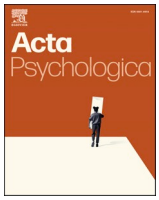
Acta Psychologica 255 (2025) 104854

Contents lists available at ScienceDirect

Acta Psychologica

journal homepage: www.elsevier.com/locate/actpsy



Cultural and emotional intelligence correlates with healthy lifestyles

Keisuke Kokubun [a,*], Kiyotaka Nemoto [b], Yoshinori Yamakawa [a,c,d,e,f]

[a] Graduate School of Management, Kyoto University, Kyoto, Japan
[b] Department of Psychiatry, Institute of Medicine, University of Tsukuba, Tsukuba, Japan
[c] Institute of Innovative Research, Tokyo Institute of Technology, Meguro, Tokyo, Japan
[d] ImPACT Program of Council for Science, Technology and Innovation (Cabinet Office, Government of Japan), Chiyoda, Tokyo, Japan
[e] Office for Academic and Industrial Innovation, Kobe University, Kobe, Japan
[f] Brain Impact, Kyoto, Japan

ARTICLE INFO

Keywords:
Cultural intelligence
Emotional intelligence
Healthy lifestyle
Self-regulated learning

ABSTRACT

A healthy lifestyle is essential to prevent illness and live a happy life. Previous research has shown that social intelligence, such as emotional intelligence (EQ) and cultural intelligence (CQ), is related to a healthy lifestyle. However, there are fewer studies that clarify the relationship between CQ and lifestyle compared to EQ and lifestyle, and the relationship between the facets that make up these intelligences and lifestyle is also unclear. Therefore, in this study, we aimed to clarify the relationship between the eight facets of these intelligences and the seven lifestyles by multiple regression analysis and relative importance analysis. As a result, consistent with the Self-Regulated Learning (SRL) strategy theory, which is based on motivation and metacognition, it was shown that the two intelligences, Use of emotion EQ and Metacognitive CQ, were most broadly correlated with the five lifestyles, and Self-emotional appraisal EQ was also correlated with the two lifestyles. These results suggest that in today's globalized society, in addition to the intelligence required to understand and utilize one's own emotions, there is a need for intelligence to understand different cultures and to verify and correct the accuracy of knowledge about them.

1. Introduction

A healthy lifestyle reduces the risk of developing diseases such as type 2 diabetes, cardiovascular disease, respiratory disease, and cancer (Nyberg et al., 2020), increases life expectancy (Li et al., 2020), and improves psychological well-being (Hanawi et al., 2020) and life satisfaction (Liu et al., 2024). Therefore, for many people, living a healthy lifestyle is one of the most important goals in life (Kashdan et al., 2024). However, just as the globalization of food has led to market domination by fast food and foreign cuisine, or the decline or change of traditional cuisine (Wijaya, 2023), or the recent COVID-19 pandemic has accelerated the digitalization of life (Cockerham, 2023), lifestyles are not static but change depending on the state of society at any given time.

Therefore, continuous learning and self-regulation are necessary for people living in today's globalized society to properly understand and adopt a healthy lifestyle. According to the self-regulated learning (SRL) strategy theory, self-regulated learners can perceive, control, and manage their learning environment (Zimmerman, 1990). For example, individuals who seek a certain level of health self-regulate their health using self-care strategies, setting reasonable health goals, and monitoring feedback on the effectiveness of the strategies to achieve the goals (Clark & Zimmerman, 2014). The SRL process involves the learner's cognitive, metacognitive, motivational, and behavioral engagement (Zimmerman, 1990). Among them, metacognition, which refers to reflecting on one's cognitive content and processes, and motivation, which refers to controlling one's emotions to achieve the goal, play a central role in the successful SRL process (Zimmerman & Moylan, 2009).

These elements are also included in the constructs of social intelligence such as emotional intelligence (EQ) and cultural intelligence (CQ), which allow us to understand our own and others' thoughts and cultures. Fortunately, recent studies have shown that these intelligences can be improved through interventions such as education (Ho et al., 2023; Rivera-Pérez et al., 2021). However, because CQ has mainly been analyzed in relation to the effectiveness of people living abroad (Chen et al., 2023; Earley & Peterson, 2004; Fang et al., 2018; Ott & Michailova, 2018), the number of studies on the relationship between CQ and lifestyle is limited compared to the relationship between EQ and lifestyle. Moreover, little is known about the relationship between the facets

* Corresponding author.
E-mail address: kokubun.keisuke.6x@kyoto-u.jp (K. Kokubun).

https://doi.org/10.1016/j.actpsy.2025.104854
Received 14 August 2024; Received in revised form 30 January 2025; Accepted 20 February 2025
Available online 25 March 2025

that make up both intelligences and lifestyle.

Considering that it is difficult for us living in a globalized society to avoid foreign products and services, it is possible that CQ, in addition to EQ, is involved in the adoption of a healthy lifestyle. Furthermore, in light of SRL strategy theory, it is possible that facets related to metacognition and motivation in these intelligences play a central role in predicting lifestyles. Therefore, this study clarifies how a total of eight facets of CQ and EQ are related to seven lifestyles.

2. Literature review

2.1. EQ and lifestyle

Emotional Intelligence (EQ) refers to the ability to guide thoughts and actions by observing and distinguishing people's emotions. One of the most well-known scales of EQ is the scale developed by Wong and Law (2002). This EQ consists of four components: Self-emotion appraisal EQ refers to the ability to understand and express one's own emotions; Others' emotion appraisal EQ refers to the ability to perceive and understand the emotions of people around oneself; Regulation of emotion EQ refers to the ability to monitor, evaluate, adjust, and change one's own emotions; and the Use of emotions EQ refers to the ability to direct emotions in a positive and productive direction (Wong & Law, 2002).

EQ is responsible for emotional abilities, especially the perception, understanding, expression, use, and regulation of emotions in people's social interactions (Wong & Law, 2002). Therefore, previous studies have revealed not only the relationship between EQ and job performance and life satisfaction (Law et al., 2008; Shamsuddin & Rahman, 2014; Wong & Law, 2002), but also the relationship between EQ and lifestyle as shown below. First, EQ has been revealed to be an important psychological ability that supports and influences learning (Al-Qadri & Zhao, 2021; Li & Dewaele, 2020). EQ increases self-efficacy by increasing positive and decreasing negative emotional experiences, helping individuals persevere and overcome adversity, accumulating psychological resources, and increasing self-confidence while avoiding emotional exhaustion (Bonilla-Yucailla et al., 2022; Gharetepeh et al., 2015; Hen & Goroshit, 2014; Salavera et al., 2017; Tang & He, 2023; Wen et al., 2020). In addition, as is often argued in the context of SRL strategy theory (Zimmerman, 1990), which will be discussed later, EQ helps individuals overcome difficulties and negative emotions by enabling them to better recognize, control, and regulate their emotions (Brackett et al., 2011; Iqbal et al., 2022), and influences positive emotions, interest in learning, motivation (Rodríguez-González et al., 2021; Tang & He, 2023; Yenice et al., 2018), and academic performance (Chang & Tsai, 2022; Wang, 2017). EQ has also been associated with overcoming interpersonal challenges (Nasir & Masrur, 2010), obtaining social support (Di Fabio & Kenny, 2015; Kong et al., 2012; Lopes et al., 2004), promoting social interactions (Lopes et al., 2004; Metaj-Macula, 2017), and maintaining positive relationships with family and friends (Brackett et al., 2004; Hsieh et al., 2014; Kumar et al., 2016; Lopes et al., 2004; Shetty et al., 2013).

Moreover, people with high EQ are motivated to improve their overall health and adjust their behavior to achieve success (Goleman, 1998). Therefore, high EQ develops a high level of awareness and evaluation of health (Wong & Law, 2002) and promotes health behaviors (Espinosa & Kadić-Maglajlić, 2018; Tsaousis & Nikolaou, 2005). At the same time, high EQ individuals tend to have a higher capacity for emotion regulation (Goleman, 1998; Peña-Sarrionandia et al., 2015) and a higher awareness of effective and healthy strategies to manage stressors in daily life (Peña-Sarrionandia et al., 2015). Meta-analyses have also shown that EQ is a predictor of physical and mental health (Martins et al., 2010; Schutte et al., 2007). Thus, studies have shown that people with higher EQ are more likely to participate in health-promoting behaviors, such as engaging in physical activity and eating a healthy diet (Acebes-Sánchez et al., 2019; Faye et al., 2011; Fernández-Abascal & Martín-Díaz, 2015; González-Valero et al., 2019; Kumar et al., 2016; Li et al., 2009; Mikolajczak et al., 2015; Shetty et al., 2013). For example, EQ is directly associated with higher levels of physical activity and adherence to a Mediterranean diet (González-Valero et al., 2019). Other studies have also found a relationship between EQ and sleep (Killgore et al., 2008; Kumar et al., 2016). On the contrary, individuals with low EQ are more likely to be unable to manage negative emotions (Messina et al., 2021; Wittgens et al., 2022), overeat (Kass et al., 2019), and become dependent on alcohol, tobacco, and illegal drugs (Claros & Sharma, 2012; Davis et al., 2022; Kun & Demetrovics, 2010; Licata et al., 2023).

