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# Environmental sensitivity in the self-assessment of cultural intelligence development

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## Abstract

**Purpose** – Cultural intelligence (CQ) is a key ability that enables employees to effectively interact with individuals from different cultures. Research suggests that not all individuals self-assess their CQ learning similarly. This exploratory study aims to identify systematic inter-individual differences in self-assessed CQ development arising from environmental sensitivity, a relevant trait given that research estimates that 20–30% of individuals are highly sensitive.

**Design/methodology/approach** – This study examines the contribution of an intercultural learning program to CQ development. It draws on survey data collected from all participants in multiple cohorts over 11 years. The participants were highly qualified junior employees representing 25 countries, with 96% from Europe. Data were gathered prior to and following program participation to evaluate changes in self-assessed CQ.

**Findings** – Results indicate that participants with greater environmental sensitivity reported lower self-assessed CQ development. Team size moderated this relationship: the negative association was significant in dyads, but not in triads or quads. Higher levels of prior international experience did not significantly affect the outcome.

**Originality/value** – The study contributes to the understanding of CQ development by highlighting the role of environmental sensitivity, an often-overlooked trait, and it critically assesses the validity of the prevailing evaluation of the effectiveness of CQ learning based on self-assessments in both research and practice. The results offer insights for the design of CQ learning programs and underscore the need to consider the unique challenges faced by environmentally sensitive learners in enhancing their CQ.

**Keywords** Cultural intelligence, Self-assessment, Intercultural learning, Environmental sensitivity, Team size, International experience

**Paper type** Research article

## Introduction

Given globalization's profound influence on the global economy since the 1990s, marked by a surge in world trade (UNCTAD, 2022), intercultural competencies have become crucial for employees and companies (Sharma, 2019; Solomon and Steyn, 2017). At the forefront of acknowledged intercultural competencies in contemporary management literature is Cultural Intelligence (CQ), denoting an individual's ability to adeptly navigate diverse cultural contexts (Ang and Van Dyne, 2015; Earley and Ang, 2003).

The effectiveness of acquiring CQ through intercultural learning programs has been widely studied. In the evaluation of these programs, learning assessment plays a crucial role by providing measurable data on learner progress, identifying strengths and weaknesses in curriculum design, and ensuring that the program's objectives are being met effectively (Alkin

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*et al*., 2024). Most empirical studies have utilized learner self-assessment of CQ for evaluation (Ang *et al*., 2015b). Self-assessments require individuals to reflect on and judge their own learning processes, achievements, and outcomes (Yan and Brown, 2017). Interestingly, the findings are inconsistent. While most studies have reported increases in self-assessed CQ among participants (e.g. Chenyang, 2022; Gustomo *et al*., 2018; Putranto *et al*., 2015), some studies have shown negligible impacts (e.g. Varela and Gatlin-Watts, 2014; Wood and St. Peters, 2014), or even declines in self-assessed CQ (Fischer, 2011; Wang *et al*., 2015). Much of the literature treats learners as a homogeneous group, typically reporting mean values of these CQ self-assessments, which may obscure individual differences that contribute to inconsistencies (Panadero *et al*., 2016). Despite some studies examining individual differences in learning CQ, such as learning styles (Li *et al*., 2013) and Big Five personality traits (Ang *et al*., 2006), there is limited understanding of *systematic inter-individual variations in subjective self-assessment* (Alexandra, 2018; Panadero *et al*., 2016). Moreover, this approach of evaluating CQ learning programs based on self-assessments presents significant challenges. These studies have treated CQ self-assessments as indicators of cognitive learning or performance. However, given the demonstrably limited accuracy and predictive validity of self-assessments (León *et al*., 2023) and their stronger association with affective outcomes rather than cognitive learning (Sitzmann *et al*., 2010), self-assessments primarily reflect not learners' actual CQ levels, but rather their *subjective sense of their CQ and confidence* (Ang *et al*., 2015b; Taras, 2020). Notably, recent meta-analyses on CQ do not problematize this difference (cognitive learning/performance vs affective outcomes/confidence) in the information provided by self-assessments (Chenyang, 2022; Schlaegel *et al*., 2021; Tripathi *et al*., 2023; Varela, 2017).

To address these limitations in research, this exploratory study aims to gain deeper insights into the interpretation of self-assessed CQ, which is crucial for self-directed learning processes. Specifically, the study seeks to identify systematic inter-individual differences in self-perceived CQ development, particularly those arising from environmental sensitivity. CQ learning is the process by which individuals acquire culture-related knowledge and abilities through experience, study, or instruction, while individual CQ development refers to the evolution of a person's CQ over time, as measured by the changes in CQ scores at multiple time points, specifically before and after participation in the intercultural learning program being examined. In their review, Ang *et al*. (2015b) proposed that future research should analyze the role of mindful attention to intercultural encounters (specifically, individuals' awareness of and attention to what is happening to and within them during a present intercultural event;, cf. Brown and Ryan, 2003) in translating international experiences into higher CQ. We focus on environmental sensitivity, which is defined as the inter-individual variation in susceptibility to environmental influences (Greven *et al*., 2019).

Heightened sensitivity, with its inherent mindful attention, is associated with a greater capacity to benefit from supportive environments but also with increased vulnerability to unfavorable contexts (Greven *et al*., 2019). In intercultural experiences, such sensitivity may influence the development of CQ "for better or for worse" (Greven and Homberg, 2020, p. 51). Yet no study has examined which factors create favorable versus unfavorable conditions for intercultural learning among environmentally sensitive individuals. In this context, team size and prior international experience are likely to be key contextual moderators, given evidence on the importance of social relationships (Bas *et al*., 2021; Tran *et al*., 2018) and exposure (Pluess and Boniwell, 2015) for environmentally sensitive individuals. Team size shapes the social-cognitive environment for collaboration and reflection, while prior international experience shapes the cognitive frameworks through which new cultural knowledge is interpreted. For highly sensitive individuals, supportive configurations of these factors may enhance self-assessed CQ development, whereas unsupportive ones may hinder it. Yet research remains inconclusive regarding the optimal team size for fostering learning (Corrégé and Michinov, 2021; Wang *et al*., 2023), and only preliminary evidence exists for its influence on self-assessments (Lim *et al*., 2014). Similarly, the role of prior international experience in conditioning learning outcomes is unclear; although generally positively associated with CQ, its role varies by type, purpose, and duration of international exposure (Liao and Thomas,

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2020). To date, no study has examined how team size and prior international experience interact with environmental sensitivity in intercultural learning. Despite the significance of environmental sensitivity in international mobility (Andresen *et al*., 2018), its role in self-assessed CQ and in the interplay between situational and individual learning conditions remains underexplored.

Given this ambiguity and a dearth of empirical exploration, the present study seeks to elucidate the relationship between environmental sensitivity and self-assessment of CQ. The research questions guiding this study are: (1) *How does the environmental sensitivity of learners in the intercultural learning program relate to their self-assessed CQ development?* (2) *In what ways do individual and situational variables, notably prior international experience and team size, influence this relationship between learners' environmental sensitivity and their self-assessed CQ development?*

In sum, there is insufficient guidance for researchers on interpreting learners' subjective self-assessments of CQ, also in relation to their environmental sensitivity. This study is guided by Neufeldt *et al*.'s (1996) theory of reflectivity, which emphasizes the role of cognitive and emotional processes in learning, and extends it by incorporating new individual and situational factors. Given that approximately 20–30% of the population is considered environmentally sensitive (Aron and Aron, 1997; Lionetti *et al*., 2018), the results are of interest to many.

