus, and Web of Science) using a set and combinations of keywords (e.g., ‘cultural intelligence’, ‘CQ’, the four CQ dimensions, and the various outcomes). Third, we complemented the database search with an issue-by-issue search, as well as by a search of in-press and online-first articles in several international business/management journals. Fourth, we called for unpublished or forthcoming articles via the mailing list of the Academy of International Business. Finally, using Google Scholar, the Science Citation Index, and Scopus, we manually searched the articles that cited the studies identified in the previous steps and searched the reference sections of each identified study for additional studies not previously identified (Cooper, 1998). We repeated this procedure until no further studies were identified.

By applying the following criteria, we reviewed the identified articles for potential inclusion. First, the studies had to be quantitative in nature and had to measure CQ or at least one of its dimensions through the CQ scale (Ang et al., 2006, 2007; Van Dyne, Ang, & Koh, 2008). Second, the studies had to report sample sizes and provide information on effect sizes that represented the relationship between CQ and a work-related outcome. When the correlation coefficients were not reported, we used available information and followed procedures to compute the necessary statistics (e.g., Peterson & Brown, 2005). Finally, to ensure the independence of the included effect sizes when several studies used the same dataset, we only used the study that reported the



**Table 8**  
Summary of the MASEM results for CQ dimensions.

Outcome variable	Model 1 (no mediation)	Model 2 (partial mediation)	Model 3 (full mediation)
General adjustment	Overall CQ: $\chi^2 = 614.78$ ( $df = 7; p < .000$ ); CFI = .915; RMSEA = .182; SRMR = .057 CQ dimensions: $\chi^2 = 588.38$ ( $df = 10; p < .000$ ); CFI = .918; RMSEA = .178; SRMR = .055	Overall CQ: $\chi^2 = 46.87$ ( $df = 4; p < .000$ ); CFI = .994; RMSEA = .077; SRMR = .016 CQ dimensions: $\chi^2 = 46.78$ ( $df = 4; p < .000$ ); CFI = .994; RMSEA = .077; SRMR = .020	Overall CQ: $\chi^2 = 174.06$ ( $df = 11; p < .000$ ); CFI = .956; RMSEA = .075; SRMR = .039 CQ dimensions: $\chi^2 = 122.84$ ( $df = 11; p < .000$ ); CFI = .984; RMSEA = .075; SRMR = .022
Interaction adjustment	Overall CQ: $\chi^2 = 232.46$ ( $df = 7; p < .000$ ); CFI = .916; RMSEA = .158; SRMR = .052 CQ dimensions: $\chi^2 = 362.51$ ( $df = 10; p < .000$ ); CFI = .949; RMSEA = .138; SRMR = .051	Overall CQ: $\chi^2 = 33.31$ ( $df = 4; p < .000$ ); CFI = .989; RMSEA = .075; SRMR = .020 CQ dimensions: $\chi^2 = 47.39$ ( $df = 4; p < .000$ ); CFI = .994; RMSEA = .077; SRMR = .016	Overall CQ: $\chi^2 = 105.33$ ( $df = 11; p < .000$ ); CFI = .965; RMSEA = .081; SRMR = .036 CQ dimensions: $\chi^2 = 124.25$ ( $df = 11; p < .000$ ); CFI = .984; RMSEA = .075; SRMR = .025
Work adjustment	Overall CQ: $\chi^2 = 302.75$ ( $df = 7; p < .000$ ); CFI = .892; RMSEA = .166; SRMR = .056 CQ dimensions: $\chi^2 = 546.12$ ( $df = 10; p < .000$ ); CFI = .925; RMSEA = .171; SRMR = .057	Overall CQ: $\chi^2 = 33.00$ ( $df = 4; p < .000$ ); CFI = .989; RMSEA = .075; SRMR = .020 CQ dimensions: $\chi^2 = 47.39$ ( $df = 4; p < .000$ ); CFI = .994; RMSEA = .077; SRMR = .016	Overall CQ: $\chi^2 = 95.27$ ( $df = 11; p < .000$ ); CFI = .969; RMSEA = .077; SRMR = .033 CQ dimensions: $\chi^2 = 124.35$ ( $df = 11; p < .000$ ); CFI = .984; RMSEA = .088; SRMR = .023
Expatriation intention	Overall CQ: $\chi^2 = 530.01$ ( $df = 7; p < .000$ ); CFI = .856; RMSEA = .212; SRMR = .059 CQ dimensions: $\chi^2 = 412.64$ ( $df = 10; p < .000$ ); CFI = .936; RMSEA = .155; SRMR = .054	Overall CQ: $\chi^2 = 42.99$ ( $df = 4; p < .000$ ); CFI = .989; RMSEA = .076; SRMR = .020 CQ dimensions: $\chi^2 = 42.99$ ( $df = 4; p < .000$ ); CFI = .994; RMSEA = .076; SRMR = .016	Overall CQ: $\chi^2 = 135.85$ ( $df = 11; p < .000$ ); CFI = .966; RMSEA = .082; SRMR = .031 CQ dimensions: $\chi^2 = 133.88$ ( $df = 11; p < .000$ ); CFI = .980; RMSEA = .082; SRMR = .026
Job satisfaction	Overall CQ: $\chi^2 = 332.213$ ( $df = 7; p < .000$ ); CFI = .910; RMSEA = .162; SRMR = .050 CQ dimensions: $\chi^2 = 881.80$ ( $df = 10; p < .000$ ); CFI = .877; RMSEA = .223; SRMR = .078	Overall CQ: $\chi^2 = 45.33$ ( $df = 4; p < .000$ ); CFI = .989; RMSEA = .077; SRMR = .020 CQ dimensions: $\chi^2 = 45.33$ ( $df = 4; p < .000$ ); CFI = .994; RMSEA = .077; SRMR = .016	Overall CQ: $\chi^2 = 258.98$ ( $df = 11; p < .000$ ); CFI = .932; RMSEA = .113; SRMR = .040 CQ dimensions: $\chi^2 = 447.34$ ( $df = 11; p < .000$ ); CFI = .938; RMSEA = .150; SRMR = .034
Job performance	Overall CQ: $\chi^2 = 1,312.97$ ( $df = 7; p < .000$ ); CFI = .838; RMSEA = .311; SRMR = .086 CQ dimensions: $\chi^2 = 1,334.80$ ( $df = 10; p < .000$ ); CFI = .835; RMSEA = .262; SRMR = .079	Overall CQ: $\chi^2 = 49.76$ ( $df = 4; p < .000$ ); CFI = .990; RMSEA = .077; SRMR = .022 CQ dimensions: $\chi^2 = 49.76$ ( $df = 4; p < .000$ ); CFI = .994; RMSEA = .077; SRMR = .018	Overall CQ: $\chi^2 = 265.32$ ( $df = 11; p < .000$ ); CFI = .947; RMSEA = .109; SRMR = .036 CQ dimensions: $\chi^2 = 338.15$ ( $df = 11; p < .000$ ); CFI = .959; RMSEA = .124; SRMR = .031

Note: CFI = confirmatory fit index, RMSEA = root mean squared error of approximation, SRMR = standardized root mean square residual. For the partial and the full mediation model, the results of the influence of the FFM personality traits, international experience, and language proficiency on the mediating variable(s) (i.e., overall CQ and CQ dimensions), as well as of the FFM personality traits on EQ and GMA, are as presented below (exact  $p$  values in parentheses). The association of the distal mediators and the mediators are the same across outcomes. The detailed results for all MASEM models are available from the corresponding author.