Thus, there is a growing body of research on the relationship between EQ and lifestyle. However, there seems to be little research that takes advantage of the characteristics of EQ as a multidimensional scale. In other words, research to date has not clarified which facets of EQ are specifically related to which lifestyles.

2.2. CQ and lifestyle

CQ is defined as an individual's ability to function and manage effectively in a culturally diverse environment and consists of four dimensions: Metacognitive CQ, Cognitive CQ, Motivational CQ, and Behavioral CQ (Ang et al., 2007). Metacognitive CQ refers to the ability to adjust one's thoughts in a cross-cultural environment. Therefore, individuals with high Metacognitive CQ can flexibly and highly apply cultural knowledge in diverse cultural interactions. Cognitive CQ reflects knowledge of norms, practices, and conventions used in various cultural environments. Individuals with high Cognitive CQ interact better with people from different cultures and understand similarities and differences between cultures. Motivational CQ is the ability to exert effort and energy to adapt to different cultures. High Motivational CQ leads to focused and sustained efforts to adapt and adjust to different cultural environments. Finally, Behavioral CQ refers to exhibiting appropriate behaviors in diverse cultures. High Behavioral CQ includes culturally appropriate language, tone, gestures, facial expressions, body language, and other verbal and non-verbal behaviors (Ang et al., 2007). Previous studies have shown that CQ correlates with intercultural adaptation and performance in people living abroad (Chew et al., 2021; Jyoti & Kour, 2017; Nunes et al., 2017; Setti et al., 2022).

Compared to EQ, research on the relationship between CQ and lifestyle is limited and largely unexplored. To the best of our knowledge, the only study that has addressed the relationship between CQ and lifestyle is Kokubun, Nemoto, and Yamakawa (2023). Kokubun, Nemoto, and Yamakawa (2023) showed that a healthy lifestyle may enhance CQ, consistent with the results of neuroscience research that healthy exercise and diet improve brain health (Kokubun et al., 2024; Kokubun & Yamakawa, 2019) and the arguments of CQ developers who claim that brain function is involved in CQ (Ang et al., 2015; Rockstuhl et al., 2010). However, limiting lifestyle to exercise and diet is a somewhat oversimplification of reality, as they themselves admit. Also, what they showed was a correlation, and the actual causal relationship may be reversed, that is, CQ may predict lifestyle. For example, individuals with high CQ may be more likely to achieve a healthy lifestyle because they are more likely to be interested in cultural differences in health-related products and services, or to more easily verify and correct the accuracy of their knowledge about health-related products and services from overseas.

In today's context, where there is almost no research directly addressing the relationship between CQ and lifestyle, previous discussions on the relationship between CQ and foreign brand acceptance are helpful in predicting the relationship between the two. Previous studies have asserted a relationship between CQ and global identity (Randrianasolo et al., 2020) and have shown that CQ is a predictor of acceptance of foreign brands (Frias-Jamilena et al., 2018; Pratono & Arli, 2020; Zdravković & Peković, 2021). Of these, Zdravković and Peković (2021) showed that Metacognitive CQ and Behavioral CQ are correlated with foreign brand acceptance. In relation to this, previous

research has shown that high cultural sensitivity has the effect of reducing consumers' ethnocentrism and fixation on domestic products (Ramadania et al., 2023). Relatedly, it has been suggested that foreign experiences may influence the reserved personality and metacognitive abilities of individuals who operate internationally as sojourners (Li, 2024). These findings suggest that high CQ may reduce irrational customer ethnocentrism and promote the adoption of foreign brands. In today's globalized society, world trade and investment have led to an increase in chronic diseases for many people, directly through the increase in harmful products, especially tobacco, fattening foods, and alcohol, and indirectly through increased economic and employment insecurity due to changes in the labor market (Labonté et al., 2011). Thus, the adoption of foreign brands does not always lead to a healthier lifestyle, and it is true that there is a risk that adopting foreign brands may worsen health. However, at the same time, world trade and investment have brought health benefits to many people through economic growth, which is often accompanied by the spread of healthy products and services (Labonté et al., 2011). Thus, just as dependence on foreign brands is dangerous, fixation on domestic brands may also narrow the scope of consumption and hinder the awareness and adoption of healthy products and services. In this situation, CQ, the ability to interact with diverse cultures, may increase literacy in foreign products and services, and promote a careful and constructive attitude that does not simply blindly introduce them, but instead takes an interest in them, learns about them correctly, analyzes them, chooses healthy ones, and avoids unhealthy ones. As with EQ, there are few studies that take advantage of the characteristics of CQ as a multidimensional scale, and it is unclear which facets are specifically related to which lifestyles.

Therefore, this study will clarify how the eight facets of CQ and EQ correlate with seven lifestyles.

2.3. EQ, CQ, lifestyle and SRL strategy theory

As can be easily noticed from the structure of CQ presented in the previous section, the concepts of SRL strategy theory and CQ are surprisingly similar. However, while there have been studies showing that SRL is related to EQ (Albani et al., 2023; Sun-Hee, 2022), there has been little discussion about the relationship between SRL and CQ. This is probably because the developers of CQ did not refer to Zimmerman's SRL strategy theory in their series of works. Also, although this is merely speculation, there is an implicit understanding among researchers that CQ is an intelligence limited to cross-cultural environments, which may have led to stagnation in the discussion of integrating or considering CQ and SRL strategy theory as one. However, in today's world where globalization is progressing and people, goods, and services from overseas are overflowing even in Japan, the scope of validity of a dichotomous view of domestic versus overseas is thought to be narrower than before. For example, a recent study showed that adopting SRL strategies increases foreign language learners' proactive approach to tasks (Zare et al., 2024). However, the similar effect has also been confirmed in previous studies using CQ (Canbay, 2020; Karadağ, 2022).

The effects of SRL have been confirmed in a variety of health-related fields in recent years. For example, previous research has shown that SRL competencies are associated with effective sport practice and higher skill level achievement (Bartulovic et al., 2017), suggesting that self-regulated athletes are able to maximize their athletic potential (McCardle et al., 2018). Similarly, another previous study showed that an online intervention to improve self-regulation skills was effective in promoting healthy eating among parents and children (Pereira, 2023). Metacognition, which refers to thinking about the content and process of one's own cognition (Winne & Azevedo, 2022), and motivation to control one's own emotions to achieve goals (Pintrich, 1999; Siekanska et al., 2023) are said to play a central role in SRL (Zimmerman & Moylan, 2009). Therefore, if the EQ and CQ facets are related to a healthy lifestyle and the strength of the relationship varies across facets, the causes may be easier to interpret considering the SRL discussion. However, because a significant relationship between personality and lifestyle was observed in previous research (Ferdosi et al., 2020), in this study analyzing the relationship between the EQ and CQ facets and lifestyle, we control for the influence of personality.

3. Overview of the current study

In this study, we positioned EQ and CQ as social intelligences for utilizing the self-regulation function of SRL strategy theory, and aimed to clarify the relationship between these intelligences and lifestyles. To this end, we analyzed quantitative data collected from a large-scale questionnaire survey of adults living throughout Japan. Specifically, to answer the following questions, we conducted descriptive analysis, correlation analysis, multiple regression analysis, and relative importance analysis to investigate the relationship between a total of eight aspects of EQ and CQ and seven lifestyles:

RQ1: What kind of intelligence is needed to choose a healthy lifestyle?
RQ2: Does the intelligence needed differ depending on the type of lifestyle?

The above discussion also leads to the following hypotheses:

H1. Both EQ and CQ facets are positively correlated with a healthy lifestyle.

H2. In particular, the positive correlation between facets related to metacognition and motivation (specifically, Metacognitive CQ and Use of emotion EQ) and a healthy lifestyle is greater than that of other facets.