This study makes three key contributions. First, it advances CQ research by investigating a relevant antecedent of self-assessed CQ development (environmental sensitivity) and two moderators of this relationship (prior international experience and team size). In doing so, it contributes to a better understanding of CQ self-assessment as an indicator of cognitive learning and emotional outcomes. Second, by testing the full reflectivity model with these additional factors, the study extends the theory of reflectivity, providing empirical evidence on how individual and situational variables interact to shape self-assessed CQ development. Third, our contributions extend to management education, informing the design of intercultural learning programs. At the organizational level, understanding the systematic variations in self-assessment is crucial for designing intercultural learning programs that cater to relevant individual differences, such as environmental sensitivity and prior international experience, and optimize situational factors, including team size. Such insights can guide both the structuring of collaborative learning processes and the evaluation of CQ learning programs. At the individual level, they can lead to the creation of tools that help learners reflect on how their environmental sensitivity, prior international experience, and team-learning contexts shape their CQ self-assessment, allowing them to identify pathways for improvement and fostering personal growth and enhanced cross-cultural relationships. Specifically, we advocate for individualized feedback that accounts for the cognitive and emotional processes and varying levels of environmental sensitivity. We offer a tailored approach to increase the effectiveness and relevance of intercultural learning in professional contexts.

## Cultural intelligence development

### *Cultural intelligence learning based on reflectivity theory*

CQ, conceptualized by Earley and Ang (2003, p. 59) as "a person's capability to adapt effectively to new cultural contexts", hinges on four facets: metacognitive, cognitive, motivational, and behavioral CQ (Ang and Van Dyne, 2015). Metacognitive CQ involves critical observation and evaluation of cross-cultural situations, while cognitive CQ centers on cultural knowledge spanning economic, social, political, and legal systems. Motivational CQ speaks to the capability to direct one's attention to enhance cross-cultural abilities, and behavioral CQ pertains to the use of appropriate verbal and non-verbal communication (Ang and Van Dyne, 2015).

Measurement approaches for CQ include self-assessments (individuals' perceptions of their CQ), informant-based measures (observers' evaluations of an individual's CQ manifestations), and performance-based measures (individuals demonstrate their

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capabilities in standardized tests; Ang *et al*., 2015b; Leung *et al*., 2014). Ang *et al*. (2015b) call for further investigation into the unique, theoretically meaningful information that these measures reveal. This study specifically examines self-assessment, a fundamental component of self-directed learning. Self-assessments indicate individuals' subjective sense of CQ and are tied to their reflections on learning processes and outcomes (cf. Lubbe *et al*., 2021). Currently, self-assessments dominate research on the effectiveness of CQ learning programs, based on the assumption that they reliably indicate cognitive learning (Chenyang, 2022). However, meta-analyses show that self-assessed knowledge correlates more strongly with affective outcomes than cognitive learning (Sitzmann *et al*., 2010). Moreover, previous research has debated the accuracy and predictive validity of CQ self-assessment as an indicator of cognitive learning (Ang *et al*., 2015b; Taras, 2020). Therefore, further research is needed to understand the implications of self-assessment values and how they reflect individual differences.

Reflectivity, defined as the ability to understand one's and others' beliefs, desires, plans, thoughts and feelings (Dimaggio *et al*., 2008), is crucial in the learning process (Kolb, 2015) and particularly relevant in self-assessment (Yan and Brown, 2017). In the context of CQ learning, the capacity to scrutinize cultural assumptions is considered significant (Alexandra, 2018; Lorenz *et al*., 2018). Following Neufeldt *et al*.'s (1996) theory of reflectivity, the sequential process, outlined in Figure 1, begins when a learner encounters an initial problem, a juncture of puzzlement and uncertainty. In our case, this trigger emanates from participation in an intercultural learning program, presenting challenges that require resolution. The reflective process involves seeking to understand these challenges, where participants analyze their intercultural experiences and reflect on their learning at a meta-level, which is manifested in a *self-assessment of their subjective CQ*. The depth of this reflective process is influenced by individual *reflectivity*, operationalized in this study as environmental sensitivity, another term for reflectivity (Aron *et al*., 2012; David *et al*., 2022), which involves processing sensory input at a deeper level through careful observation, comparison of new experiences with previous experiences, and integration with existing knowledge (David *et al*., 2022). The relationship between reflectivity and self-assessment is moderated by *situational and individual factors* (Neufeldt *et al*., 1996). According to reflectivity theory (Neufeldt *et al*., 1996), situational factors refer to characteristics of the immediate learning environment that shape opportunities for reflection and knowledge construction, whereas individual factors refer to relatively stable learner characteristics that influence how these opportunities are perceived and utilized. Our study incorporates team size as a situational factor and prior international experiences as an individual factor, which typically trigger reflection and may help reduce emotional and cognitive load in new international experiences by increasing familiarity and experience.

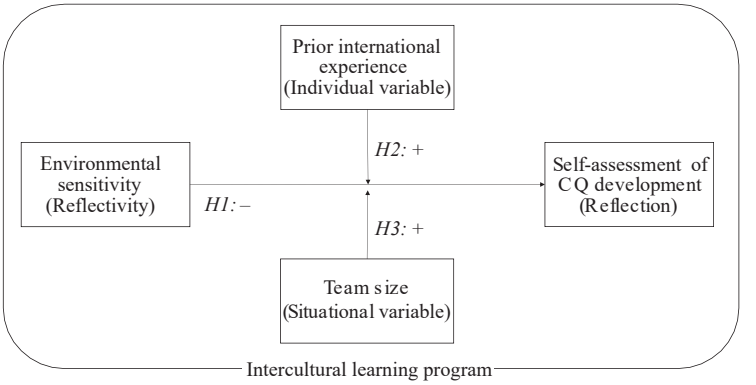


**Figure 1.** Research model – reflective process in CQ development. Source: Authors' work

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Ultimately, this reflective process leads to changes in work practice, enhancing the ability to derive meaning from experiences (Neufeldt *et al*., 1996). In the intercultural context, successful learners may develop their actual CQ; however, instruments for measuring actual CQ remain elusive (Ang *et al*., 2015b). This study focuses on the intercultural learning experiences and learners' self-assessment as a reflective process.

Research evaluating the impact of CQ learning programs on self-assessed CQ, using pre-post measures, consistently reveals positive relationships with overall CQ (Alexandra, 2018; Gustomo *et al*., 2018; Ramsey and Lorenz, 2016; Wang *et al*., 2015) or specific facets of CQ (Eisenberg *et al*., 2013; Kurpis and Hunter, 2017). Crucially, field-based learning programs tend to showcase notably higher self-assessed CQ improvements (Engle and Crowne, 2014; Wood and St. Peters, 2014) compared to their classroom-based counterparts (Bücker and Korzilius, 2015). Additionally, experiential methods tend to have a stronger impact on CQ than cognitive approaches (Chenyang, 2022).

However, since the positive relationship between intercultural learning and its self-assessment is not universal (Wang *et al*., 2015) and self-assessments tend to reflect affective outcomes more than cognitive learning (Sitzmann *et al*., 2010), we turn our attention to individual differences in self-assessment that reflect cognitive learning and affective outcomes.

*Environmental sensitivity and self-assessment of CQ*

Engaging with foreigners offers a fertile ground for reflection. Yet the degree of reflectivity varies among individuals (Kolb, 2015), for example depending on environmental sensitivity, which arises from deeper processing of sensory input. Researchers consider environmental sensitivity to be synonymous with reflectivity (Acevedo *et al*., 2014; Aron *et al*., 2010, 2012; David *et al*., 2022), which is central to learning processes (e.g. Ng *et al*., 2009; Peng *et al*., 2015) and is an integral and crucial component of the self-assessment process (Yan and Brown, 2017). The intriguing question of whether environmental sensitivity relates to individuals' self-assessment of CQ remains unanswered.

*High level of environmental sensitivity and self-assessed CQ.* Variation in environmental sensitivity is intricately linked to the cognitive and emotional predisposition to reflect (Aron *et al*., 2012; David *et al*., 2022; Harvey *et al*., 2016). Environmental sensitivity encompasses four dimensions: heightened awareness of subtleties, deeper cognitive processing, greater empathy, and increased susceptibility to overstimulation. The first two aspects align with the cognitive facet of reflectivity, while the latter two correspond to its emotional facet (Nesbit, 2012). On the one hand, environmental sensitivity affects *cognition*, as deeper information processing (Aron *et al*., 2012) is expected to lead to better memory and learning (David *et al*., 2022; de Villiers *et al*., 2018). On the other hand, it is associated with *emotional* factors, including high empathy but also risk of overarousal from sensory overstimulation (Acevedo *et al*., 2014). Emotional upsets can interfere with mental activities (Baumeister *et al*., 2015), suggesting that the reflectivity associated with environmental sensitivity may both aid self-assessment of CQ in terms of cognitive learning and hinder it in terms of affective outcomes.