*Agreeableness*: Overall CQ .01 (.850); CCQ -.01 (.752); MeCQ .08 (.001); MoCQ .09 (.000); BCQ .10 (.000); EI .03 (.276); GMA -.03 (.205). *Extraversion*: Overall CQ .14 (.000); CCQ .02 (.361); MeCQ .07 (.005); MoCQ .15 (.000); BCQ .06 (.012); EI .09 (.000); GMA -.11 (.000).

*Conscientiousness*: Overall CQ .10 (.000); CCQ -.03 (.515); MeCQ .02 (.774); MoCQ .12 (.000); BCQ .08 (.002); EI .20 (.000); GMA -.11 (.000).

*Openness*: Overall CQ .27 (.000); CCQ .30 (.000); MeCQ .30 (.000); MoCQ .33 (.000); BCQ .27 (.000); EI .17 (.000); GMA .27 (.000).

*Emotional stability*: Overall CQ -.09 (.002); CCQ -.02 (.500); MeCQ .06 (.010); MoCQ -.07 (.007); BCQ -.11 (.000); EI .24 (.000); GMA .14 (.000).

*International experience*: Overall CQ .09 (.000); CCQ .11 (.000); MeCQ .10 (.000); MoCQ .06 (.020); BCQ .05 (.017).

*Language proficiency*: Overall CQ .14 (.000); CCQ .24 (.000); MeCQ .15 (.000); MoCQ .12 (.000); BCQ .14 (.000).

most information. If a study was based on multiple samples, the respective correlations were utilized as if originating in separate studies.

The literature search returned 70 publications that met our inclusion criteria for the six work-related outcomes. An additional 48 studies examined the effects of CQ on other outcome variables that had been investigated in less than five studies and, therefore, were excluded from the meta-analysis due to the small sample size. The 70 studies provided data from 80 independent samples, representing 18,359 study participants. The meta-analytic dataset covered the time frame between 2007 and December 2019. The average age of the study participants was 30 (ranging from 19 to 56 years), and 45 % were female. Most of the studies used participants from different countries (mixed sample: 35 %), and/or were conducted in more than one country (21 %). Studies that were conducted in a single country mainly referred to the U.S. 13 %, China 8 %, Iran 6 %, Taiwan 5 %, Singapore 5 %, and Turkey 5 %.

### 3.2. Coding and meta-analytic procedure

We extracted and coded the data based on a coding scheme (Lipsey & Wilson, 2001). Two authors independently coded each study for sample size, effect sizes, and reliability of the predictor and the criterion variable, including potential contextual and methodological moderators (e.g., year of data collection, study country, respondent citizenship, measures, average respondent age, respondent gender, and response rate). The initial average Cohen's kappa was .88, indicating a high level of intercoder agreement (see Orwin & Vevea, 2009). All inconsistencies were reconciled, based on a discussion among the coders.

To assess the direct association between CQ and its dimensions and the different outcomes, we applied bivariate meta-analysis and used Hunter and Schmidt (2004) meta-analytic procedure to meta-analytically synthesize the correlations reported in the primary studies. In addition to reporting the uncorrected correlation coefficient, we corrected for measurement error in the independent variables (CQ and its dimensions), as well as for the different work-related outcomes. When a study did not report measurement reliability, we calculated the generalized reliability based on a meta-analysis of all reliabilities reported for the respective variable (Greco, O'Boyle, Cockburn, & Yuan, 2018).

We reported the number of samples ( $k$ ), the total number of participants in the sample ( $N$ ), and the sample size weighted average correlation ( $\bar{r}$ ), as well as the reliability corrected and sample size weighted average correlation ( $\rho$ ) for each relationship examined in the meta-analysis. The standard error of the average effect size was used to compute the 95 % confidence interval (CI). Confidence intervals that do not include zero indicate a statistically significant average correlation. To assess and interpret the heterogeneity of effect sizes, we calculated the  $Q$ -statistic and the  $I$ -squared ( $I^2$ ) (Huedo-Medina, Sanchez-Meca, Marin-Martinez, & Botella, 2006). For all relations with at least ten studies, we used the trim-and-fill procedure (Duval & Tweedie, 2000) with a fixed-effects model to assess potential publication bias (Kepes, Banks, McDaniel, & Whetzel, 2012). We also conducted an outlier analysis as meta-analytic results grounded in distributions without outliers tend to be more robust and credible (Kepes & Thomas, 2018; Viechtbauer & Cheung, 2010).

## 4. Results

### 4.1. Results on the associations between (sets of) CQ and work-related outcomes

The results of the bivariate meta-analysis, which provide information on the associations between CQ and the work-related outcomes, are summarized in Table 3.

Across all CQ dimensions and work-related outcomes, the average reliability corrected effect size was .39 (uncorrected .30), ranging from .29 to .66 (uncorrected .20–.53), which is almost twice the size of the

average effects reported in other meta-analyses on work-related outcomes in a non-cross-cultural context (e.g., .26 by Aguinis, Pierce, Bosco, Dalton, & Dalton, 2011; .16 by Bosco, Aguinis, Singh, Field, & Pierce, 2015; .278 by Paterson, Harms, Steel, & Credé, 2016; and .21 by Richard, Bond, & Stokes-Zoota, 2003). The average effect size is also higher than those reported for predictors of work-related outcomes in the cross-cultural context (e.g., Bhaskar-Shrinivas et al., 2005; Hechanova et al., 2003; Mol et al., 2005). In the present study, all except two effect sizes exceed the threshold of .30 for meaningful, practical relevance (Aguinis & Edwards, 2014). The homogeneity statistics reveal significant heterogeneous distribution ( $Q$ ) and high relative variance ( $I^2$  above 75 %) for all relationships, indicating between-study variation. This variation requires further evaluation in future studies, using moderator analysis.

To assess Hypothesis 1, we used commonality analysis, the statistical program R, and the package 'yhat' (Nimon & Oswald, 2013). The meta-analytic correlations for each outcome provide the foundation for the commonality analysis. These correlations are based on the bivariate meta-analyses of the present study, additional meta-analyses by the authors (see Table A2), and the correlations reported in prior meta-analyses that examined relationships not covered by the current study. Table 4 indicates the meta-analytic correlations, and Table 5 presents the results of the commonality analysis.

The commonality coefficients and their percentage of explained variance have effect sizes that are regarded as negligible (< 1 %), small (1–9 %), moderate (10–25 %), or large (> 25 %); the latter indicating a substantive share of explained variance (Schlaegel, Engle, & Lang, 2020). We computed the 95 % confidence intervals on the commonality coefficients via bootstrapping (5,000 replications) to assess the precision of the commonality coefficients (Nimon & Oswald, 2013). As the unique effects cannot be less than 0, the confidence interval provides information on whether and to what extent the commonality coefficient of CQ dimensions extends into the negligible range.