4. Method

4.1. Participants

From December 25 to December 27, 2023, an online survey was distributed and collected through an internet research company to people living throughout Japan. The subjects were monitor members of the research company, aged between 30 and 80 years old. Participants were limited to those aged 30 and over to exclude students who may have relied on their parents for lifestyle decisions. Other than age, no other inclusion/exclusion criteria were set. A stratified sampling method was used to ensure equal distribution by sex and age group, divided into 10-year age groups. The response time was approximately 15 min. As a result of a preliminary sample size calculation using SurveyMonkey's sample size calculator (https://jp.surveymonkey.com/mp/sample-size-calculator/), the necessary sample size was determined to be 4161 people, with a confidence level (%) of 99 and a margin of error (%) of 2, for Japan's total population of 124,946,789 as of October 1, 2022 (Statistics Bureau, Ministry of Internal Affairs and Communications, 2023).

Respondents were paid a fee by the research company, and the goal was to collect 5000 responses. 5155 people, 2618 women and 2537 men aged between 30 and 79 participated the survey. Respondents were required to answer all questions, but were allowed to choose “Don't know” or no answer for income-related questions. In this study, 879 people who did not provide information on personal income were excluded, leaving 4276 people, 2061 women and 2215 men aged between 30 and 79, as valid respondents. *t*-Tests were conducted to examine the differences in sex, age, education, and overseas experience between participants included in the sample and those excluded from the sample, and no significant differences were found ($p < 0.05$). Effective participants came from all 47 prefectures, with the top three prefectures in terms of number of participants being Tokyo with 586, Kanagawa with 360, and Osaka with 350. These figures are roughly equivalent to the actual population percentages; for example, Tokyo's share of Japan's total population in 2023 was 11.3 % (Ministry of

Internal Affairs and Communications, 2023), whereas the sample figure was 13.7 %. For personal annual income (Japanese Yen), the most common answer was "Less than 2 million" at 43.2 %, followed by "2 million to less than 4 million." The average annual income of Japanese people is 4.58 million yen (National Tax Agency, 2024), and the median is 3.96 million yen (Ministry of Health, Labor and Welfare, 2024), so the sample is biased toward lower annual incomes than the Japanese average, even though it excludes younger people under the age of 30. This is thought to be related to the fact that the survey was conducted on monitor members of the research company. Other attributes are shown in Table 1. This study was approved by the Ethics Committee of Tokyo Institute of Technology (Approval Number 2023137) and was conducted following the institutes' guidelines and regulations. All participants provided written informed consent before participation, and their anonymity was maintained.

4.2. Procedure

In the multiple regression model of this study, eight facets of EQ and CQ are used as independent variables, and seven facets of lifestyle are used as dependent variables. In addition, overseas experience, sex, age, educational background, personal annual income, and five facets of the Big Five personality are used as control variables.

4.2.1. Emotional intelligence

The EQ scale was adapted from Wong and Law (2002). A total of 16 EQ items comprised four facets: Self-emotional appraisal EQ (four items, e.g., "I have a good sense of why I have certain feelings most of the time", $\alpha = 0.891$, $\omega = 0.892$); Others' emotional appraisal EQ (four items, e.g., "I am sensitive to the feelings and emotions of others", $\alpha = 0.843$, $\omega = 0.844$); Use of emotion EQ (four items, e.g., "I would always encourage myself to try my best", $\alpha = 0.834$, $\omega = 0.838$); and Regulation of emotion EQ (four items, e.g., "I am quite capable of controlling my own emotions", $\alpha = 0.889$, $\omega = 0.891$). All items were rated on a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree), and the items were averaged to calculate the value of each variable.

4.2.2. Cultural intelligence

The CQ scale was adapted from Ang et al. (2007). A total of 20 CQ items comprise four facets: Metacognitive CQ (four items, e.g., "I check the accuracy of my cultural knowledge as I interact with people from different cultures", $\alpha = 0.882$, $\omega = 0.883$); Cognitive CQ (six items, e.g., "I know the rules for expressing non-verbal behavior in other cultures", $\alpha = 0.921$, $\omega = 0.922$); Motivational CQ (five items, e.g., "I enjoy interacting with people from different cultures", $\alpha = 0.915$, $\omega = 0.915$); and Behavioral CQ (five items, e.g., "I change my verbal behavior when a cross-cultural interaction requires it", $\alpha = 0.906$, $\omega = 0.906$). All items were rated on a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree), and the items were averaged to calculate a value for each variable.

4.2.3. Lifestyle

As a variable representing lifestyle, we used the BHQ Actions scale, which consists of seven subsets: "Healthcare", "Social life", "Learning", "Exercise", "Environment", "Rest", and "Diet" (Kokubun, Toyama, et al., 2023). For details on each item, please refer to Appendix A.

Of these, "Healthcare" is a scale developed with reference to Walker et al. (1987). After the introductory sentence, "To what extent are you interested in your own health? Please tell us whether the following applies to the actions you are taking," we presented four questions: "1. I am interested in health," "2. I collect information about health," "3. I regularly check my health status," and "4. I am taking steps to improve my health," and asked participants to choose from two options for each: "1. Applies" or "2. Does not apply." After that, we assigned a score of 1 if the number of "1. Applies" was 0, 2 if 1, 3 if 2, 4 if 3, and 5 if 4.

"Social life" is a scale developed by modifying Saito et al. (2018).

Table 1
Respondent attributes.

	N	%
Sex	(4276)	
Male	2215	51.8
Female	2061	48.2
Area	(4276)	
Hokkaido	227	5.3
Tohoku	232	5.4
Kanto	1588	37.1
Chubu	689	16.1
Kinki	835	19.5
Chugoku	224	5.2
Shikoku	105	2.5
Kyushu	376	8.8
Marriage	(4276)	
Unmarried	1384	32.4
Married	2892	67.6
Child	(4276)	
No children	1469	34.4
With children	2807	65.6
Household annual income (Japanese Yen)	(4276)	
Less than 2 million	434	10.1
2 million to less than 4 million	1074	25.1
4 million to <6 million	998	23.3
6 million to <8 million	677	15.8
8 million to <10 million	390	9.1
10 million to <12 million	206	4.8
12 million to <15 million	110	2.6
15 million to <20 million	57	1.3
20 million or more	37	0.9
Don't know	280	6.5
No answer	13	0.3
Personal annual income (Japanese Yen)	(4276)	
Less than 2 million	1847	43.2
2 million to less than 4 million	1154	27.0
4 million to <6 million	696	16.3
6 million to <8 million	308	7.2
8 million to <10 million	163	3.8
10 million to <12 million	53	1.2
12 million to <15 million	26	0.6
15 million to <20 million	11	0.3
20 million or more	18	0.4
Occupation	(4276)	
Civil servant	143	3.3
Manager/executive	69	1.6
Company employee (administrative)	532	12.4
Company employee (technical)	463	10.8
Company employee (other)	544	12.7
Self-employed	223	5.2
Freelance	92	2.2
Full-time housewife/househusband	796	18.6
Part-time/casual work	629	14.7
Student	6	0.1
Other	119	2.8
Unemployed	660	15.4
Sex and age	(4276)	
Male 30–39 years old	388	9.1
Male 40–49 years old	495	11.6
Male 50–59 years old	469	11.0
Male 60–69 years old	434	10.1
Male 70–79 years old	429	10.0
Female 30–39 years old	321	7.5
Female 40–49 years old	425	9.9
Female 50–59 years old	410	9.6
Female 60–69 years old	410	9.6
Female 70–79 years old	495	11.6
Education	(4276)	
12 years or less	1397	32.7
14 years or less	818	19.1
16 years or less	1685	39.4
17 years or more	376	8.8
Overseas work experience	(4276)	
Without experience	3981	93.1
With experience (over 1 year)	295	6.9
Overseas educational experience	(4276)	
With experience	4012	93.8

(continued on next page)

Table 1 (*continued*)

	N	%
With experience (over 1 year)	264	6.2
Other overseas experience	(4276)	
With experience	4036	94.4
With experience (over 1 year)	240	5.6

After the introductory statement "How many social relationships do you have? Please tell us whether any of the following apply to you," five questions were presented: "1. Living with spouse," "2. Living with family members other than spouse," "3. Interacting with friends," "4. Participating in local group activities," and "5. Working." For each question, participants were asked to choose from two options: "1. Applies" or "2. Does not apply." After that, participants were assigned a score of 1 if they answered "1. Applies" to 0 or 1 question, 2 if they answered "2," 3 if they answered "3," 4 if they answered "4," and 5 if they answered "5."