*Cognitive Facet of Environmental Sensitivity.* The cognitive facet of environmental sensitivity may positively relate to self-assessed CQ development. This is because high-sensitives, more attuned to subtleties (Aron, 2020), may discern even nuanced cultural differences. Moreover, their deep cognitive processing (Acevedo *et al*., 2014; Aron, 2020) and reflective inclination (Aron *et al*., 2012) help them view cultural experiences from diverse angles, challenge personal assumptions and construct new cultural knowledge (Li *et al*., 2013). Therefore, these individuals may interpret intercultural interactions more accurately (Aron *et al*., 2010). Yet, this heightened information processing may undermine their self-assessment. High-reflective individuals are prone to recognize what they do not (yet) know regarding CQ (cf. Loades and Myles, 2016). Consequently, high-sensitives may report lower self-assessed CQ development than their less environmentally sensitive counterparts.

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Additionally, the detailed processing of information can make highly sensitive individuals perceive more challenges in intercultural collaboration, which they may struggle to solve spontaneously due to a cognitive backlog (cf. Takano and Tanno, 2009). Thus, this processing can ultimately result in lower self-assessed CQ development in terms of cognitive learning.

*Emotional Facet of Environmental Sensitivity.* Concerning the emotional facet of environmental sensitivity, research suggests that sensitivity is primarily characterized by emotional reactivity to environmental stimuli (Lionetti *et al*., 2018; Turjeman-Levi and Kluger, 2022), which may yield both positive and negative outcomes. Heightened empathy, as typical for high-sensitive individuals (Acevedo *et al*., 2014), i.e. the ability to understand the feelings, thoughts, and behaviors of people from different cultures, is positively associated with intercultural collaboration and CQ (Hofhuis *et al*., 2020). This is because deeper cognitive processing enhances awareness of subtle stimuli and increases emotional reactivity, which then motivates further in-depth processing (Baumeister *et al*., 2015; David *et al*., 2022). By contrast, heightened sensitivity also raises the likelihood of overstimulation, triggering stress and burnout (Andresen *et al*., 2018; Aron *et al*., 2012). Anxiety regulation might consume a significant portion of reflective capacities, especially for highly sensitive learners (Aron and Aron, 1997). This is because individuals may perceive the need to amend or even unlearn certain behaviors (Helyer, 2015; Lengelle *et al*., 2016) but lack the resources to learn new strategies for managing intercultural interaction (Figueroa and Hofhuis, 2024). Thus, anxious individuals, including those with high sensitivity (Evers *et al*., 2008), may not fully benefit from their reflectivity and could experience heightened stress, overwhelm, or even depression (Andresen *et al*., 2018; Jones *et al*., 2009). Such effects can diminish their resources for effective CQ learning. Consistent with this, Bobek *et al*. (2024) found a significant negative correlation between stress and self-assessed CQ, indicating that respondents with lower stress levels in intercultural environments reported higher CQ. Therefore, as self-assessments are generally considered primarily affective evaluations (Sitzmann *et al*., 2010) and highly sensitive individuals tend to show more emotional reactivity, their self-assessment of CQ development is likely to be low.

*Low level of environmental sensitivity and self-assessed CQ.* Conversely, there are two lines of argument as to why individuals with low environmental sensitivity may assess their CQ development comparably higher. The first relates to potentially lower levels of self-criticism. To shield their worldviews from reflective questioning (Brooks, 2004), individuals low in cognitive reflectivity often rationalize poor outcomes in intercultural interactions (cf. Davis *et al*., 2006). Research suggests that individuals with low reflectivity prefer positive over self-discrepant feedback (Hixon and Swann, 1993), which reinforces their existing capabilities and favorable descriptions of themselves. The same may be observed in individuals with low environmental sensitivity. Wachs (2013) demonstrated that non-sensitive individuals not only perceived their environment less accurately than their highly sensitive counterparts but also had estimations less consistent with observers' ratings. Thus, non-environmentally sensitive individuals may have higher estimates of their CQ development in terms of cognitive learning.

Another explanation is that emotional stability, typical of individuals with lower environmental sensitivity (Lionetti *et al*., 2018), may enhance CQ development, as suggested by empirical studies (e.g. Hofhuis *et al*., 2020). Research showed that emotional stability increased learners' intercultural effectiveness (Hofhuis *et al*., 2020) and culture-related cognition (Figueroa and Hofhuis, 2024). This suggests emotional stability helps individuals manage intercultural anxiety, uncertainty, and culture shock (Hofhuis *et al*., 2020; Moon *et al*., 2012) and master intercultural differences through this stress reduction (Figueroa and Hofhuis, 2024). Consequently, non-environmentally sensitive individuals may report higher self-assessed CQ development in terms of its affective component.

*H1.* Environmental sensitivity of learners in the intercultural learning program is negatively related to self-assessed CQ development.

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*Moderation of the environmental sensitivity–CQ self-assessment link*

Team size and previous international experience were selected as moderators based on reflectivity theory (Neufeldt *et al*., 1996), which posits that the relationship between reflectivity and self-assessment is shaped by both situational and individual factors. In this study, team size represents a situational factor that shapes the social and cognitive environment in which intercultural learning takes place, whereas previous international experience functions as an individual factor that reflects a learner's prior exposure to cultural diversity and signals their readiness for intercultural learning. These two moderators capture theoretically meaningful dimensions of the learning process, namely, the external structure of the learning environment and the internal characteristics of the learner, both of which are central to reflective learning in intercultural contexts.

Learning theory emphasizes that learning is fundamentally social, occurring through interaction with others (Leahy, 2021). As learners exchange and reorganize information, complex problems are often solved better by teams of collaborating learners than individual learners, a phenomenon known as the collaborative learning effect (Paas and Sweller, 2012). However, there is no consensus in theory or research on the optimal team size for maximizing individual performance and learning (Corrégé and Michinov, 2021; Wang *et al*., 2023). Moreover, learning theory holds that learners actively build new knowledge by linking it to their existing cognitive frameworks. Prior international experience provides schemas into which new cultural information can be integrated, while reflection on these experiences deepens and consolidates learning (Kolb, 2015; Neufeldt *et al*., 1996). In sum, team size influences how effectively social and cognitive resources can be harnessed without incurring excessive coordination costs, whereas previous international experience influences how efficiently learners can encode and integrate new knowledge. Together, these moderators capture the interaction between external learning conditions and internal learner attributes, shaping the self-assessed development of CQ through reflection.

*Prior international experience as a moderator of the environmental Sensitivity–CQ self-assessment link.* We postulate that although highly sensitive individuals may initially be more critical in the self-assessment of their CQ development, this perception will likely shift to a positive trajectory with increased intercultural exposure (see Figure 1). The initial decrement in self-assessed CQ development among high-sensitives is posited to stem from increased anxiety in unfamiliar contexts, as suggested by Wang *et al*. (2015). This apprehension may diminish with time spent abroad. Highly-sensitives' deeper processing, heightened attention to cultural differences, and increased empathy (Acevedo *et al*., 2014; Aron, 2020) may facilitate the assimilation of intercultural information. The habituation effect to novel stimulation from prior experiences may enhance highly sensitive individuals' ability to learn and assimilate cultural norms with less mental load (Aron, 2020; Tarantino *et al*., 2024). According to Aron *et al*. (2012) and Van Dyne *et al*. (2012), this increasing habituation is further supported by growing confidence in handling cultural differences, which diminishes overwhelm and withdrawal from social interactions.