Hypothesis 1 state that sets of two and three CQ dimensions account for a substantive share of explained variance in the work-related outcomes under investigation. For expatriation intention (H1a), the results reveal that the unique effects account for 45 % of the variance. While cognitive, metacognitive, and behavioral CQ only have a small unique effect (i.e., 3 %, 2 %, and 2 %, respectively), motivational CQ has a large unique effect (i.e., 35 %). While none of the joint effects of sets of two CQ dimensions (2 %–13 %) and three CQ dimensions (0 %–12 %) is larger than the common effect of all four CQ dimensions (22 %), the total of the joint effects of sets of two and three CQ dimensions is substantive (36 %) and larger than the common effect. These results support Hypothesis 1a.

For the three cross-cultural adjustment dimensions (H1b), the results show that the unique effects in total account for 55 %, 25 %, and 25 % of the variance in general adjustment, interaction adjustment, and work adjustment, respectively. For the three adjustment dimensions, motivational CQ shows a moderate to large unique effect (51 %, 18 %, and 14 %), and this effect is larger than the unique effects of the other CQ dimensions (0 %–8 %). The common effect of all four CQ dimensions accounts for 19 %, 31 %, and 30 % of the variance in general adjustment, interaction adjustment, and work adjustment, respectively. For all three adjustment dimensions, this common effect is larger than any joint effect of a set of two CQ dimensions (1 %–9 %) or three CQ dimensions (2 %–11 %). However, the total joint effects of sets of two and three CQ dimensions are substantive and larger than the common effect of all four CQ dimensions for interaction adjustment (43 % vs. 31 %) and work adjustment (46 % vs. 30 %). For general adjustment, the total joint effects are on the threshold value of explained variance (25 %), yet larger than the common effect of all four CQ dimensions. These results support Hypothesis 1b.

For job satisfaction (H1c), the results show that the unique effects in total account for 32 % of the variance in job satisfaction. Motivational CQ has a moderate unique effect (22 %) and this effect is larger than the unique effect of the other CQ dimensions (1 %–7 %). None of the sets of

two CQ dimensions (4 %–14 %) or three CQ dimensions (4 %–18 %) explains a higher amount of variance in job satisfaction than the common effect of all four CQ dimensions (24 %), but the common effect is lower compared to the total of joint effects of sets of two and three CQ dimensions, which is substantive (43 %). This supports Hypothesis 1c.

For job performance (H1d), the results reveal that the unique effects account for 23 % of the variance in job performance. While cognitive, metacognitive, and motivational CQ have only a small unique effect (2 %, 5 %, and 3 %, respectively), behavioral CQ has a moderate unique effect (13 %). The joint effects of neither the set of two CQ dimensions (1 %–8 %) nor the set of three CQ dimensions (3 %–13 %) explain a higher amount of variance in job performance than the common effect of all four CQ dimensions (31 %). However, this common effect is lower compared to the total of joint effects of sets of two and three CQ dimensions, which is substantive (46 %). These results support Hypothesis 1d.

Commonality analysis also reveals suppressor effects indicated by negative commonality coefficients of variables. A suppressor variable is a predictor that removes irrelevant variance in another predictor (i.e., variance not shared with the outcome variable), thus strengthening the association of the dependent variable and the predictor (Ray-Mukherjee et al., 2014). Suppression can occur when a variable has zero or a small positive correlation with the dependent variable but is correlated with the predictor variable (Ray-Mukherjee et al., 2014). Inspection of the involved predictors allows the identification of suppressor variables and effects. By summing the negative commonality coefficients, we can assess how much of the regression effect is due to suppression (Nimon & Reio, 2011). For example, for expatriation intention, all joint effects with a negative commonality coefficient include behavioral CQ. This indicates that although behavioral CQ may be correlated with other CQ dimensions, it does not share relevant variance with other CQ dimensions in explaining expatriation intention. By controlling for these suppression effects, we are able to identify the unique effects of CQ dimensions on the outcomes.

In summary, the results of the commonality analysis show that compared to the common effect of all four CQ dimensions, none of the sets of two and three CQ dimensions contributes more explained variance for each of the different outcomes. Moreover, for all work-related outcomes, the total of the unique and the common effects explains more than 50 % of the variance in the outcomes. However, as a whole, the joint effects of sets of two and three CQ dimensions consistently explain a substantive amount of variance in the work-related outcomes (except for general adjustment, which is at the threshold), therefore supporting Hypothesis 1.

#### 4.2. Results on the associations of CQ, other predictors, and work-related outcomes

To test the hypotheses on the incremental validity of the CQ dimensions, we used the respective meta-analytic correlation matrixes (see Table 4) and the harmonic mean for each work-related outcome (Landis, 2013). The incremental validity of CQ is tested with hierarchical stepwise regressions where the other predictors are entered in the first step and CQ is entered in the second step (Westfall & Yarkoni, 2016). The results of this approach are presented in Tables 6 and 7.

Hypotheses 2a and 2b postulate that the four CQ dimensions account for significant incremental validity over and above GMA and EQ, over and above personality traits (Hypothesis 3), and over and above international experience and language proficiency (Hypothesis 5a and 5b) in explaining variance in work-related outcomes. In Tables 6 and 7, GMA, EQ, FFM personality traits, language ability, and international experience are entered first in Model 1 (M1). In Model 2a (M2a), overall CQ, and in Model 2b (M2b), the four CQ dimensions are added to these predictors.

The addition of overall CQ to Model 2a significantly increases the explained variance in work-related outcomes (see Table 7). The

explained variance significantly increases for expatriation intention from 13.5 % to 33.6 % (plus 20.1 percentage points); for general adjustment from 21.5 % to 22.7 % (plus 1.2 percentage points); for interaction adjustment from 23.7 % to 27.8 % (plus 4.1 percentage points); for work adjustment from 30.3 % to 31.5 % (plus 1.2 percentage points); and for job satisfaction from 17.5 % to 25 % (plus 7.5 percentage points). Finally, the addition of overall CQ results in a significant increase in the explained variance from 36.9 % to 50.9 % (plus 14 percentage points) for job performance. In summary, overall CQ shows incremental predictive value over and above GMA, EQ, personality traits, language proficiency, and international experience for all outcomes under investigation.

The same conclusion is drawn for the individual CQ dimensions (see Models 2b in Tables 6 and 7) as they have incremental predictive power over and above GMA, EQ, personality traits, language proficiency, and international experience (plus 5.2 % variance explained for expatriation intention; plus 16 % for general adjustment; plus 5.4 % for interaction adjustment; plus 5.2 % for work adjustment; plus 27.6 % for job satisfaction; and plus 14.5 % for job performance). We assessed the robustness of our findings and changed the order of the variables in the regression so that overall CQ and the CQ dimensions were entered first in the stepwise procedure. Our findings remained stable as no additional variance was explained beyond overall CQ and the CQ dimensions, and as the explained variance was below .1. These results support Hypotheses 2a, 2b, 3, 5a, and 5b.