"Learning" is a scale developed by modifying Wilson et al. (2021). The question "How often have you engaged in hobbies or learning in the past year (how much time do you spend on hobbies or learning on weekdays)?" was presented, and participants were asked to choose from five options: "1: less than once a year," "2: several times a year," "3: several times a month," "4: several times a week," and "5: daily/almost daily." They were then assigned a score from 1 to 5.

"Exercise" is a scale developed with reference to Colcombe and Kramer (2003) and Tseng et al. (2011). The question "How many times a week do you exercise for 30 minutes or more?" was presented, and participants were asked to choose from five options: "1: Never," "2: Once a week," "3: Twice a week," "4: Three times a week," and "5: Every day/almost every day." They were then assigned a score from 1 to 5.

"Environment" is a scale developed based on Yu et al. (2017) and Berman et al. (2008). The question "How much time do you have per week to go outside and experience nature?" was presented, and participants were asked to choose from five options: "1: Not at all," "2: Less than 1 hour per week," "3: 1-2 hours per week," "4: 2-3 hours per week," and "5: 3 hours or more per week." They were then assigned a score from 1 to 5.

"Rest" is a scale developed based on The International Classification of Sleep Disorders – Third Edition (ICSD-3. American Academy of Sleep Medicine, 2014). The question "Please tell us whether this applies to your sleep during the last week" was presented, and participants were asked to choose from five options: "1. I fall asleep easily," "2. I sleep soundly until morning," "3. I don't take naps or they are short (less than 30 minutes)," "4. I sleep at the same time," and "5. I sleep 7 to 8 hours a night." They were then assigned a score of 1 to 5.

"Diet" is a scale that uses the same items as the neurodegenerative delay (MIND) diet score developed by Morris et al. (2015) but with a modified answer format. The question "Please select the number of items consumed in meals last week" was presented, and participants were asked to choose between "1. Applies" and "2. Does not apply" for each of 14 items, including "I ate green leafy vegetables 6 or more times a week." After that, participants were assigned a score of 1 if 3 or fewer items applied, a score of 2 if 4–6 items applied, a score of 3 if 7–8 items applied, a score of 4 if 9–12 items applied, and a score of 5 if 13 or more items applied.

4.2.4. Control variables

The personality scale was adapted from Gosling et al.'s (2003) 10-item measure of the Big-Five dimensions. A total of 10 items were paired together to form five facets: Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to Experience. All items were rated on a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree), and the value of each variable was calculated as the average of the items.

For overseas experience, we used the items from Kokubun, Nemoto, and Yamakawa (2023). We used the total number of responses to each of the questions, "For how many months have you lived in foreign countries for work?", "For how many months have you lived in foreign countries for study", and "For how many months have you lived in foreign countries for things other than work and study", as overseas experience for the analysis. In addition to personality variables and the overseas experience, sex (male = 1; female = 0), age (years old, for which respondents entered the exact number), educational background (years, for which respondents entered the exact number), and personal annual income (Japanese Yen, for which respondents chose from the nine categories shown in Table 1) were used as control variables.

The Japanese translations of EQ, CQ, and personality were taken from Toyota and Yamamoto (2011), Nakao (2019), and Oshio et al. (2012), respectively.

5. Data analysis

In this study, we conducted multiple regression analysis to predict seven lifestyles using a total of eight facets, EQ and CQ. In this study, we performed relative importance analysis (LeBreton et al., 2007) to measure relative weights by dividing the variance explained by the dependent variable by each predictor variable, complementing the regression analysis (Tonidandel & LeBreton, 2011). For the relative importance analysis, we used RWA Web (Tonidandel & LeBreton, 2015). Considering the sample size, the statistical significance standard was set at 1 %, which is more conservative than that of typical questionnaire survey analyses. All the other statistical analyses have been performed using IBM SPSS Statistics/AMOS Version 26 (IBM Corp., Armonk, NY, USA).

6. Results

Before proceeding with the main analysis, we used Harman's single factor analysis to check whether the variance in the data could be mainly attributed to a single factor, and used confirmatory factor analysis (CFA) to test whether the factors were related to the measurement. First, Harman's factor analysis showed that only 29.1 % of the variance could be explained by a single factor, which was <50 %. Thus, it was established that the data were not affected by common method variance (Podsakoff et al., 2003). Next, we conducted a CFA for CQ and EQ to evaluate the fit of the model. Here, we followed Kline (2023) who advocates the use of CFI (comparative fit index), RMSEA (root mean square error of approximation), and SRMR (standardized root mean square residual). The acceptable range of index values is as follows: CFI $\geq$ 0.90; RMSEA <0.06; SRMR <0.08 (Hu & Bentler, 1999). The multidimensional structure of the model meets the acceptable requirements for CQ (X^2 = 1419.522, df = 151, CFI = 0.980, RMSEA = 0.044 SRMR = 0.029) and EQ (X^2 = 1066.576, df = 92, CFI = 0.976, RMSEA = 0.050, SRMR = 0.038). In addition, the psychological scales EQ and CQ were tested using composite reliability (CR). First, the results for CQ were as follows. Metacognitive CQ = 0.834; Cognitive CQ = 0.882; Motivational CQ = 0.828; Behavioral CQ = 0.821. Meanwhile, the results for EQ were as follows: Self-emotion appraisal EQ = 0.837; Others' emotion appraisal EQ = 0.769; Regulation of emotion EQ = 0.779; Use of emotions EQ = 0.831. All subsets exceeded the CR standard value of 0.70 (Nunnally & Bernstein, 1994), confirming high convergent validity.

Table 2 presents descriptive statistics. An asterisk indicates that the absolute value of the correlation coefficient is >0.1, the watershed of the effect size "small" proposed by Cohen (1988), and is significant at the 1 % level. The correlation coefficients below the diagonal are normal correlation coefficients, and those above the diagonal are partial correlation coefficients. Below, we consider the partial correlation coefficients marked with an asterisk. Healthcare was correlated with all eight facets of EQ and CQ. In contrast, Social life and Exercise were not correlated with any of the facets of EQ or CQ. Learning was correlated with the following variables: Self-emotional appraisal EQ (r = 0.144), Use of emotion EQ (r = 0.137), Metacognitive CQ (r = 0.153), Cognitive CQ (r = 0.101), and Behavioral CQ (r = 0.127). Environment was

Table 2
Descriptive statistics.

		Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	DB1: Age	55.130	13.651																									
2	DB2: Sex	0.518	0.500	-0.047																								
3	DB3: Education	14.400	2.754	-0.069	0.171*																							
4	DB4: Overseas experience	4.393	26.218	0.040	0.048	0.097																						
5	DB5: Income	2.110	1.365	-0.143*	0.504*	0.239*	0.094																					
6	PN1: Extraversion	3.688	1.200	0.069	-0.052	-0.016	0.056	0.087																				
7	PN2: Agreeableness	4.696	1.002	0.204*	-0.154*	-0.005	-0.012	-0.064	-0.035																			
8	PN3: Conscientiousness	4.072	1.082	0.206*	-0.056	0.024	0.044	0.042	0.199*	0.275*																		
9	PN4: Neuroticism	4.074	1.069	-0.207*	-0.074	-0.052	-0.059	-0.127*	-0.232*	-0.296*	-0.351*																	
10	PN5: Openness to Experience	3.749	1.057	0.041	0.112*	0.017	0.051	0.128*	0.346*	0.043	0.245*	-0.232*																
11	EQ1: Self-emotional appraisal EQ	4.602	1.045	0.134*	-0.150*	0.018	0.034	-0.033	0.147*	0.345*	0.248*	-0.269*	0.144*															
12	EQ2: Others' emotional appraisal EQ	4.267	1.047	0.051	-0.152*	-0.003	0.056	-0.014	0.171*	0.350*	0.264*	-0.165*	0.197*	0.580*														
13	EQ3: Use of emotion EQ	3.851	1.093	0.055	0.016	0.063	0.067	0.132*	0.335*	0.171*	0.392*	-0.316*	0.402*	0.402*	0.475*													
14	EQ4: Regulation of emotion EQ	3.886	1.126	0.144*	0.006	0.059	0.066	0.096	0.224*	0.397*	0.358*	-0.568*	0.279*	0.453*	0.431*	0.544*												
15	CQ1: Metacognitive CQ	3.964	1.127	0.131*	-0.018	0.106*	0.091	0.060	0.086	0.174*	0.148*	-0.148*	0.163*	0.324*	0.333*	0.315*	0.266*											
16	CQ2: Cognitive CQ	3.118	1.226	-0.107*	0.116*	0.174*	0.187*	0.211*	0.182*	-0.047	0.133*	-0.158*	0.293*	0.131*	0.221*	0.319*	0.259*	0.426*										
17	CQ3: Motivational CQ	3.425	1.276	-0.026	0.040	0.135*	0.168*	0.171*	0.361*	0.090	0.156*	-0.258*	0.362*	0.210*	0.293*	0.396*	0.367*	0.447*	0.627*									
18	CQ4: Behavioral CQ	3.732	1.178	-0.086	-0.028	0.116*	0.113*	0.107*	0.170*	0.116*	0.108*	-0.131*	0.214*	0.295*	0.357*	0.329*	0.297*	0.533*	0.526*	0.679*								
19	LS1: Healthcare	3.610	1.379	0.259*	-0.085	0.054	0.031	0.027	0.135*	0.197*	0.206*	-0.127*	0.128*	0.238*	0.241*	0.280*	0.219*	0.248*	0.169*	0.184*	0.167*							
20	LS2: Social life	2.610	1.093	-0.117*	0.042	0.094	0.045	0.240*	0.196*	0.073	0.040	-0.098	0.081	0.068	0.118*	0.175*	0.120*	0.114*	0.110*	0.199*	0.152*	0.137*						
21	LS3: Learning	2.930	1.346	0.096	-0.008	0.086	0.011	-0.005	0.046	0.114*	0.095	-0.115*	0.117*	0.197*	0.131*	0.192*	0.147*	0.199*	0.127*	0.120*	0.157*	0.254*	0.027					
22	LS4: Exercise	2.370	1.511	0.196*	0.040	0.041	0.053	0.023	0.108*	0.104*	0.140*	-0.128*	0.117*	0.119*	0.110*	0.177*	0.145*	0.139*	0.093	0.118*	0.077	0.352*	0.035	0.301*				
23	LS5: Environment	2.630	1.458	0.277*	0.023	0.037	0.056	0.004	0.109*	0.142*	0.140*	-0.150*	0.106*	0.165*	0.134*	0.186*	0.166*	0.184*	0.117*	0.150*	0.13*	0.328*	0.110*	0.264*	0.491*			
24	LS6: Rest	2.970	1.338	0.126*	-0.031	0.035	0.026	0.037	0.101*	0.140*	0.145*	-0.219*	0.060	0.141*	0.106*	0.188*	0.208*	0.071	0.059	0.110*	0.068	0.169*	0.126*	0.101*	0.130*	0.179*		
25	LS7: Diet	2.770	1.059	0.234*	-0.151*	0.049	0.053	-0.036	0.087	0.180*	0.161*	-0.152*	0.064	0.221*	0.185*	0.182*	0.184*	0.213*	0.083	0.129*	0.141*	0.363*	0.145*	0.192*	0.222*	0.268*	0.237*	

Note: n = 4276. Below the diagonal are normal correlation coefficients, above are partial correlation coefficients.
Age = years old. Education = years. Overseas experience = months. Sex = male 1 and female 0. Income = the nine levels of personal annual income shown in Table 1 (Japanese Yen). CQ = cultural intelligence; DB = demographic background; EQ = emotional intelligence; LS = lifestyle; PN = personality; SD = standard deviation.
* p < 0.01 and correlation coefficient > 0.1.

correlated with the following variables: Use of emotion EQ (r = 0.115), Metacognitive CQ (r = 0.120), Cognitive CQ (r = 0.110), Motivational CQ (r = 0.102), and Rest was correlated with Use of emotion EQ (r = 0.109). Diet was correlated with the following variables: Self-emotional appraisal EQ (r = 0.121), Others' emotional appraisal EQ (r = 0.100), Use of emotion EQ (r = 0.112), Metacognitive CQ (r = 0.148), and Behavioral CQ (r = 0.115).

Table 3 shows the results of the multiple regression analysis. The coefficients of determination (R^2) ranged from 0.081 to 0.187, with an average of 0.120, which is close to the "medium" value of 0.130 according to Cohen's (1988) criteria. β is the standard partial regression coefficient, and Raw relative weight (RRW) refers to the additive decomposition of R-squared. Rescaled weight (RW) is the ratio obtained by dividing RRW by R-squared (Tonidandel & LeBreton, 2015). An asterisk indicates significance at the 1 % level and "a" shows the top two variables with the largest rescaled weights of the total of eight facets of EQ and CQ. Metacognitive CQ was significantly correlated with healthcare (β = 0.086; RW = 9.81), learning (β = 0.091; RW = 16.58), exercise (β = 0.051; RW = 7.03), environment (β = 0.058; RW = 7.67), and diet (β = 0.095; RW = 11.25), with RW being one of the top two variables. Similarly, Use of emotion EQ was significantly correlated with healthcare (β = 0.148; RW = 13.25), social life (β = 0.085; RW = 7.02), exercise (β = 0.093; RW = 12.01), environment (β = 0.090; RW = 7.35), and rest (β = 0.115; RW = 15.58), with RW being the top two variables. Motivational CQ was significantly correlated with social life (β = 0.094; RW = 8.29), and Self-emotional appraisal EQ was significantly correlated with learning (β = 0.116; RW = 17.32) and diet (β = 0.070; RW = 9.24), with RW being the top two variables. The above was significant at the 1 % level for both β and RW. The correlation between Regulation of emotion EQ and rest (β = 0.116; RW = 17.32) was not significant for β but was significant for RW, with RW being the top two variables. These results show that both EQ and CQ facets are positively correlated with a healthy lifestyle, and in particular, the positive correlation between facets related to metacognition and motivation, specifically Metacognitive CQ and Use of emotion EQ, and a healthy lifestyle is greater than the other facets, so they support both H1 and H2.

7. Discussion

In this study, we clarified the relationship between the total of eight facets that make up CQ and EQ and seven lifestyles. Expanding on the recent research model by Kokubun, Nemoto, and Yamakawa (2023), which showed that two lifestyles, exercise and diet, are related to CQ, this study analyzed the relationship between seven more diverse lifestyles and CQ and EQ. As a result, the two facets related to metacognition and motivation, which are the main axes of SRL theory, namely Metacognitive CQ and Use of emotion EQ, were most extensively correlated with the lifestyle scales. This result is also consistent with expectancy-value theory, which considers, for example, that the reason why students do not have effective study habits is either because they lack metacognitive strategies, do not know about learning or feel unable to reflect on their learning, or because they lack motivation and are unwilling to study (Wigfield & Eccles, 2000; Zhou & Wang, 2022).

Metacognitive CQ is responsible for planning, regulating, and monitoring mental models to achieve optimal performance in intercultural environments (Magnusson et al., 2013). Individuals with high levels of metacognitive CQ "monitor and think about their own assumptions, beliefs and emotions, as well as the way they process environmental and behavioral cues provided by others" (Ng et al., 2009, p. 516). The relationship between CQ, especially Metacognitive CQ, and lifestyle can be interpreted by applying SRL strategy theory. Metacognition, which refers to thinking about one's own cognitive content and processes, plays a central role in SRL (Winne & Azevedo, 2022). Therefore, metacognition plays a key role in most cognitive tasks, from everyday actions to problem solving and performance (Winne & Azevedo, 2022). When learning, individuals use metacognition to monitor

Table 3
Results of multiple regression analysis and relative importance analysis.