Empirical evidence underscores the link between reflective tendencies and the depth of prior experiences. DeRue *et al*. (2012) highlight that the reflection effect is most pronounced when individuals possess a wealth of past encounters. Aligned with this perspective, we contend that over time, highly sensitive individuals, due to their heightened reflectivity, engage in more deliberate and systematic analysis of their intercultural experiences, leading to deeper insights and a coherent framework (Anseel and Ong, 2020). Empirical studies showing that prior international experience is associated with greater CQ (Crowne, 2013; Moon *et al*., 2012) and the arguments here above lead us to the following hypothesis:

*H2*. The negative relationship between learners' environmental sensitivity and self-assessed CQ development in the intercultural learning program is moderated by prior international experience – such that for learners with lower levels of prior international experience, this relationship is stronger than for learners with extensive prior international experience.

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*Team size as a moderator of the environmental Sensitivity–CQ self-assessment link.* Intercultural teams typically face two main challenges: navigating intercultural dynamics and managing the work task itself. Regarding intercultural dynamics, Earley and Peterson (2004) argue that such diversity adds complexity to identifying commonalities among team members, allocating roles effectively and appropriately, and establishing clear rules for interaction. An increase in team size amplifies the number of variables a team must manage. Stahl *et al*. (2010) found that as team size increases, culturally diverse teams communicate less effectively and report lower satisfaction. Yet, solid empirical evidence on the role of team size remains limited. Most CQ studies treat team size merely as a control variable – if at all (e.g. Hu *et al*., 2019; Ratasuk and Charoensukmongkol, 2020).

In contrast, in terms of managing the work task itself, intra-team learning – where teams create shared meaning from existing information, bridge gaps in the team's collective knowledge, and question, test, and explore assumptions – is key to effective collaboration (Wiese *et al*., 2022). Larger teams typically possess broader cognitive resources, which can provide an advantage in managing higher demands for information processing, exchanging ideas, discussing and evaluating diverse perspectives, and correcting potential errors (Bernerth *et al*., 2023; Leblanc *et al*., 2024; Wiese *et al*., 2022). They may also foster a stronger sense of social support, help, and assistance among members (Watzek *et al*., 2019). In line with this, studies found that quad teams functioned better than dyads in terms of learning performance and social discourse (Corrégé and Michinov, 2021; Peltokorpi and Niemi, 2019). Meta-analyses support the idea that team size enhances the relationship between intra-team learning behavior (Wiese *et al*., 2022) or team reflexivity (Leblanc *et al*., 2024) and team performance.

This cognitive and emotional support may help environmentally sensitive learners not only process task-related information more effectively – thus increasing task-related confidence – but also manage their emotions and uncertainties in intercultural collaboration. This support can facilitate a better understanding of cultural dynamics without overwhelming the learner, ultimately enhancing their self-assessment of CQ development. In sum, team size likely shapes learning and perspective-sharing in intercultural learning processes. Larger teams may alleviate the anxieties and challenges sensitive individuals face, ultimately enhancing their self-assessment of CQ development. Therefore, we hypothesize that:

*H3.* Team size moderates the relationship between environmental sensitivity and self-assessed CQ development in the intercultural learning program, such that the negative association between environmental sensitivity and CQ development is stronger in smaller teams and attenuated in larger teams.

## Methods

### *Sample and procedures*

Data were collected between 2012 and 2024 (excluding 2020–2021 due to the COVID pandemic) from learners in the intercultural learning program. Multiple cohorts were included to enhance the sample size. All participants were highly qualified (IOM, 2019), holding at least a bachelor's degree, and were junior employees aged 21–46 (M = 24.49). They represented 25 different countries, with 96% originating from Europe. Participants responded to two questionnaires. The first survey was administered to all 253 individuals who participated in the learning experience over the span of 11 years. Of these, 251 participants responded to the survey conducted one month before the program started; however, two responses were eliminated due to incomplete data. One month after the learning experience, 147 participants (58.8%) completed the second survey. The main analyses applied to test the hypotheses were based on responses from 125 participants (50%) who completed both surveys and provided responses to all variables. Some robustness checks used a larger number of observations, as noted below.

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*Intercultural learning program*

The full-time learning program underlying this study is orchestrated by a network of seven European universities. To promote the most intensive learning experience possible, between 13 and 32 learners each year – including managers, psychologists, lawyers, and engineers with academic degrees – participate in the management program as a cohesive group, after undergoing a formal selection process. The program is designed to equip participants with an international mindset for careers in management. Participants receive a certificate that includes their grades, which may be recognized for credit at the partner universities.

This 15-week initiative invites participants from various, primarily European backgrounds to engage in three weeks of classroom sessions and an immersive twelve-week international consulting project. The core of this project involves an intercultural team of two to four individuals working on-site at an organization in Europe, outside their home countries. The teams fully immerse themselves in the host countries and organizations, sharing housing and office space within their company. During the projects, teams regularly interact with employees of their organization and the supervisor from the local partner university. The primary working language for the projects and within the organizations is English, although the projects may require participants to speak the local language for tasks such as interviews with employees.

The classroom sessions are divided into three residential periods at the beginning, middle, and end of the program, held across three European countries, where the cohort and professors come together. These sessions, conducted in English, aim to spark reflection through activities like studying international management literature, engaging in intercultural simulations, working on case studies, giving project presentations, writing an integration paper and essay on cross-cultural learning, and discussing learning experiences.

Acknowledging that self-assessments tend to reflect affective outcomes more than cognitive learning, the intercultural training program has adopted evidence-based strategies to strengthen the relationship between self-assessment and cognitive learning, as identified by Sitzmann *et al.* (2010). These strategies include providing external feedback, facilitating personal interaction, emphasizing interpersonal skills alongside cognitive skills, and measuring CQ levels rather than gains. The program adopts a holistic approach that blends field-based (team projects) and classroom-based (residentials) experiential and cognitive learning (Chenyang, 2022), which is instrumental in fostering CQ development (Ng *et al*., 2009).

*Measures*

*Self-assessed CQ development* was measured using the 20-item CQ scale (Ang *et al*., 2007). The act of self-assessing was given a learning-oriented purpose, in that students received individualized written and confidential feedback and underwent CQ training, to reflect on their development opportunities. Responses ranged from 1 (strongly disagree) to 7 (strongly agree). A sample item reads, "I am conscious of the cultural knowledge I apply to cross-cultural interactions". Within each cohort, CQ was collected longitudinally, both before and after the learning experience. Each CQ item was calculated by subtracting the pre-learning experience response from the post-learning experience response. Researchers have conducted confirmatory factor analyses (CFAs) using this scale, yielding four-factor, one-factor, and second-order solutions (Ang *et al*., 2007; Ramsey and Lorenz, 2016; Rockstuhl *et al*., 2011). Moreover, a bi-factor structure has been recommended (Rockstuhl and Van Dyne, 2018). Therefore, we tested these four models. The one-factor model fitted the data poorly, while the bi-factor model fitted the data well. However, the bi-factor models' structure was inconsistent, with numerous insignificant factor loadings, like Lakshman *et al*. (2021). The goodness of fit indices of the four-factor and the second-order models were adequate and quite similar ($\chi^2 = 230.66$, RMSEA = 0.05, CFI = 0.91, TLI = 0.89, and $\chi^2 = 231.09$, RMSEA = 0.05, CFI = 0.91, TLI = 0.90, respectively). In the second-order solution, the 20 items loaded onto

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the four CQ facets (metacognitive, cognitive, motivational, and behavioral), which then loaded onto overall CQ. Given the substantial second-order factor loadings, the non-significant $\chi^2$ difference between the four-factor and second-order models, and the theoretical support for an overall CQ factor, we selected the second-order solution (Brown, 2015; Byrne, 2005). Hence, in the analyses, we used overall CQ, the average of the 20 items. McDonald's Omega reliability of overall CQ development is 0.84.