Hypothesis 4 states that the four CQ dimensions partially mediate the relationship between the FFM personality traits and work-related outcomes. To assess this mediational process, we used meta-analytic structural equation modeling (MASEM) based on the meta-analytic correlation matrix. We tested a model that included associations of FFM personality traits with the CQ dimensions (mediator) and the work-related outcomes, as well as the direct effects of the FFM personality traits on GMA and EQ, both of which in turn are also associated with the respective outcome. Table 8 provides a summary of the MASEM results.

Our results show that the partial mediation model fits the data significantly better than both the direct effects model and the full mediation model. In the partial and the full mediation model, openness has the strongest association with the four CQ dimensions. In order to account for the heterogeneity of meta-analytic correlations and assess the robustness of the MASEM results, we used full-information MASEM (FIMASEM; Yu, Downes, Carter, & O'Boyle, 2016). FIMASEM uses meta-analytic correlations and their standard deviations to generate bootstrap samples (5,000 samples) on which the path model is tested (the matrixes, including the standard deviations for all outcome variables, are available from the corresponding author). The FIMASEM results show that average path coefficients, 95 % confidence intervals, and 80 % credibility intervals for the associations between the FFM personality traits and overall CQ and the CQ dimensions are comparable to the MASEM results. Moreover, the results of the FIMASEM-fit indices for the partial mediation model are within the recommended thresholds (i.e., CFI > .95 and SRMR < .08; see Richter, Sinkovics, Ringle, & Schlaegel, 2016) for most bootstrap samples (98 %–100 %). In summary, both the MASEM and the FIMASEM results support Hypothesis 4 since they indicate that overall CQ and the CQ dimensions partially mediate the relationships between the FFM personality traits and the work-related outcomes.

## 5. Discussion of implications for theory and research

### 5.1. A mutualism perspective on CQ's association with work-related outcomes

Our findings have several implications for theory and research. First, our review of the theoretical frameworks used in CQ research shows that the theories advance the notion that CQ and its dimensions have positive associations with work-related outcomes. The theoretical mechanisms

that underly these positive associations vary and attribute different weights to specific individual effects. Moreover, the role of the interrelations of CQ dimensions in explaining the work-related outcomes remains underdeveloped. In light of CQ's multidimensional nature and the considerable intercorrelations of the CQ dimensions, this is a fundamental theoretical shortcoming. It is further exacerbated by previous studies that placed their conceptual and analytical focus on either the effect of overall CQ or the effect of the individual CQ dimensions on an outcome.

Second, drawing on the mutualism theory of intelligence (Van der Maas et al., 2006) and previous conceptual work (Ang et al., 2006; Thomas, 2006; Thomas et al., 2008), we developed arguments for a mutualism perspective on CQ. We specifically argue that the CQ dimensions influence each other in a mutually reinforcing way. Therewith, they also explain different outcomes in combination as the presence of two or more dimensions reinforces the positive effect on various work-related outcomes. This perspective provides a more holistic view on how the CQ dimensions *together* explain different outcomes and complement insights gained through the bi-factor model of CQ (Rockstuhl & Van Dyne, 2018). Our empirical findings suggest that sets of two and three CQ dimensions are not only relevant in explaining variance in work-related outcomes, but that they also demonstrate that a decomposition of CQ dimensions' shared effects into effects of two and three dimensions offers richer insights than focusing only on an individual dimension or the overall CQ. Neglecting joint effects between sets of CQ dimensions may lead to misleading conclusions regarding the relevance of specific dimensions. For instance, while our findings show a very small unique effect of cognitive CQ on expatriation intention, cognitive CQ plays a larger role in combination with metacognitive and motivational CQ in this outcome. Hence, we encourage future researchers to engage in theorizing and testing the mutualism perspective on CQ by employing a blended theoretical lens that combines the mutualism perspective on CQ with the selected theoretical perspective used to explain a specific outcome.

Third, our study also responds to calls to uncover the distinct profiles of CQ dimensions and how they work together in predicting different outcomes (Gelfand et al., 2008). In particular, whereas earlier research challenged the role of *motivational CQ* within the CQ construct (e.g., Blasco et al., 2012; Thomas et al., 2008, 2015), the results of our study highlight the importance of motivational CQ as it has the highest individual share of explained variance across all outcomes, except for job performance. The relevance of motivational CQ is further underlined by the finding that it contributes to almost all joint effects of two and three CQ dimensions that, in turn, account for at least 5 percent of the explained variance in the work-related outcomes (19 out of 21 joint effects). Moreover, previous conceptual work specifically emphasized the binding role of *metacognitive CQ*. Rockstuhl and Van Dyne (2018) found that, indeed, metacognitive CQ moderates the relationships between the other CQ dimensions and different outcomes. Our findings underline the role played by metacognitive CQ in mutually reinforcing the effect of other CQ dimensions. It is involved in 15 out of the 21 joint effects that account for at least 5 % of the explained variance in the outcomes. Hence, we demonstrate that metacognitive CQ and, more importantly, motivational CQ are of core relevance to understand how sets of CQ dimensions relate to different outcomes.

Fourth, our findings enable a discussion of patterns of CQ associations with different outcomes and outcome categories: For expatriation intention, we find strong support for the relative relevance of motivational, metacognitive, and cognitive CQ, over and above effects that stem from behavioral CQ. This finding is in line with, for instance, arguments derived from the theory of planned behavior and its extensions (e.g., Richter, Schlaegel, van Bakel, & Engle, 2020; Richter, van Bakel et al., 2020) and it complements this perspective by adding the joint effect of the three CQ dimensions. For the three adjustment outcomes, we find different patterns of CQ dimensions that matter for the specific types of adjustment: For general adjustment, the unique effect of

motivational CQ is the strongest and joint effects point to the relevance of motivational and cognitive CQ with clearly less relevance of behavioral CQ. For interaction and work adjustment, there are numerous joint effects between CQ dimensions. Furthermore, the common effects of all four CQ dimensions are pronounced. For job satisfaction, motivational and metacognitive CQ are highly relevant, both in an individual and in a mutually reinforcing manner in combination with behavioral CQ. These findings point to the importance of considering these affective outcomes individually, as there are different mechanisms that underly the four affective and even the three adjustment outcomes; current theorizing is unable to fully explain the different patterns of associations with these outcome categories. Finally, for job performance, our findings demonstrate the relevance of behavioral CQ both individually and in a mutually reinforcing manner with other dimensions; most importantly with metacognitive CQ and motivational CQ, but also with cognitive CQ. Likewise, the common effect of all four CQ dimensions is strong for job performance. These findings support arguments emphasizing the relevance of the joint influence of all four CQ dimensions on job performance (e.g., Ang et al., 2007).

Fifth, researchers in the CQ field encouraged the consideration of predictor-criterion matching (Lievens et al., 2005; Sackett & Lievens, 2008) and the matching principle (Ajzen, 2005). An assumption stemming from this principle is that a cognitive predictor is more relevant for a cognitive criterion, an affective predictor is more relevant for an affective outcome, and a behavioral predictor is more relevant for a behavioral outcome. For job performance, we confirm the relevance of behavioral CQ, even though our findings for other CQ dimensions and work-related outcomes remain mixed and do not fully reflect the ideas involved in predictor-criterion matching. While we believe that this approach is interesting—because it may trigger a stronger evaluation based on the predictor and criterion, irrespective whether overall CQ, specific individual dimensions, or sets of CQ dimensions are of specific relevance to an outcome—it needs further theorizing and testing in the field.