Variable	LS1: Healthcare			LS2: Social life			LS3: Learning			LS4: Exercise			LS5: Environment			LS6: Rest			LS7: Diet		
	β	RRW	RW	β	RRW	RW	β	RRW	RW	β	RRW	RW	β	RRW	RW	β	RRW	RW	β	RRW	RW
Demographic																					
Age	0.225*	0.049	26.05*	−0.119*	0.014	10.24*	0.065*	0.006	6.44*	0.167*	0.030	36.28*	0.250*	0.062	47.84*	0.083*	0.009	11.28*	0.190*	0.039	27.64*
Sex	−0.090*	0.006	3.26*	−0.057*	0.003	2.39*	0.010	0.000	0.25	0.055*	0.002	2.48	0.051*	0.001	1.07	−0.048*	0.001	1.60	−0.148*	0.018	12.49
Education	0.040*	0.002	1.07	0.034	0.004	2.88*	0.073*	0.006	6.36*	0.028	0.001	1.21	0.023	0.001	0.61	0.023	0.001	0.88	0.056*	0.003	1.87
Overseas experience	−0.021	0.000	0.08	0.011	0.001	0.43	−0.020	0.000	0.20	0.020	0.001	1.31	0.014	0.001	0.78	0.000	0.000	0.16	0.022	0.001	0.82
Income	0.064*	0.002	1.08	0.224*	0.042	31.49*	−0.044	0.001	1.02	−0.016	0.000	0.47	−0.022	0.001	0.53	0.036	0.001	1.37	0.032	0.002	1.16
Personality																					
PN1: Extraversion	0.038	0.005	2.57*	0.151*	0.024	17.76*	−0.020	0.001	0.53	0.042	0.004	4.74	0.036	0.003	2.65*	0.017	0.003	3.34*	0.009	0.002	1.04
PN2: Agreeableness	0.086*	0.013	7.10*	0.086*	0.005	3.42*	0.047*	0.004	4.70*	0.042	0.003	4.24	0.062*	0.007	5.34*	0.048*	0.006	7.74*	0.048*	0.009	6.42*
PN3: Conscientiousness	0.040	0.011	5.69*	−0.043	0.001	0.60	−0.016	0.001	1.44	0.031	0.005	6.32*	0.005	0.004	2.89*	0.016	0.005	6.08*	0.024	0.006	4.12*
PN4: Neuroticism	0.061*	0.002	0.91	−0.022	0.002	1.81*	−0.032	0.003	3.41*	−0.006	0.003	3.55	−0.013	0.004	3.28*	−0.119*	0.020	24.55*	−0.037	0.006	3.90*
PN5: Openness to Experience	−0.004	0.003	1.45*	−0.042	0.001	0.90	0.054*	0.005	5.48*	0.023	0.003	4.18	−0.001	0.002	1.42	−0.047*	0.001	0.96	−0.013	0.001	0.41
EQ																					
EQ1: Self-emotional appraisal EQ	0.052*	0.013	6.91*	−0.034	0.001	0.61	0.116*	0.015	17.32*,a	0.018	0.003	3.35	0.051*	0.007	5.12*	0.032	0.005	5.56*	0.070*	0.013	9.24*,a
EQ2: Others' emotional appraisal EQ	0.034	0.012	6.50*	0.033	0.004	2.60*	−0.051	0.003	3.04*	−0.001	0.002	2.37	−0.008	0.003	2.05*	−0.029	0.002	1.98*	0.01	0.006	4.39*
EQ3: Use of emotion EQ	0.148*	0.025	13.25*,a	0.085*	0.009	7.02*,a	0.115*	0.013	14.43*	0.093*	0.010	12.01*,a	0.090*	0.010	7.35*,a	0.115*	0.013	15.58*,a	0.066*	0.008	5.55*
EQ4: Regulation of emotion EQ	−0.004	0.007	3.74*	−0.018	0.002	1.62*	−0.030	0.003	3.39*	−0.007	0.003	3.66	−0.022	0.003	2.63*	0.040	0.011	13.40*,a	−0.004	0.005	3.47*
CQ																					
CQ1: Metacognitive CQ	0.086*	0.018	9.81*,a	0.055*	0.004	3.01*	0.091*	0.014	16.58*,a	0.051*	0.006	7.03*,a	0.058*	0.010	7.67*,a	−0.029	0.001	0.61	0.095*	0.016	11.25*,a
CQ2: Cognitive CQ	0.099*	0.010	5.39*	−0.072*	0.002	1.37	0.051	0.005	5.27*	0.031	0.002	2.76	0.055*	0.004	3.41*	0.003	0.001	0.90	0.01	0.002	1.27*
CQ3: Motivational CQ	−0.004	0.005	2.68*	0.094*	0.011	8.29*,a	−0.061	0.002	2.30	0.015	0.002	2.79	0.034	0.004	3.39*	0.036	0.003	3.16*	−0.007	0.002	1.68*
CQ4: Behavioral CQ	−0.008	0.005	2.47*	0.006	0.005	3.54*	0.066*	0.007	7.84*	−0.02	0.001	1.23	0.000	0.003	1.97*	−0.009	0.001	0.87	0.033	0.005	3.27*
R^2		0.187			0.134			0.087			0.081			0.130			0.081			0.141	

Note: n = 4276.
Age = years old. Education = years. Overseas experience = months. Sex = male 1 and female 0. Income = the nine levels of personal annual income shown in Table 1 (Japanese Yen).
CQ = cultural intelligence; DB = demographic background; EQ = emotional intelligence; LS = lifestyle; PN = personality; RRW = raw relative weight; RW = rescaled weight; SD = standard deviation.
* $p < 0.01$.
[a] The top two variables that had the highest RW of the total eight facets EQ and CQ.

what they know and whether it is consistent with the intended learning outcomes. The learner then controls and plans their next action based on their own monitoring, adapting and adjusting their cognition and behavior. People learn better when they have strong metacognitive abilities and can effectively regulate their learning (Winne & Azevedo, 2022). For example, Serafin (2021) reported that excellent kickboxers achieved metacognitive levels above the average of the general population, suggesting that they have well-developed insight into their own evaluative biases in their actions, can accurately predict their own actions, and can consciously correct their mistakes.

Considering that in today's globalized world, it is difficult to live a lifestyle that is separate from products and services from overseas, the results of this study, which showed that metacognitive CQ correlates most with lifestyles in the context of SRL, are understandable. If consumers mindlessly introduce these products and services without reflecting on their own knowledge and goals, they will not be able to use them effectively and will not be motivated to continue using them. Alternatively, if the products or services that consumers do not purchase because they do not use metacognition are good for their health, then they will have given up the opportunity to adopt a healthy lifestyle.

CQ can be enhanced through work and study abroad experiences, and cultural experiences in the classroom (McCann et al., 2023; Rehg et al., 2012; Şahin et al., 2014). People who have experienced such events may not expect that CQ will be applied to their future healthy lifestyles, even if it is applied to their current work and study-related life and interactions with people in the local area. However, even if the relationship between CQ and lifestyle is a coincidence beyond the intention of the people involved, applying the theory of SRL makes it possible to treat it as a science that can be intervened in the future. SRL theory asserts that the frame of reference for evaluating the process of supporting learning includes the person's previous experience, past successes and failures, and memory of related information (Efklides, 2011). In this case, our memory of past experiences is more useful as a guide for metacognitive and self-regulatory choices when learning is new and challenging (Tullis et al., 2018). Therefore, it is not surprising that memories gained through overseas experiences and related training may be unintentionally useful in making future lifestyle choices. Thus, although the relationship between CQ and SRL has hardly been addressed to date, it is highly compatible, and in today's globalized world, it should be considered as even more closely related.

In a globalized society, foreign products and services are incorporated into people's lifestyles. This also applies to lifestyles that are considered healthy, and the Mediterranean diet that this study dealt with is a typical example (Guasch-Ferre & Willett, 2021). People who are highly committed to the products and services of the country where they were born and raised, or who have a negative image of products and services from abroad, are reluctant to adopt products and services even if they are considered healthy in most of the world. This attitude can sometimes protect the mind and body from harmful products and services, but if taken too far, it can also lead to missing opportunities to maintain health. For consumers to overcome these awareness barriers and acquire a truly healthy lifestyle that is not limited to a specific country or culture, it is necessary to question their own way of thinking, which may be irrationally attached to the lifestyle of their own country, and metacognitive CQ is needed to monitor and adjust their current lifestyle. Today, there are faculties and departments for global studies at universities in the countries where the authors live. These advertise “Let's learn about the diversity of the world together” and “Let's understand diverse values” to attract and enroll students. However, even in these faculties and departments, there are few cases where they mention how knowing diverse values will affect students' later lives. For some students, simply understanding the diverse values of the world may not be very productive. As this study shows, if it is understood that metacognitive CQ is necessary to make the right choices for a healthy lifestyle, more students will want to get involved in global studies not only to learn about other countries but also to improve their skills in questioning and correcting their own knowledge in order to enhance their metacognitive CQ.