*Environmental sensitivity* was measured using survey responses to the Highly Sensitive Person Scale, e.g. "Are you annoyed when people try to get you to do many things at once?" and "Do you seem to be aware of subtleties in your environment?" (Aron and Aron, 1997). Responses were anchored from 1 (strongly disagree) to 7 (strongly agree). As investigations have found different factor solutions to this 27-item scale, we first conducted an exploratory factor analysis (EFA) using responses from the respondents in Wave 1. Considering the interpretability of the factors, the Kaiser's rule, the scree plot, and the parallel test (Brown, 2015), we obtained a three-factor solution like that identified by Smolewska *et al*. (2006). We then removed three items because their factor loadings were below 0.30. Subsequently, following Lionetti *et al*. (2018), we conducted three CFAs to validate the scale's factor structure. We found that the bifactor model (Bellia *et al*., 2024; Dunne *et al*., 2024; Lionetti *et al*., 2018) provided a statistically significantly better fit than the three-factor model. Thus, environmental sensitivity is the average of the 24 items (Cronbach alpha = 0.84).

*Prior international experience* was measured using survey responses. When these were lacking, we extracted the information from the CVs students provided to be admitted in the program under study. We measured the duration of the stay/s abroad (study abroad and/or work/internships abroad) in months.

Team size refers to the number of participants involved in each intercultural consulting project. It ranges from two to four members. This range is consistent with the definition of a team as the minimum number of people necessary to accomplish a task (Sundstrom *et al*., 1990) and reflects the design of the intercultural learning program, which requires teams of two to four to complete the projects. It is also consistent with learning research, which frequently focuses on dyads to quads, noting that a group size of two is sufficient to achieve the benefits of peer learning (Bacon, 2005; Corrégé and Michinov, 2021; Wang *et al*., 2023). While variability in team size is limited, such constraints are common in applied team research (Orlitzky and Benjamin, 2003), and even small differences in team size can meaningfully affect social-cognitive dynamics, collaboration, and reflective learning (Corrégé and Michinov, 2021; Wang *et al*., 2023).

*Controls*: The *year* in which the respondents participate in the learning experience controls for the potential lack of independence among cohorts. Participants came from 25 different countries. However, some nationalities included very few respondents. Thus, we categorized *nationality* into four levels: the three most common nationalities (Dutch, German, and French) and a fourth category for all other nationalities. We included *cultural tightness-looseness* (Uz, 2015) of participant's country of citizenship, as it can relate to their CQ development. We also introduce the variable *current international experience*, defined as the total number of weeks participants spend abroad during the intercultural learning program under study. The program comprises three teaching periods hosted by different European universities and one team-based consulting project at a company. Multiple projects are carried out across participating companies. For all participants, the project and two teaching periods take place abroad, while the remaining teaching period may occur either abroad or in the participant's country of origin. Current international experience was calculated by summing the weeks each participant spent abroad for their consulting project and teaching periods, excluding any period in their country of origin. Finally, we added *neuroticism* because, among other personality traits, it is most strongly related to environmental sensitivity (Aron and Aron, 1997; Smolewska *et al*., 2006). We assess it by averaging the responses to the 12 neuroticism items of the NEO Five-Factor Inventory (Costa and McCrae, 1989). A CFA using the first wave responses confirmed that these items loaded onto one factor with adequate goodness of fit ($\chi^2 = 80.30$, RMSEA = 0.05, CFI = 0.96, TLI = 0.95).

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*Common method variance*

This study focused on the participants' perception of several internal states (CQ, environmental sensitivity), which are most accurately measured by self-reports, as it is difficult for others to infer participants' perceptions about such states (Chan, 2009). However, as all variables were self-reported, common method variance (CMV) could be present (Podsakoff *et al*., 2003). Therefore, we took several actions to test and mitigate its influence. First, independent variables were measured at Wave 1, and the dependent variable was measured at Wave 2. The 20-week gap between the surveys helped minimize participants' tendency to maintain consistency in their responses (Podsakoff *et al*., 2003). Second, we applied the marker variable correlation technique (Lindell and Whitney, 2001) to detect potential CMV in the data, as it is one of the most efficacious techniques for such detection (Bozionelos and Simmering, 2022). We used respondents' age as a marker variable to examine if the significance of the correlation relevant to our hypotheses (i.e. between environmental sensitivity and CQ development) changed when partialling out age. It did not. These tests suggest that CMV is unlikely to bias our results.

## Results

Table 1 shows the descriptive statistics. In this data, neuroticism and environmental sensitivity are highly correlated ($r = 0.64$, $p < 0.001$, $n = 216$). Hypothesis 1 posited that environmental sensitivity is negatively associated with self-assessed CQ development. To test it, we regressed CQ development on environmental sensitivity, the moderators (prior international experience and team size), and controls (years, nationality, cultural tightness-looseness, current international experience, and neuroticism). Results show (Table 2) that environmental sensitivity was negatively related to self-assessed CQ development ($b = -0.34$; $p < 0.01$; $n = 125$). The standardized regression coefficient is −0.40, indicative of a moderate effect. Thus, Hypothesis 1 is supported.

Hypothesis 2 predicts that prior international experience moderates the environmental sensitivity–CQ development association. To test it, we regressed CQ development on the interaction term environmental sensitivity*prior international experience, its lower order terms, team size, and the control variables. As shown in Table 3, the interaction term is non-significant. Thus, Hypothesis 2 is not supported.

As per Hypothesis 3, team size moderates the environmental sensitivity-CQ development relationship. We regressed CQ development on the interaction between environmental sensitivity and team size, including the lower-order terms, prior international experience, and control variables. Table 3 shows the interaction term is statistically significant. Thus, Hypothesis 3 is supported. To facilitate interpretation, we plotted the relationship between environmental sensitivity and CQ development at team sizes of 2, 3 and 4 members (see Figure 2). For teams of 3 and 4 members, environmental sensitivity does not lead to significant differences in self-assessed CQ development (simple slopes $b = 0.14$, n.s. and $b = 0.43$, n.s., respectively). In contrast, for two-member teams, higher environmental sensitivity significantly reduces the self-assessment of CQ development (simple slope $b = -0.40$, $p < 0.001$). Thus, Hypothesis 3 is supported. Figure 3 summarizes the findings.

*Additional checks and missingness*

We checked the multicollinearity in all regressions used to test the hypotheses by calculating the VIFs, which were all smaller than 2.5. Thus, multicollinearity is not a concern.

Survey data had very few missing values, only in the multi-item scales (CQ development, neuroticism, and environmental sensitivity), where less than 5% of values were missing. Following recommendations (Newman, 2014), we calculated those variables using only the items with observed information and excluded those with missing values. We also tested the hypotheses using listwise deletion, which rendered similar results, except for the interaction

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**Table 1.** Means, standard deviations and correlations of the study variables

| | Mean | Std. Dev. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Overall CQ development | 0.09 | 0.70 | | | | | | | | | |
| 2. Dutch | 0.23 | – | 0.07 | | | | | | | | |
| 3. German | 0.21 | – | 0.10 | −0.28* | | | | | | | |
| 4. French | 0.12 | – | 0.10 | −0.20* | −0.19* | | | | | | |
| 5. Cultural tightness and looseness | 84.88 | 22.31 | −0.04 | −0.15* | −0.05 | 0.24* | | | | | |
| 6. Current international experience | 13.94 | 0.73 | 0.02 | −0.16* | −0.11 | 0.07 | 0.14* | | | | |
| 7. Neuroticism | 2.49 | 0.64 | −0.08 | −0.06 | −0.01 | 0.19* | −0.03 | 0.06 | | | |
| 8. Prior international experience | 6.52 | 5.74 | −0.07 | −0.20* | 0.07 | 0.25* | −0.04 | 0.12 | 0.10 | | |
| 9. Team size | 2.33 | 0.56 | −0.02 | −0.15* | 0.02 | −0.06 | −0.01 | −0.01 | −0.05 | 0.13* | |
| 10. Environmental sensitivity | 4.20 | 0.74 | −0.10 | −0.18* | 0.18* | 0.22* | −0.08 | 0.09 | 0.64* | 0.14* | 0.00 |

**Note(s):** Dutch = 1, other nationalities = 0; German = 1, other nationalities = 0; French = 1, other nationalities = 0; *$p < 0.05$