Finally, echoing Rockstuhl and Van Dyne (2018), we encourage future researchers to carefully consider the conceptualization of CQ when uncovering the theoretical background and formulating hypotheses, when designing research approaches, and when discussing the theoretical implications of their findings. We recommend that researchers theoretically specify whether they view CQ as an overall construct, or view the individual CQ dimensions separately, or regard CQ's joint effects to have the most utility for predicting a specific outcome. Similar to Barrick and Mount's (2005) study in the context of personality research, we posit that when the objective is to maximize prediction, the appropriate approach is to consider the validity of all relevant CQ dimensions in unison. For more fine-grained findings on specific associations and effects, a commonality analysis can shed light on the contribution of the individual CQ dimensions. If the performance of a commonality analysis is beyond the scope of a study, we recommend, as a minimum, (1) to report the correlations for CQ dimensions and overall CQ, (2) to describe how the overall measure was calculated (e.g., average across items, the sum or average of all dimensions, etc.), and (3) when theorizing at the overall CQ level, to report the results for the CQ dimensions as robustness checks.

## 5.2. CQ's role in work-related outcomes, in the broader context of predictors

We also examined the role of CQ in explaining work-related outcomes regarding a broader set of established predictors, as it is necessary to understand under which conditions CQ complements and/or substitutes the effects of other different abilities such as EQ and GMA. Prior research argued that while CQ and EQ are related constructs, CQ should be more relevant in a cross-cultural context given the cultural specificity of emotions and emotion recognition (Ang et al., 2007). Our findings provide empirical evidence of the important and unique role of CQ in a cross-cultural context and provide a better understanding of the position



of CQ within its nomological setting. For instance, with reference to EQ, we find that the relevance of EQ for work-related outcomes is significantly reduced in the presence of CQ. This finding accords with previous CQ studies, which demonstrated the unique relevance of CQ as an antecedent of work-related outcomes in culturally diverse contexts (e.g., Groves & Feyerherm, 2011; Rockstuhl, Seiler, Ang, Van Dyne, & Annen, 2011). However, our results also show that—in the presence of CQ—EQ still exhibits a significant relationship with the work-related outcomes under investigation. These results challenge the view that denies EQ's role in predicting favorable work-related outcomes in a cross-cultural context. Our findings point to a complementary relationship between EQ and CQ that, as a minimum, partially predicts specific outcomes. EQ is a multidimensional construct. It comprises dimensions that are more related to the other (i.e., other's emotional appraisal and regulation of emotion), as well as dimensions that are more related to the self (i.e., self-emotional appraisal and use of emotion). Recent research has shown that although emotion perception is more universal, emotion understanding and emotion regulation are more culture specific (Shao, Doucet, & Caruso, 2015). This suggests that CQ dimensions can explain certain work-related outcomes beyond some but not all EQ dimensions. Since most of the studies included in our meta-analysis reported overall EQ, we were unable to delve into the detailed effects of the EQ dimensions. Hence, we call for further research to improve our understanding of CQ in relation to specific EQ dimensions. Moreover, we contribute to an understanding of the role of CQ in relation to personality traits. We find that CQ partially mediates the relationships between FFM personality traits and work-related outcomes, confirming the conceptual model outlined in Leung et al. (2014). This is an important finding as it contributes to our understanding of how specific, more distal antecedents, such as broad personality traits, translate into work-related outcomes in an international context.

To further improve our understanding of the complementary or compensatory effects of CQ regarding correlates and the complementary or compensatory effects regarding antecedents, we recommend a further examination of the specific sub-dimensions of the individual CQ dimensions in addition to the dimensions of related constructs, which were beyond the scope of this study. Regarding CQ, researchers could utilize the expanded CQ scale proposed by Van Dyne et al. (2012). This scale allows the development of a deeper understanding of the specific role of subdimensions—for example, planning as a subdimension of metacognitive CQ and extrinsic interest as a subdimension of motivational CQ—to enhance individuals' work-related outcomes in a cross-cultural context. Hence, we need to proceed from asking whether CQ has incremental predictive validity to answering the question how CQ predicts outcomes in combination with other established predictors.

### 5.3. Limitations and directions for future research

The present meta-analysis is not without limitations, which, in part, result from the limitations of the analyzed studies. First, our argumentation for mutually reinforcing relationships between CQ dimensions should be viewed in light of a major limitation of previous CQ studies and, therewith, also of this meta-analysis. Because the majority of previous studies are cross-sectional, we were unable to assess the causal direction of the relationships (Aguinis et al., 2011). This limitation applies to both the interrelations of the CQ dimensions and the relationships between the CQ dimensions and the outcomes. Only a few studies used longitudinal research designs to investigate CQ and work-related outcomes. Consequently, the majority of existing studies are unable to assess possible reciprocal relationships and reverse causality. The CQ dimensions may also correlate as a result of alternative explanations, specifically due to their construct redundancy and to common method variance (CMV) (Schoen et al., 2011). Bucker et al. (2015), in their earlier review of the results of confirmatory factor analysis of CQ dimensions, found that the majority of studies demonstrate the CQ dimensions' acceptable discriminant validity (not all studies tested for it).

While there is (to the best of our knowledge) no review of CMV in CQ research, most studies included in our meta-analysis tested for CMV and none of them reported any serious adverse effects. In addition, the (few) studies that did provide CM-adjusted correlations, reported correlations that are marginally lower (e.g.,  $\Delta r = .04$  in Lorenz, Ramsey, & Richey, 2018). Although it is impossible to completely rule out the redundancy of CQ dimensions and CMV, the intercorrelations of CQ dimensions appear to be indicative of the mutually beneficial relationships between the dimensions as conceptually described in prior research (e.g., Thomas, 2006).

Second, the majority of previous studies were based on self-reported CQ measures and outcomes, and only a few studies used supervisor or other-reported measures (e.g., Shannon & Begley, 2008; Van Dyne et al., 2008). In their meta-analysis, Rockstuhl and Van Dyne (2018) show that correlations of CQ dimensions and task performance are lower for studies that used different sources than studies that used the same source in their datasets. While prior research indicates that self and other-ratings show a relatively high correlation for CQ (e.g., Shannon & Begley, 2008), more primary studies that use other-ratings (supervisor or peers) are required to reduce or rule out a potential same-source bias. Furthermore, as the CQ scale was used in various countries, questions arise on the measurement invariance of the construct (e.g., Schlägel & Sarstedt, 2016). To rule out potential measurement effects on observed findings, more studies are required that examine the invariance of the CQ scale.

Third, while we observed considerable heterogeneity for various meta-analytic correlations in our study, the number of primary studies per relationship restricted our ability to assess potential moderators. Echoing Leung et al. (2014), an important direction for future theorizing and research involves potential boundary conditions that affect the relationships between CQ dimensions and work outcomes. Future research should examine individual, organizational and environmental factors, as well as cross-level interactions. For example, future individual-level research can enrich our understanding of the complex dynamics between international experience, language proficiency, and CQ dimensions and the mechanisms through which they are related to specific work-related outcomes. At the organizational level, future research can benefit from examining the organizational factors which may enhance or diminish the effects of CQ dimensions on work outcomes. At the environmental level, future research can examine whether certain factors, such as the cultural tightness of the host country, moderate the relationship between CQ dimensions and work-related outcomes.