In addition, the results of this study showed a positive and significant correlation between Motivational CQ and Social life, and Behavioral CQ and Learning. Cognitive CQ also had a positive and significant correlation with Healthcare and Environment, while it had a negative and significant correlation with Social Life. According to Zimmerman (1989), a proponent of SRL theory, people set goals, acts in a specific environment, and draw conclusions based on the results of their actions. These conclusions then become feedback and modify subsequent behavior. Clark and Zimmerman (2014) claim that this series of loops can be applied to health-related learning. Therefore, we can interpret the results of this study as follows. First, in a cross-cultural environment, an increase in Motivational CQ, which is the desire to interact with people, leads to a desire for a fulfilling social life. A fulfilling social life increases opportunities for verbal and non-verbal communication, which in turn enhances Behavioral CQ. The increase in Behavioral CQ promotes the progress of learning and leads to conclusions. The conclusions drawn become feedback and are accumulated as Cognitive CQ, helping people to choose appropriate healthcare and the environment. At the same time, self-regulation supported by such enriched knowledge may reduce the need for help from others (Clark & Zimmerman, 2014), which stagnates social life. However, if they are dissatisfied with the results, Metacognitive CQ can help them set a goal by analyzing the gap between expectations and reality, leading to a new Motivatioal CQ for a new interaction. The results of this study suggest that the CQ loop that unfolds and develops in such a cross-cultural environment may be memorized (Efklides, 2011) and referenced (Tullis, 2018) to help people make lifestyle choices even within their home country that may appear to have low cultural diversity.

Compared to the relationship between CQ and lifestyle, as seen above, there is already a certain amount of research on the relationship between EQ and lifestyle. There is also a certain amount of research showing the relationship between EQ and SRL (Albani et al., 2023; Sun-Hee, 2022). For example, previous studies have shown that EQ enhances SRL in university students (Albani et al., 2023) and that SRL mediates the relationship between EQ and clinical performance in nursing students (Sun-Hee, 2022). However, it has not been clear which facets are related to lifestyle. In this study, Use of Emotion EQ was most correlated with lifestyle. Use of Emotion EQ refers to the ability to motivate oneself to achieve goals and is related to motivation (Wong & Law, 2002). Motivation, along with metacognition, is a central element of SRL (Pintrich, 1999; Siekanska et al., 2023; Zimmerman & Moylan, 2009). Students who effectively employ SRL strategies are more likely to use metacognition to recognize their learning strengths and weaknesses, as well as to be motivated to learn and to monitor themselves in pursuit of goals (Muis et al., 2018; Perry et al., 2017; Zimmerman & Schunk, 2011). Recent studies have shown that the metacognitive and motivational processes of SRL determine whether athletes perform well or poorly (Siekanska et al., 2023). Use of emotion EQ is also related to self-efficacy (Choi et al., 2021; Kim & Sohn, 2019), which is important for SRL and serves to regulate behavior to achieve goals (Rogowska et al., 2022; Zimmerman, 1990). For example, basketball players report high self-efficacy in practice environments that demand SRL (Cleary & Zimmerman, 2001).

In addition, the results of this study showed that Self-emotional appraisal EQ is related to learning and dieting. This is a reasonable result considering that SRL is closely related to emotions (Zheng et al., 2023). Learners stop learning when they fail and experience confusion and frustration (D'Mello et al., 2014; Munzar et al., 2021). However, if they can think about the cause of the confusion by reappraising their emotions, they can resolve the impasse and continue their learning and problem solving by engaging in further SRL processes such as metacognitive monitoring (D'Mello et al., 2014; Muis et al., 2018). Therefore, recent studies have revealed that emotional reappraisal supports problem solving through SRL (Losenno et al., 2020). On the other hand, there

was no significant correlation between Others' emotional appraisal EQ and Regulation of emotion EQ and lifestyle. Of these, the fact that Others' emotional appraisal EQ did not correlate with lifestyle is a reasonable result, given that the concept of "others" does not appear in the central discussion of SRL. In other words, the results of this study suggest that even if a person can understand the emotions of others and therefore understand what kind of lifestyle they want, he will not be able to achieve a good health unless he can use this skill to understand his own emotions and choose the lifestyle he wants. To put it more simply, it seems that people who can consult their own feelings rather than imitating others will be able to live a healthy lifestyle. On the other hand, the lack of correlation between Regulation of Emotion EQ and lifestyle is not difficult to understand, given that emotion regulation has not been addressed in the context of SRL (Price et al., 2018), but it can be interpreted based on previous studies that showed that emotion suppression can increase negative emotions and reduce learning outcomes (Gross & Thompson, 2007; Perry et al., 2017) and that it is cognitively demanding and causes depletion of cognitive resources required for SRL (Gross & Thompson, 2007; Richards & Gross, 2000). Consistent with the results of this study, a recent study also found that emotion reappraisal enhanced musicians' use of SRL, while emotion suppression, rumination, and repression did not (Peistaraite & Clark, 2020). Moreover, some studies have found a negative correlation between emotion regulation and a healthy lifestyle (Ferdosi et al., 2020). However, because difficulties in emotion regulation have been shown to be positively correlated with health risk behaviors (Singh & Singh, 2023), the impact of suppressing or controlling emotions on a healthy lifestyle may be a bit complicated. For example, regulating emotions may not be very effective at promoting a healthy lifestyle, but it may be somewhat effective at suppressing unhealthy lifestyle habits, such as not taking rest when he should. This complex relationship may be reflected in the difficult-to-interpret relationship between Regulation of Emotion EQ and rest (low beta and high RW).

Previous research has dealt extensively with the relationship between EQ and lifestyle, but has rarely dealt with the relationship between CQ and lifestyle. Furthermore, no research has been conducted on how facets of EQ, as well as CQ, relate to lifestyle. This study shows that both CQ and EQ are related to lifestyle, and in particular, consistent with SRL strategy theory, which has metacognition and motivation as its main axes, Metacognitive CQ and Use of Emotion EQ are most broadly related to lifestyle. This is the first study to show that in order to live a healthy lifestyle in today's globalized society, not only EQ, which has been emphasized until now, but also CQ is required.

8. Limitation

Like many other studies, this study has some problems to overcome. This study analyzed the relationship between EQ and CQ and lifestyle based on SRL theory, but did not use measures directly related to SRL theory (e.g., Toering et al., 2012; Turan et al., 2009). Therefore, future studies may verify the results of this study or develop better models by using measures related to SRL theory or other learning theories in combination with intelligence measures. Other general but important limitations should also be mentioned. First, although the sample size is larger than previous studies, it only targeted Japanese people living in Japan, so caution is needed when adapting to expatriates, international students, and people from other countries living overseas. In addition, because it was a cross-sectional study, it does not show causal relationships between variables. Therefore, future research could verify and develop the results of this study by conducting intervention studies that include people from various backgrounds and nationalities.

9. Conclusions

In this study, we positioned EQ and CQ as social intelligences for utilizing the self-control function of SRL strategy theory, and aimed to clarify the relationship between these intelligences and lifestyle. To that end, multiple regression analysis and relative importance analysis using data obtained from a large-scale questionnaire survey showed that a total of eight aspects of EQ and CQ were correlated with seven lifestyle scales. In particular, the correlations between Metacognitive CQ and Use of Emotion EQ and lifestyle were the most extensive and significant, which is consistent with SRL strategy theory, which places metacognition and motivation as the main axes of learning. This result suggests that learning and self-control based on both EQ and CQ are necessary to achieve a healthy lifestyle.

CRediT authorship contribution statement

Keisuke Kokubun: Writing – original draft, Software, Formal analysis, Conceptualization. **Kiyotaka Nemoto:** Writing – review & editing, Supervision, Resources, Conceptualization. **Yoshinori Yamakawa:** Writing – review & editing, Supervision, Project administration, Funding acquisition, Data curation, Conceptualization.

Consent for publication

All participants gave consent for the publication of the results of this study.

Ethics approval and consent to participate

This study was approved by the Ethics Committee of Tokyo Institute of Technology (Approval Number 2023137) and was conducted following the institute's guidelines and regulations. All participants provided written informed consent before participation, and their anonymity was maintained.

Funding

This work was supported by JSPS KAKENHI (Grant Number JP17H06151; JP19K01833; JP21K12153; JP22K01695) and the ImPACT Program of the Council for Science, Technology and Innovation (Cabinet Office, Government of Japan).

Declaration of competing interest

The authors have declared that no competing interests exist.

Appendix A. Lifestyle

Q1 (LS1: Healthcare) To what extent are you interested in your own health? Please tell us whether the following applies to the actions you are taking.

1. I am interested in health.
2. I collect information about health.
3. I regularly check my health status.
4. I am taking steps to improve my health.

[Scoring of answers] Participants were asked to choose from two options for each: "1. Applies" or "2. Does not apply." After that, they were assigned a score of 1 if the number of "1. Applies" was 0, 2 if 1, 3 if 2, 4 if 3, and 5 if 4.

Q2 (LS2: Social life) How many social relationships do you have? Please tell us whether any of the following apply to you.