**Source(s):** Authors' own work

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**Table 2.** Environmental sensitivity predicts CQ development

| | Hypothesis 1<br>Overall CQ development<br>Coefficient | (robust SE) |
|---|---|---|
| Year | yes | |
| Nationality | yes | |
| Cultural tightness and looseness | −0.00 | (0.00) |
| Current international experience | 0.11 | (0.08) |
| Neuroticism | 0.23 | (0.13) |
| Prior international experience | −0.02 | (0.01) |
| Team size | 0.06 | (0.13) |
| Environmental sensitivity | −0.34** | (0.10) |
| Constant | yes | |
| *n* | 125 | |
| *R*-squared | 0.21 | |

**Note(s):** Unstandardized coefficients shown; Robust standard errors are in parenthesis; Continuous variables are centered; Dummies for Years and Nationalities are included; Residuals approximate the normal distribution; *$p < 0.05$ **$p < 0.01$

**Source(s):** Authors' own work

**Table 3.** Prior international experience and team size moderate environmental sensitivity-CQ development

| | Hypothesis 2<br>Overall CQ development | | Hypothesis 3<br>Overall CQ development | | Full model<br>Overall CQ development | |
|---|---|---|---|---|---|---|
| | Coefficient | (Robust SE) | Coefficient | (Robust SE) | Coefficient | (Robust SE) |
| Year | yes | | yes | | yes | |
| Nationality | yes | | yes | | yes | |
| Cultural tightness and looseness | −0.00 | (0.00) | −0.00 | (0.00) | −0.00 | (0.00) |
| Current international experience | 0.11 | (0.08) | 0.11 | (0.07) | 0.11 | (0.07) |
| Neuroticism | 0.23 | (0.13) | 0.20 | (0.13) | 0.20 | (0.13) |
| Team size | 0.06 | (0.13) | −0.00 | (0.13) | 0.00 | (0.13) |
| Prior international experience | −0.01 | (0.01) | −0.02 | (0.01) | −0.02 | (0.01) |
| Environmental sensitivity | −0.34** | (0.10) | −0.27* | (0.11) | −0.26* | (0.12) |
| Environmental sensitivity * Prior international experience | −0.01 | (0.01) | | | −0.01 | (0.01) |
| Environmental sensitivity *Team size | | | 0.42* | (0.20) | 0.42* | (0.21) |
| Constant | yes | | yes | | yes | |
| *n* | 125 | | 125 | | 125 | |
| *R*-squared | 0.21 | | 0.25 | | 0.26 | |

**Note(s):** Unstandardized coefficients shown; Robust standard errors are in parenthesis; Continuous variables are centered; Dummies for Years and Nationalities are included; Residuals approximate the normal distribution; *$p < 0.05$ **$p < 0.01$

**Source(s):** Authors' own work

term in Hypothesis 3, which was only significant at the 10% level. Hence, missingness is not an issue. Furthermore, neuroticism was not measured in 2022, thus we could not use responses from this year's participants in the tabled results. However, emotionality – one of the six

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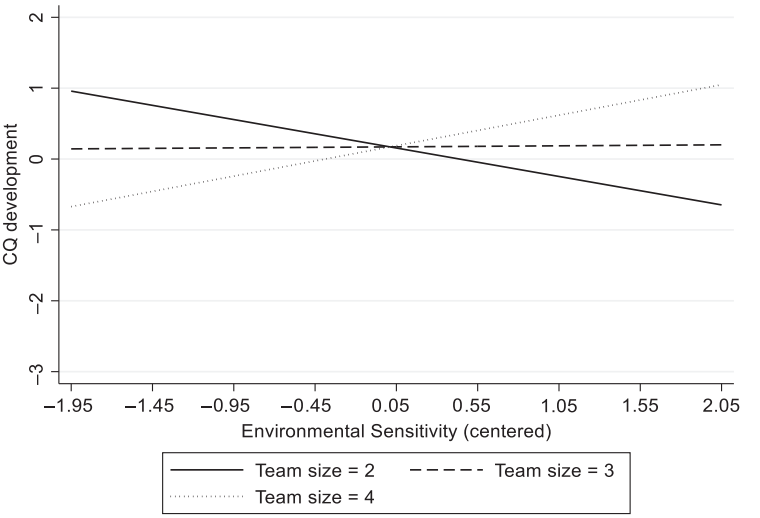


**Figure 2.** Team size moderates environmental sensitivity-CQ development. Source: Authors' work

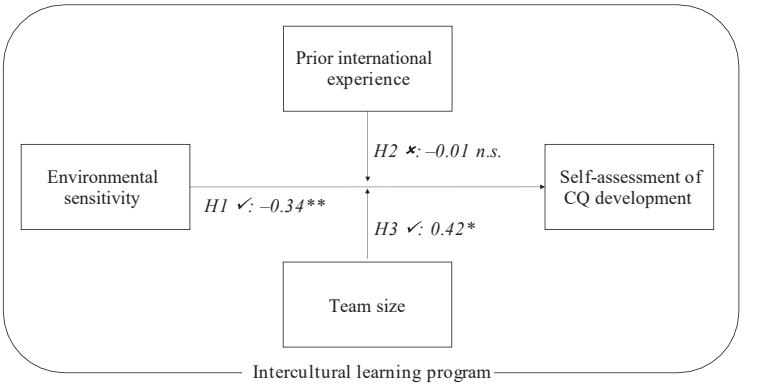


**Figure 3.** Statistical results – reflective process in CQ development. Source: Authors' work

dimensions of the HEXACO personality model (Ashton and Lee, 2007) – was measured in 2022. Given the high meta-analytic correlation between HEXACO's emotionality and the Big Five's neuroticism ($\hat{\rho} = 0.63$, $p < 0.05$; Thielmann *et al.*, 2022), we used the average of seven emotionality items to approximate 'neuroticism' in the 2022 sample. We excluded three items related to the sentimentality facet, as this facet is part of emotionality but not represented in the Big Five's neuroticism (Thielmann *et al.*, 2022). We tested all hypotheses using a sample of 142 observations, which included 2022 program participants, and obtained results consistent with those reported – except for the interaction term in Hypothesis 3, which was significant only at the 10% level.

Before testing our hypotheses, we conducted four paired-sample *t*-tests to examine whether the different facets of CQ changed significantly from before to after the learning program. Results indicate that only cognitive CQ showed a significant increase ($\Delta = 0.29$, $p < 0.001$). In contrast, changes in metacognitive ($\Delta = 0.04$, *n.s.*), motivational ($\Delta = -0.10$, *n.s.*), and behavioral CQ ($\Delta = 0.10$, *n.s.*) were not statistically significant.

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Moreover, to test for a potential threshold beyond which additional international experience no longer enhances CQ, we included a squared term in the regressions for Hypothesis 1. Its non-significance suggests no such threshold effect. Additionally, we estimated a comprehensive model that includes both interaction terms simultaneously: environmental sensitivity * prior international experience and environmental sensitivity * team size (see Table 3). This approach allows us to examine each interaction while controlling for the other, thereby reducing the risk of omitted variable bias (Allison, 1999, pp. 50–51), which can otherwise inflate effects when moderators are tested independently. It also better reflects the complexity of real-world dynamics, where individuals' CQ development is shaped by multiple factors concurrently. The results are consistent with those from models testing each moderator separately, indicating that the moderators do not share substantial variance and that suppressor effects are unlikely. These findings strengthen the robustness of our interpretation of the individual moderating effects. Finally, a one-way ANOVA confirmed that the average environmental sensitivity and CQ development were similar across years.

## Discussion

This study aimed to explore how learners' environmental sensitivity relates to their self-assessed CQ development, as well as how individual and situational factors – specifically prior international experience and team size – might influence this relationship. The results offer valuable insights by revealing significant variations in self-assessed CQ development within this cohort, contingent on individual differences in environmental sensitivity. Specifically, highly sensitive individuals characterized by high reflectivity reported significantly lower self-assessments of their CQ development. Furthermore, the results highlight the moderating role of team size, while indicating no buffering effect of prior international experience. In fact, prior international experiences, which have been subject to reflective processes in the past, were insignificant for overall CQ development. However, higher environmental sensitivity was associated with lower self-assessed CQ development only in dyad teams, but not in triad and quad teams. These results contribute significantly to unraveling how the individual differences influence the self-assessment of CQ development.