Finally, the incremental predictive validity test is based on a meta-analytic correlation matrix. In addition to the general limitations of this procedure (Becker & Schram, 1994), a limitation of this study is that the included correlations obtained from other meta-analyses are not situated in a cross-cultural environment. Therefore, the incremental predictive validity of CQ and its dimension could be underestimated as GMA, EQ, and personality traits, in a cross-cultural context, may have smaller effects on the work-related outcomes compared to CQ.

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### Appendix A

Table A1

Summary of studies included in the meta-analysis.

Reference	N	Respondent type	Citizenship participants	Study country	Outcome variables	Theories/ models used to hypothesize on CQ-effect on work-related outcomes	CQ hypothesis test	Moderation, mediation, or direct effect
Akhal and Liu (2019)	402	Professionals	Mixed	China	General adjustment, interaction adjustment, work adjustment	Black and Stephens's (1989, 1991) model of cross-cultural adjustment	CQ dimensions	Direct
Ang et al. (2007)	98	Professionals	Mixed	Singapore	Task performance	Campbell's (1999) idea that—combined with CQ as a facilitator of understanding and acting along role expectations—knowledge, skills, abilities, and motivation are predictors of performance (Katz & Kahn, 1978)	CQ dimensions	Direct
Aslam, Ilyas, Imran, and Rahman (2016)	202	Professionals	Pakistan	Pakistan	Job performance	-/-	Overall CQ	Direct
Baluku, Kikooma, Bantu, Onderi, and Otto (2019)	283	Professionals	Mixed	Mixed	Job satisfaction	CQ as an extension of conceptual ideas, advanced by Baron and Markman (2000, 2003) on social competence and entrepreneurial success	Single CQ dimension (B)	Direct
Barakat, Lorenz, Ramsey, & Cretoiu (2015)	332	Professionals	Mixed	Brazil	Job satisfaction, job performance	Bandura's (1997) concept of self-efficacy, in combination with theories on dispositional causes of job satisfaction (e.g., Judge et al., 1998), theories on work motivation, and goal-setting theories (e.g., Locke & Latham, 1990)	Overall CQ	Direct (job satisfaction); CQ's effect is mediated (job performance)
Begenirbas and Turgut (2016)	133	Professionals	Mixed	Mixed	Job performance	-/-	CQ dimensions	direct
Bücker, Furrer, Poutsma, & Buyens (2014)	225	Professionals	China	China	Job satisfaction	Hackman & Oldham's (1976) job characteristics and job satisfaction model	Overall CQ	CQ has a direct effect and CQ's effect is mediated
Camargo, Storme, & Celik (2020)	241	Students	N/A	France	Expatriation intention	An extended version of social cognitive career theory (Lent & Brown, 2013), mainly developed from Bandura's social cognitive theory and ideas on self-efficacy (1986, 1997)	CQ dimensions	CQ's effect is partially mediated
Chao, Takeuchi, & Farh (2017)	469	Students	N/A	France	Expatriation intention		[Overall CQ and CQ dimensions]	[Direct]
Chen (2013)	254	Students	China	Mixed	General adjustment, interaction adjustment, work adjustment	[hypotheses on the influence of adjustment on CQ]		
Chen (2015)	59	Professionals	U.S.	U.S.	Job performance	Arguments building on Hollander's (1995) relational (leadership) theory	Overall CQ	Direct
Chen & Lin (2013)	393	Professionals	Philippine	Taiwan	Work adjustment	Black and Stephens's (1989, 1991) model of cross-cultural adjustment	Overall CQ	CQ's effect is mediated and moderated
Chen, Lin, & Sawangpattanakul (2011)	307	Professionals	Philippine	Taiwan	Work adjustment	Bandura's social learning/cognitive theory (1986), in combination with Black and Stephens's (1989, (1991)) model of adjustment	Overall CQ	CQ as a moderator
Chen, Lin, & Sawangpattanakul (2011)	382	Professionals	Philippine	Taiwan	Performance	Arguments that relate to Campbell (1999) and the better fulfillment of role expectations (e.g., Stone-Romero et al., 2003); arguments that relate to motivation, in combination with self-efficacy and self-esteem (e.g., Kanfer & Heggstad, 1997), and to the presentation of the self-concept (Goffman, 1959)	Overall CQ and CQ dimensions	CQ's effect is mediated
Chen, Kirkman, Kim, Farh, & Tangirala (2010)	556	Professionals	Mixed	Mixed	Job performance, work adjustment	Motivation theories (e.g., Kanfer, 1990), in combination with arguments on self-efficacy (Bandura, 1997) and on intrinsic motivation (Deci et al., 1989)	Single CQ dimension (M)	M's effect is mediated and moderated
Chen, Portnoy, & Liu (2012)	305	Professionals	U.S.	U.S.	Individual total sales, individual cultural sales	Arguments on self-efficacy (Bandura, 1997) and on intrinsic motivation (Deci et al., 1989)	Single CQ dimension (M)	M is moderated
Chew, Ghurburn, Terspstra-Tong, and Perera (2019)	237	Professionals	mixed	mixed	General adjustment, interaction adjustment, work adjustment, job performance	Theory of work adjustment (including ideas on person-environment fit) (Dawis & Lofquist, 1984); used in this case as demands-abilities-fit in combination with Black et al.'s (1991) model of adjustment	Overall CQ	Direct effect (adjustment dimensions); CQ's effect is mediated (job performance)
Diao and Park (2012)	304	Professionals	mixed	South Korea	Job satisfaction	-/-	CQ dimensions	CQ is moderated
Diemer (2015)	88	Professionals	U.S.	China	Work adjustment, job performance, job satisfaction	-/-	CQ dimensions	Direct
	279	Students	France, U.S.		Acceptance of foreign job offer	-/-	Overall CQ	CQ as a mediator

(continued on next page)



Table A1 (continued)

Reference	N	Respondent type	Citizenship participants	Study country	Outcome variables	Theories/ models used to hypothesize on CQ-effect on work-related outcomes	CQ hypothesis test	Moderation, mediation, or direct effect
Engle, Dimitriadi, & Sadrieh (2012)				France, U.S.				
FakhrEIDin (2011)	87	Professionals	Egypt	Egypt	Employee performance	-/-	CQ dimensions	Direct
Firth, Chen, Kirkman, & Kim (2014)	70	Professionals	mixed	mixed	Work adjustment	Building on Kanfer and Heggstad (1997) and on the ideas of self-regulatory motivation control and emotion-control strategies, combined with the ideas on motivational CQ (self-efficacy and intrinsic motivation)	Single CQ dimension (M)	M's effect is mediated
Gorji and Gharesefloo (2011)	105	Professionals	Iran	Iran	Employee's performance	-/-	CQ dimensions	Direct
Guðmundsdóttir (2015)	178	Professionals	mixed	U.S.	General adjustment, interaction adjustment, work adjustment	Gudykunst's (1998), (2005) anxiety/uncertainty management model; self-concept theory (Goffman, 1959); self-efficacy theory (Bandura, 1997); and Hall's (1959) ideas incorporated in silent language thinking	Overall CQ and CQ dimensions	Direct
Henderson et al. (2018)	218	Professionals	mixed	mixed	Job satisfaction, job performance	-/-	CQ dimensions	CQ as a moderator
Hua, Zheng, Zhang, & Fan (2019)	103	Professionals	mixed	U.S.	Interaction adjustment	-/-	Single CQ dimension (M)	CQ as a control variable
Huff (2013)	141	Professionals	N/A	Japan	General adjustment, interaction adjustment, work adjustment, satisfaction with the job assignment, desire to accept an assignment in a different country	-/-	CQ dimensions	CQ is moderated
Huff, Song, & Gresch (2014)	155	Professionals	U.S.	Japan	General adjustment, interaction adjustment, work adjustment	-/-	CQ dimensions	Direct
Isfahani, Jooneghani, & Azar (2013)	100	Professionals	Iran	Iran	Performance	-/-	Overall CQ	Direct
Iskhakova (2018)	189	Students	mixed	Australia	General adjustment, interaction adjustment	-/-	CQ dimensions	Direct
Jafari (2013)	147	Professionals	Iran	Iran	Performance	[some arguments on anxiety decrease and on role expectations]	CQ dimensions	Direct
Jyoti and Kour (2015)	225	Professionals	India	India	General adjustment, interaction adjustment, work adjustment, task performance	Adjustment: -/-; performance: Campbell (1999) in combination with role expectations (Stone-Romero et al., 2003)	Overall CQ	CQ's effect is mediated
Jyoti, Kour, & Bhau (2015)	342	Professionals	India	India	Job performance	Definition of performance as role-prescribed behavior (Campbell, 1999), in combination with arguments on role expectations; arguments on stress reduction (building on Kraimer, Wayne, & Jaworski, 2001)	Overall CQ	CQ's effect is mediated
Kelidbari, Dizgah, & Jourshari (2012)	217	Professionals	Iran	Iran	Job performance	-/-	Overall CQ and CQ dimensions	Direct
Kim and Froese (2012)	151	Professionals	South Korea	Mixed	Expatriation intention	-/-	Single CQ dimension (M)	CQ as a control variable
Kittler, Rygl, & Puce (2009)	82	Professionals	mixed	Singapore	General adjustment, interaction adjustment, work adjustment	-/-	CQ dimensions	CQ is moderated
Kononahalli et al. (2014)	191	Professionals	UK	UK	General adjustment, work adjustment, interaction adjustment,	[diverse arguments, mainly rooted in the CQ concept—specifics that go slightly beyond self-efficacy and stress reduction]	CQ dimensions	Direct
Lee and Kartika (2014)	278	Professionals	mixed	Taiwan, China	Expatriate adjustment	-/-	Overall CQ	CQ's effect is mediated
Lee and Sukoco (2010)	222	Professionals	Taiwan	Taiwan	General adjustment, work adjustment, interaction adjustment, job performance	Reference to Black & Stephens's, 1989, 1991) model of adjustment	Overall CQ	CQ's effect is mediated
Lee, Veasna, & Sukoco (2013)	256	Professionals	Taiwan	mixed	General adjustment, work adjustment, interaction adjustment	-/-	Overall CQ	CQ as a moderator
Lee, Veasna, & Wu (2013)	156	Professionals	Taiwan	China	Work adjustment, interaction adjustment, task performance, contextual performance	Arguments that relate to socio-analytic theory (Hogan & Shelton, 1998), Bandura's (1986), (1997) social cognitive theory, and ideas on self-efficacy	Overall CQ	CQ as a moderator

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Table A1 (continued)

Reference	N	Respondent type	Citizenship participants	Study country	Outcome variables	Theories/ models used to hypothesize on CQ-effect on work-related outcomes	CQ hypothesis test	Moderation, mediation, or direct effect
Lee, Weber, & Rivera (2019)	370	Professionals	U.S.	U.S.	Expatriation intention	A combination of self-efficacy theory (Bandura, 1997) and job demands-resources (JD-R) theory (Bakker & Demerouti, 2007)	Overall CQ	Direct
Lie, Suyasa, & Wijaya (2016)	265	Professionals	mixed	mixed	Job satisfaction	Anxiety/uncertainty management theory (Gudykunst, 1998, 2005)	Overall CQ	CQ has a direct effect on job satisfaction and acts as a mediator
Malek and Budhwar (2013)	134	Professionals	mixed	Malaysia	General adjustment, interaction adjustment, work adjustment, task performance, contextual performance	Anxiety/uncertainty management theory (Gudykunst, 1998, 2005)	CQ dimensions	CQ has a direct effect on adjustment; CQ's effect is mediated (performance)
Mohammed & Vishwanathan (2016)	523	Professionals	India	U.S.	General adjustment	-/-	Overall CQ	Direct
Moon, Choi, & Jung (2012)	190	Professionals	mixed	South Korea	General adjustment, work adjustment	[several theoretical concepts, but with a focus on the antecedents of CQ, e.g., social learning, the theory of resource allocation, selective attention, etc.]	CQ dimensions	CQ as a mediator
Nafei (2013)	280	Professionals	mixed	Egypt	Job performance	-/-	CQ dimensions	Direct
Nam and Park (2013)	746	Professionals	South Korea	South Korea	Job performance	-/-	Overall CQ	CQ has a direct effect, and CQ's effect is mediated
Nozari (2016)	131	Professionals	Iran	Iran	Job performance	-/-	Overall CQ	Direct
Nunes, Felix, & Prates (2017)	217	Professionals	mixed	Brazil	General adjustment, work adjustment, cross-cultural adjustment, job performance	Contact theory (Allport, 1954) and arguments related to role expectations	Overall CQ	Direct (cross-cultural adjustment) and CQ's effect is mediated (job performance)
Presbitero (2016b)	223	Professionals	Philippines	Philippines	Task performance	Campbell (1999) concept and arguments related to better meeting role expectations	CQ dimensions	Direct
Presbitero (2016a)	125	Professionals	Philippines	Philippines	Task performance	Arguments on intrinsic motivation/self-determination (Deci et al. 1985, 1989), in combination with expectancy-value theory (Vroom, 1964) and Black & Stephens's, 1989, 1991) model of adjustment	Single CQ dimension (M)	CQ has a direct effect, and CQ as a mediator
Presbitero (2017)	110	Professionals	mixed	mixed	General adjustment, interaction adjustment	-/-	Overall CQ	CQ is moderated
Presbitero and Quita (2017)	514	Students	Philippines	Philippines	Intention for expatriate career	-/-	Overall CQ	CQ as a moderator
Presbitero and Toledano (2018)	225	Professionals	mixed	mixed	Job performance	-/-	Overall CQ	CQ's effect is moderated
Racicot and Ferry (2016)	60	Students	mixed	mixed	Future work abroad	Kolb's (1984) experiential learning theory	CQ dimensions	Direct
Ramalu, Rose, Kumar, and Uli (2010), Ramalu, Wei, and Rose (2011), Ramalu, Shamsudin, and Subramaniam (2012)	332	Professionals	mixed	Malaysia	General adjustment, interaction adjustment, work adjustment, overall job performance (task performance, contextual performance, specific performance)	Diverse theoretical backgrounds: Bandura's social cognitive theory and ideas on self-efficacy (1986, 1997), stage models of adjustment, Goffman's (1959) theory of self-presentation, and intrinsic motivation (Deci et al., 1989)	CQ dimensions	Different set-ups: Direct effect of CQ, CQ's effect is mediated and CQ as a mediator
Remhof, Gunkel, & Schlägel (2013)	518	Students	Germany	Germany	Intention to work abroad	Bandura's (1986), (1997) social cognitive theory and arguments on self-efficacy; including certain arguments on uncertainty reduction	CQ dimensions	CQ as a mediator
Richter, Schlaegel et al. (2020), Richter, van Bakel et al. (2020)	306 203 260	Students Students Students	Germany U.S. China	Germany U.S. China	Expatriation intention Expatriation intention Expatriation intention	Theory of planned behavior (Ajzen, 1991)	CQ dimensions	Direct
Sahin, Gürbüz, Köksal, & Ercan (2013)	241	Professionals	Turkey	Turkey	In-role performance (self-rated and peer-rated)	-/-	CQ dimensions	Direct
Schlaegel, Engle, Dimitriadi, Tatoglu, & Ljubica (2013)	173	Students	Sweden	Sweden	Expatriation intention			
	210	Students	U.S.	U.S.	Expatriation intention			
	178	Students	Turkey	Turkey	Expatriation intention			
	187	Students	Russia	Russia	Expatriation intention	-/-	CQ dimensions	Direct
	300 213	Students Students	Germany France	Germany France	Expatriation intention Expatriation intention			