### *Implications for research on CQ development*

Addressing a research problem identified by Ott and Michailova (2018) regarding the unclear nature of the CQ development process in view of inconsistent findings, our study addresses major shortcomings of previous studies. In line with previous studies that consistently report significant gains in cognitive CQ, while other CQ facets are less likely to be developed (e.g. Gustomo *et al.*, 2018; Hodges *et al.*, 2011; Varela and Gatlin-Watts, 2014), we find that cognitive CQ significantly increased in the overall sample. Moreover, only a few studies evaluating the effect of learning programs on CQ development using pre-post measures have examined interindividual differences (see also Ott and Michailova, 2018, for a general overview). Our study focuses on *subjective* self-assessments, which are generally more useful as indicators of how learners feel about their learning experiences (e.g. their confidence levels) than as indicators of how much they learned. Additionally, it explores *individual differences* in the self-assessment of CQ development by expanding the limited repertoire of individual factors scrutinized in CQ research, which has focused on variables such as Big Five personality traits, self-efficacy, and social dominance orientation (Alexandra, 2018; Ott and Michailova, 2018; Toumi and Su, 2025), yielding inconsistent results (Ang *et al.*, 2015a; Ott and Michailova, 2018). To our knowledge, no empirical study has examined whether environmental sensitivity influences the self-assessment of CQ development, despite convictions that reflective processes, characteristic of highly sensitive individuals, are integral to learning CQ (e.g. Ng *et al.*, 2009; Peng *et al.*, 2015) and self-assessments in general (Yan and Brown, 2017). This study offers novel insights into environmental sensitivity,

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an as-yet unexplored antecedent of self-assessed CQ development, and explores relevant boundary conditions.

*Implications for theory on environmental sensitivity and CQ self-assessment*

Self-assessment of one's own development is an essential step in self-directed learning (Lubbe *et al*., 2021). Its benefit is active engagement in the learning process rather than congruence with reality. Through reflection on their skills and learning outcomes, learners enhance their ability to learn and assess their potential for success (cf. Andrade, 2019; van Loon, 2019). The significant differences in self-assessed CQ development among learners could be explained by the inclination of high-sensitive individuals toward more intense reflection and critical self-assessment compared to less sensitive individuals, as well as being overwhelmed with learning. Baumeister *et al*. (2015) have shown that emotional arousal can alter learners' judgments of their learning progress.

Two effects are conceivable here. On the one hand, the heightened self-awareness and critical reflection that characterize highly sensitive individuals may diminish their perceived self-efficacy in adapting to intercultural differences (cf. Earley and Ang, 2003). This lower perceived self-efficacy may result in lower self-assessed CQ development (Ang *et al*., 2015a; Leung *et al*., 2014). High-sensitives' acute awareness of their knowledge gaps may exacerbate their experiences of over-arousal and stress (Turjeman-Levi and Kluger, 2022), which are well documented factors that can negatively affect self-assessment (Kroll *et al*., 2021). Consequently, studies assessing the *average* effects of learning arrangements on self-assessed CQ development may overestimate effects for high-sensitive individuals (who tend to rate themselves lower) while underestimating effects for low-sensitives (who tend to self-assess their development higher) (Bakermans-Kranenburg and Van Ijzendoorn, 2015; de Villiers *et al*., 2018). However, the lower self-assessed CQ of sensitives should not be equated with reduced cognitive learning; rather, it underscores the necessity of considering their affectivity when interpreting self-assessment data.

Conversely, it is plausible that the heightened reflectivity of learners with high environmental sensitivity makes learning situations more manageable. Their deep reflection encourages the development and testing of personal cultural theories, which could result in a subjective perception of less progress in CQ among highly sensitive individuals. By contrast, individuals with lower environmental sensitivity may engage more easily in intercultural interactions without a complete grasp of potential misunderstandings (Aron *et al*., 2010) and therefore rate their ability comparatively higher (Noori, 2016).

In sum, the individual differences in environmental sensitivity emphasize the importance of trait-based intercultural competencies in the self-assessed development of CQ (Aron *et al*., 2010; Fischer, 2011). This suggests that the lower self-assessed CQ development in high-sensitives compared to low-sensitives may indicate a more frequent transition from unconscious incompetence to conscious incompetence – a positive indicator of intercultural competence growth (cf. Fischer, 2011; Panadero *et al*., 2016). We therefore challenge the assumption that self-assessments of intercultural competence provide valuable performance-related information about an individual (Leung *et al*., 2014). Rather, self-assessments offer crucial insights into an individual's reflective journey towards developing CQ and affective outcomes. Therefore, self-assessments in previous CQ studies are imprecise indicators of actual CQ (Ang *et al*., 2015b; Kim *et al*., 2016; Neufeldt *et al*., 1996).

In their literature review, Panadero *et al*. (2016, p. 814) summarize that learners with greater competence and experience in the ability being self-assessed tend to produce more accurate self-assessments. However, contrary to our prediction, we found no evidence that highly sensitive learners self-assess their CQ development more positively as their international experience increases. It appears that the highly sensitive individuals did not habituate significantly to the stimuli associated with international work, even with added experience. Multiple studies suggest that a key characteristic of high sensitivity is reduced adaptation and

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habituation, meaning that prolonged or repeated sensory stimulation does not lead to a significant decrease in neural or behavioral responses (Martindale *et al*., 1996; Ward, 2019). Furthermore, highly sensitive individuals have been shown to be less influenced by their cultural context and pay greater attention to all aspects of a stimulus (Aron *et al*., 2010). As a result, two outcomes are likely. First, these individuals may experience a higher cognitive load when processing intercultural experiences that have not been automatized. Second, they may take longer to develop complex cognitive schemata for intercultural tasks, which also contributes to increased cognitive load. Both conditions suggest that the monitoring aspect of self-assessment could be more challenging for highly sensitive individuals (cf. Panadero *et al*., 2016). Nevertheless, the expansion of intercultural experience appears to be a valuable strategy for promoting cognitive learning and emotional habituation, though it may take longer. It can be posited that enhanced awareness of learning progress and emotional security may lead to elevated self-assessments (Baumeister *et al*., 2015). To monitor this developmental process, it is beneficial to conduct self-assessments and provide constructive feedback to learners, thus enabling them to develop their learning skills through self-assessment (Andrade, 2019; Panadero *et al*., 2016).

There is no consensus in the literature on the optimal team size for collaborative learning (Corrégé and Michinov, 2021), and our results contribute to this debate by showing that the impact of environmental sensitivity on self-assessed CQ development depends on whether learners work in dyad, triad, or quad teams. Specifically, for teams of three or four members, environmental sensitivity had not significant effect, whereas in dyads, higher environmental sensitivity was associated with lower self-assessed CQ development.

From a cognitive load perspective, larger teams can distribute the substantial cognitive demands of the consulting project across more members (Leahy, 2021; Leblanc *et al*., 2024), freeing individual cognitive capacity for reflective learning and intercultural engagement. As team size increases, so does intercultural diversity, creating more chances for intercultural interactions involving different perspectives and opinions. This exposure provides a wider range of insights, feedback, and learning opportunities (Minbaeva *et al*., 2021; Wang *et al*., 2023), which supports CQ development. These benefits appear to counterbalance potential disadvantages of larger teams, such as increased coordination demands (Bernerth *et al*., 2023) and greater risk of interpersonal conflict (Yu and Wei, 2025), resulting in the neutral effect observed in triads and quads.

By contrast, dyads, while allowing more direct and frequent interaction, place proportionally greater cognitive, communicative, and emotional demands on each member (Leblanc *et al*., 2024; Wang *et al*., 2023; Zhan *et al*., 2022). For highly sensitive individuals, this concentrated workload, higher interdependency, and reduced diversity of perspectives may heighten vulnerability to stressors and limit the cognitive resources available for intercultural reflection. In such cases, the disadvantages appear to outweigh the benefits, explaining why higher environmental sensitivity is linked to lower self-assessed CQ development in dyads.