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Table A1 (continued)

Reference	N	Respondent type	Citizenship participants	Study country	Outcome variables	Theories/ models used to hypothesize on CQ-effect on work-related outcomes	CQ hypothesis test	Moderation, mediation, or direct effect
Sharma and Hussain (2019)	224	Students	China	China	Expatriation intention	-/-	Overall CQ	Direct
	191	Students	Croatia	Croatia	Expatriation intention			
	246	Students/ professionals	India	India	General adjustment, interaction adjustment			
Shu, McAbee, & Ayman (2017)	355	Students	Mixed	U.S.	General adjustment, interaction adjustment, work adjustment	-/-	CQ dimensions	Direct
Sims (2011)	240	Professionals	Mixed	Mixed	Job satisfaction	Theory of work adjustment (or person-job-fit, person-organization-fit, person-environment-fit) (Dawis & Lofquist, 1984)	Overall CQ	CQ's effect is mediated
Sozibilir and Yesil (2016)	86	Professionals	Turkey	Turkey	Job satisfaction, job performance	Arguments on dispositional causes of job satisfaction (e. g., Judge et al., 1998); upper echelons theory (Hambrick & Mason, 1984) argues for the CQ-performance association	CQ dimensions	CQ's effect is mediated
Sultan and Tareen (2014)	380	Professionals	Pakistan	Pakistan	Employee performance	-/-	Overall CQ	CQ as a mediator
Templer et al. (2006)	157	Professionals	Mixed	Singapore	Work adjustment, general adjustment, interaction adjustment	Arguments related to intrinsic motivation and self-efficacy	Single CQ dimension (M)	Direct
Van Dyne, Ang, & Koh (2008)	142	Professionals	U.S.	U.S.	Interactional adjustment	-/-	CQ dimensions	Direct
Wu and Ang (2011)	169	Professionals	mixed	Singapore	General adjustment, interaction adjustment, work adjustment, contextual performance, task performance	-/-	CQ dimensions	CQ as a moderator
Yurtkoru, Dauda, & Sekarawisut (2017)	153	Students	Turkey	Turkey	Expatriation intention	An extension of the theory of planned behavior (Ajzen, 1991) and a model of work-related perceptions in the form of integrating cognitive CQ as a moderating variable	Single CQ dimension (C)	CQ as a moderator
Zhao, Liu, & Zhou (2020)	389	Professionals	China	mixed	Task performance, contextual performance	-/-	Single CQ dimension (B)	B as a moderator

Note: N = total sample size, MC = metacognitive CQ, C = cognitive CQ, M = motivational CQ, B = behavioral CQ.

**Table A2**  
Results of the bivariate meta-analysis for relationships between CQ and related variables.

Relationship	Before outlier removal														After outlier removal									
	k	N	$\bar{r}$	$\rho$	SD ( $\rho$ )	80 % CV	95 % CI	Q	$I^2$	# TF	Side	$\rho_{TF}$	95 % CI <sub>TF</sub>	# out	k	n	$\rho$	80 % CV	95 % CI	# TF	Side	$\rho_{TF}$	95 % CI <sub>TF</sub>	
Overall CQ																								
Emotional intelligence	15	3674	.44	.53	.23	.20/.75	.43/.62	169.71	***	92	1	left	.51	.41/.60	0									
Openness	8	1581	.34	.40	.16	.15/.61	.30/.50	39.57	***	82	3	right	.50	.39/.59	0									
Conscientiousness	5	853	.17	.20	.17	-.33/.63	.04/.34	22.68	***	82	na			na										
Extraversion	6	977	.28	.32	.09	.09/.55	.22/.35	7.93		54	na			na										
Agreeableness	5	853	.12	.14	.10	-.17/.43	.06/.23	10.43	*	61	na			na										
Emotional stability	5	853	.06	.06	.17	-.52/.43	-.05/.16	22.42	***	82	na			na										
International experience	26	5670	.15	.17	.12	-.03/.35	.12/.22	97.98	***	75	0			1	25	5229	.15	.01/.29	.11/.20	8	left	.10	.05/.14	
General mental ability	7	1460	.07	.07	.12	-.13/.27	-.03/.17	20.77	**	71	2	right	.01	-.10/.12	0									
Language ability																								
Overall CQ	11	2691	.19	.21	.03	.14/.27	.16/.25	12.42		20	0			0										
Cognitive CQ	18	3944	.24	.28	.15	.03/.49	.21/.34	94.53	***	82	0			0										
Metacognitive CQ	19	4132	.15	.17	.14	-.07/.40	.10/.24	94.86	***	81	7	right	.26	.19/.34	1	18	3614	.15	-.01/.31	.10/.21	3	left	.12	.06/.18
Motivational CQ	20	4805	.17	.19	.17	-.09/.45	.11/.27	148.17	***	87	1	right	.20	.13/.28	0									
Behavioral CQ	18	3944	.16	.18	.10	.01/.34	.12/.23	53.04	***	68	4	right	.22	.16/.28	0									

Note: k = number of independent samples cumulated, N= cumulative sample size (number of individuals), r = sample-size weighted correlation (not corrected for measurement error),  $\rho$  sample-sizes weighted and measurement error corrected correlation, CI = 95 % confidence interval. '# TF' denotes the number of estimated missing effect sizes imputed in the trim-and-fill procedure. 'Side' provides information on which side of the mean effect size the estimated missing effect sizes are imputed in the trim-and-fill procedure. \*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .

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