### *Managerial relevance*

The results of the study provide information for the selection and management of employees as well as for the design of intercultural training. When selecting new employees or candidates for expatriation, HR managers acknowledge that job/expatriation candidates with disparate levels of environmental sensitivity may exhibit systematic discrepancies in their self-assessment. It is also important to assess candidates' actual CQ, as can be done in an intercultural assessment center. Since self-assessment relates to affective outcomes, such as self-efficacy in managing intercultural collaboration challenges (Ang *et al*., 2015a), providing workers with CQ performance feedback is valuable.

In intercultural training, employing reflection instruments is recommended to enhance learners' self-assessment (Harvey *et al*., 2016). Rather than using universal reflection instruments (e.g. Cseh *et al*., 2013), our research suggests that customizing reflection instruments based on

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individual differences in environmental sensitivity is essential to effectively promote CQ development. In terms of *cognitive reflectivity* (Nesbit, 2012), providing personalized feedback on cultural competence can enhance self-awareness and reduce uncertainty about how well or poor their intercultural competence is. To support highly sensitive learners who may feel overwhelmed by their environment, providing supportive feedback, coordinating the amount of information provided in feedback, and balancing challenging intercultural situations with positive environmental factors can help to reduce the cognitive load. Helping them to attribute learning setbacks to controllable factors rather than innate ability can help maintain motivation in the face of difficulty (Cleary and Zimmerman, 2004). Unlike environmentally sensitive learners, those with lower sensitivity tend to process information less intensely and often focus on what they already know rather than what they do not (cf. Dunning *et al*., 2018). Techniques like elaborative interrogations (asking "why" questions and self-explaining during intercultural interactions) and premortem exercises (imagining reasons for potential failure) can promote self-reflection (van Loon, 2019).

In terms of *emotional reflectivity* (Nesbit, 2012), coaching and emotional support are crucial for individuals high in environmental sensitivity. These resources help address feelings of unease during reflective processes, reduce uncertainty, which is often perceived as unpleasant, and refocus learners' attention on managing intercultural challenges, thereby increasing motivation and promoting the implementation of more effective action strategies (Colomer *et al*., 2013). Additionally, mindfulness practices can help highly sensitive individuals harness the positive aspects of their emotional reflectivity, leading to less anxiety and stress as well as more personal growth (Soons *et al*., 2010). Since mindfulness can be trained by techniques such as meditation or yoga (Good *et al*., 2016), educators may enhance program design by integrating mindfulness elements into the intercultural learning curriculum. This includes creating a learning culture that promotes and normalizes mindful personality traits, what Maymin and Langer (2021) describe as a culture of active, present-centered awareness and what Glomb *et al*. (2011, p. 146) term a "culture that promotes mindfulness." Such a culture emphasizes openness, non-judgmental awareness, and intentional reflection in interpersonal interactions. Educators can foster this environment by offering mindfulness training, creating silent spaces where contemplative techniques can be applied appropriately, modeling mindful communication, and embedding reflective pauses into team activities. In doing so, they establish a value-based framework that supports both self-regulation and openness necessary for intercultural learning. Conversely, trainers could encourage learners low in environmental sensitivity to focus more on the emotional aspects of their intercultural experiences, fostering deeper self-reflection (Zimmerman, 2008).

This study suggests that intercultural training programs may benefit from incorporating international exposure combined with reflective experiences, as well as targeted support tailored to learners' levels of environmental sensitivity, as core components of their design. Additionally, environmental sensitivity training is proposed as a complementary element to foster awareness of individual differences in reflectivity, which influence learners' engagement and self-assessment of growth. Such awareness has the potential to enhance the inclusivity and overall effectiveness of intercultural training programs and collaborative teamwork.

Our findings indicate that dyadic team structures may present particular challenges for individuals high in environmental sensitivity, who reported lower self-assessed CQ development in such settings. For practice, this suggests that intercultural learning initiatives and team assignments should carefully consider group size. Larger configurations, such as triads or quads, may provide more supportive social-cognitive environments that buffer sensitive individuals from negative self-assessments. When dyads are unavoidable, for example, due to logistical or organizational constraints, managers and trainers can mitigate potential drawbacks by offering additional support through structured reflection, peer feedback, or coaching. More broadly, the results highlight the importance of tailoring intercultural learning strategies to account for individual differences rather than assuming uniform effects across all team constellations.

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*Limitations and directions for future research*

Despite the data reflecting a timeline that spans several years, the consistent trends observed across multiple cohorts underscore the robustness of the findings, while the foundational principles of intercultural learning and CQ remain relevant, allowing for the insights to be applicable to current and future iterations of intercultural programs. Our study is exploratory in nature and encompasses the entire program cohorts that participated in the same intercultural learning program. Future research could not only validate and expand upon our findings by examining other intercultural learning programs, but also enhance the robustness and generalizability of the results by investigating the effects of varying durations and frequencies of international experiences across diverse classroom- and field-based settings, including internships, study abroad programs, and other intercultural learning initiatives. Deriving meaning from experiences is inherently relational. If the experience is too short or too infrequent, there may not be enough opportunities to fully engage with others. Therefore, studies should ascertain the optimal combination, duration and frequency of these experiences for effective learning outcomes, considering learners' environmental sensitivity (cf. Kolb, 2015).

The lack of significant moderation of the observed negative relationship between environmental sensitivity and changes in self-assessed CQ may indeed partly be explained by the potential influence of the European background of the learners and the implementation of the intercultural learning program in Europe. Given that Europeans are likely to be more familiar with the cultural norms, political system, history, climate etc. within Europe than with those of non-European countries (cf. Muthukrishna *et al*., 2020), it is possible that there is comparatively less overwhelm among highly sensitive individuals, making the proposed moderating effect of prior international experience less relevant in this context than in more unfamiliar environments. Future research should also explore other factors that might affect learning outcomes for individuals with different levels of environmental sensitivity. These could include cultural distance, destination familiarity, geographic distance, and intercultural team diversity, which add to the complexity of the international experience (Varela and Gatlin-Watts, 2014).

Given that 72% of participants in the study worked in two-member teams for the consulting project, and only 28% were in teams of three or four members, the significant results of the environmental sensitivity * team size interaction should be interpreted as exploratory. Future research could aim for a more balanced distribution across different team sizes to enable more robust conclusions.

Self-assessments do not always correlate with cognitive learning, indicating a disconnect between validity evidence and interpretations of self-assessments in CQ research. This challenges previous views on the effectiveness of CQ learning programs and their key elements. If the goal is to determine if a teaching method increases CQ, informant- or performance-based measures of CQ should be included in courses. Conversely, if the focus is on how learners self-direct their CQ learning, self-assessments are useful. Future research should investigate the influence of self-assessments on CQ learning processes and sensitivity differences. Since CQ enhances intercultural communication, future research should explore its relationship with tangible workplace outcomes, such as better cultural understanding, success in intercultural collaborations, and behavioral adaptation (cf. Ang *et al*., 2015a). Although highly sensitive individuals often rate their CQ development as lower, this may reflect a deeper level of reflection on their existing knowledge, potentially leading to better intercultural adaptation. Exploring these broader implications can provide researchers with a deeper understanding of how self-assessed CQ affects objective success in intercultural situations (Gudykunst, 2005).

## Conclusion

Our study illuminates the role of environmental sensitivity in the self-assessment of CQ development within an intercultural learning program that combines classroom- and

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field-based elements. The insights are based on data from all participants in multiple cohorts of the program in focus over 11 years, comprising highly qualified junior employees from 25 countries, the majority from Europe. Our research reveals systematic individual variations in the self-assessment of CQ development, thereby expanding on existing CQ literature. We uncovered a significant inverse association between intercultural learning and its self-assessment in individuals with high sensitivity. Highly sensitive individuals reported significantly lower self-assessments of their CQ development. This negative relationship was evident only in dyads, whereas it was buffered in triad and quad teams; by contrast, higher levels of prior international experience did not mitigate it. Considering these findings, we offer implications for both CQ research and the design of intercultural learning arrangements.

**Data availability statement**

The data and study materials are not publicly available due to confidentiality issues and ethical reasons as their containing information could compromise the privacy of research participants.

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