1. Living with spouse.
2. Living with family members other than spouse.
3. Interacting with friends.
4. Participating in local group activities.
5. Working.

[Scoring of answers] For each question, participants were asked to choose from two options: "1. Applies" or "2. Does not apply." After that, participants were assigned a score of 1 if they answered

"1. Applies" to 0 or 1 question, 2 if they answered "2," 3 if they answered "3," 4 if they answered "4," and 5 if they answered "5."

Q3 (LS3: Learning) How often have you engaged in hobbies or learning in the past year (how much time do you spend on hobbies or learning on weekdays)?

1. Less than once a year.
2. Several times a year.
3. Several times a month.
4. Several times a week.
5. Daily/almost daily.

[Scoring of answers] They were then assigned a score from 1 to 5.

Q4 (LS4: Exercise) How many times a week do you exercise for 30 minutes or more?

1. Never.
2. Once a week.
3. Twice a week.
4. Three times a week.
5. Every day/almost every day.

[Scoring of answers] They were then assigned a score from 1 to 5.

Q5 (LS5: Environment) How much time do you have per week to go outside and experience nature?

1. Not at all.
2. Less than 1 hour per week.
3. 1-2 hours per week.
4. 2-3 hours per week.
5. 3 hours or more per week.

[Scoring of answers] They were then assigned a score from 1 to 5.

Q6 (LS6: Rest) Please tell us whether this applies to your sleep during the last week.

1. I fall asleep easily.
2. I sleep soundly until morning.
3. I don't take naps or they are short (less than 30 minutes).
4. I sleep at the same time.
5. I sleep 7 to 8 hours a night.

[Scoring of answers] They were then assigned a score of 1 to 5.

Q7 (LS7: Diet) Please select the number of items consumed in meals last week.

1. Used oil as cooking oil on a daily basis.
2. Ate whole grains 3 or more times per day.
3. Drink 1 glass of wine per day.
4. Ate non-green vegetables 1 or more times per day.
5. Ate green leafy vegetables 6 or more times per week.
6. Ate nuts 5 or more times per week.
7. Ate beans 3 or more times per week.
8. Ate berries 2 or more times per week.
9. Ate chicken 2 or more times per week.
10. Ate fish 1 or more times per week.
11. Limited fast food intake to less than once per week.
12. Limited cheese intake to less than once per week.
13. Limited red meat intake to less than four times per week.
14. Limited sweet breads and desserts to less than five times per week.
15. Limited butter or margarine intake to less than one tablespoon per day.

[Scoring of answers] Participants were asked to choose between "1. Applies" and "2. Does not apply" for each. After that, participants were assigned a score of 1 if 3 or fewer items applied, a score of 2 if 4–6 items applied, a score of 3 if 7–8 items applied, a score of 4 if 9–12 items applied, and a score of 5 if 13 or more items applied.

Data availability

The datasets generated during the current study are not publicly available but are available from the corresponding author upon reasonable request.

References

Acebes-Sánchez, J., Diez-Vega, I., Esteban-Gonzalo, S., & Rodriguez-Romo, G. (2019). Physical activity and emotional intelligence among undergraduate students: A correlational study. *BMC Public Health, 19*(1), 1–7. https://doi.org/10.1186/s12889-019-7576-5

Albani, A., Ambrosini, F., Mancini, G., Passini, S., & Biolcati, R. (2023). Trait emotional intelligence and self-regulated learning in university students during the COVID-19 pandemic: The mediation role of intolerance of uncertainty and COVID-19 perceived stress. *Personality and Individual Differences, 203*, Article 111999. https://doi.org/10.1016/j.paid.2022.111999

Al-Qadri, A. H., & Zhao, W. (2021). Emotional intelligence and students' academic achievement. *Problems of Education in the 21st Century, 79*(3), 360–380. https://doi.org/10.33225/pec/21.79.360

American Academy of Sleep Medicine. (2014). *The International Classification of Sleep Disorders – Third Edition (ICSD-3)*. Darien, IL: American Academy of Sleep Medicine.

Ang, S., Van Dyne, L., Koh, C., Ng, K. Y., Templer, K. J., Tay, C., & Chandrasekar, N. A. (2007). Cultural intelligence: Its measurement and effects on cultural judgment and decision making, cultural adaptation and task performance. *Management and Organization Review, 3*(3), 335–371. https://doi.org/10.1111/j.1740-8784.2007.00082.x

Ang, S., Van Dyne, L., & Rockstuhl, T. (2015). Cultural intelligence: Origins, conceptualization, evolution, and methodological diversity. In M. J. Gelfand, C. Y. Chiu, & Y. Y. Hong (Eds.), *Vol. 5. Handbook of advances in culture and psychology* (pp. 273–323). New York, NY, USA: Oxford University Press (2015).

Bartulovic, D., Young, B. W., & Baker, J. (2017). Self-regulated learning predicts skill group differences in developing athletes. *Psychology of Sport and Exercise, 31*, 61–69. https://doi.org/10.1016/j.psychsport.2017.04.006

Berman, M. G., Jonides, J., & Kaplan, S. (2008). The cognitive benefits of interacting with nature. *Psychological Science, 19*(12), 1207–1212. https://doi.org/10.1111/j.1467-9280.2008.02225.x

Bonilla-Yucailla, D., Balseca-Acosta, A., Cárdenas-Pérez, M. J., & Moya-Ramírez, D. (2022). Emotional intelligence, engagement and academic self-efficacy. *Analysis mediation within Ecuadorian universities. Interdisciplinaria, 39*(2), 249–264.

Brackett, M. A., Mayer, J. D., & Warner, R. M. (2004). Emotional intelligence and its relation to everyday behaviour. *Personality and Individual Differences, 36*(6), 1387–1402. https://doi.org/10.1016/S0191-8869(03)00236-8

Brackett, M. A., Rivers, S. E., & Salovey, P. (2011). Emotional intelligence: Implications for personal, social, academic, and workplace success. *Social and Personality Psychology Compass, 5*(1), 88–103. https://doi.org/10.1111/j.1751-9004.2010.00334.x

Canbay, F. (2020). The relationship between cultural intelligence and language learning motivation. *i-Manager's Journal on Educational Psychology, 13*(4), 34–43.

Chang, Y. C., & Tsai, Y. T. (2022). The effect of university students' emotional intelligence, learning motivation and self-efficacy on their academic achievement—Online English courses. *Frontiers in Psychology, 13*, Article 818929. https://doi.org/10.3389/fpsyg.2022.818929

Chen, Y., Yang, Z., Liu, B., Wang, D., Xiao, Y., & Wang, A. (2023). How cultural intelligence affects expatriate effectiveness in international construction projects. *Engineering Construction and Architectural Management, 31*(4), 1696–1714. https://doi.org/10.1108/ECAM-03-2022-0247

Chew, E. Y., Ghurburn, A., Terspstra-Tong, J. L., & Perera, H. K. (2021). Multiple intelligence and expatriate effectiveness: The mediating roles of cross-cultural adjustment. *The International Journal of Human Resource Management, 32*(13), 2856–2888. https://doi.org/10.1080/09585192.2019.1616591

Choi, E. O., You, Y. Y., Park, I. C., & Park, H. S. (2021). A study on the effect of perceived emotional intelligence of members on self-efficacy and job satisfaction. *Ilkogretim Online, 20*(3), 1254. https://doi.org/10.17051/ilkonline.2021.03.140

Clark, N. M., & Zimmerman, B. J. (2014). A social cognitive view of self-regulated learning about health. *Health Education & Behavior, 41*(5), 485–491. https://doi.org/10.1177/1090198114547512

Claros, E., & Sharma, M. (2012). The relationship between emotional intelligence and abuse of alcohol, marijuana, and tobacco among college students. *Journal of Alcohol and Drug Education, 56*(1), 8–37.

Cleary, T. J., & Zimmerman, B. J. (2001). Self-regulation differences during athletic practice by experts, non-experts, and novices. *Journal of Applied Sport Psychology, 13*(2), 185–206. https://doi.org/10.1080/104132001753149883

Cockerham, W. C. (2023). Health lifestyle theory in a changing society: The rise of infectious diseases and digitalization. *Journal of Health and Social Behavior, 64*(3), 437–451. https://doi.org/10.1177/00221465231155609

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). New York, United States: Routledge. https://doi.org/10.4324/9780203771587

Colcombe, S., & Kramer, A. F. (2003). Fitness effects on the cognitive function of older adults: A meta-analytic study. *Psychological Science, 14*(2), 125–130. https://doi.org/10.1111/1467-9280.t01-1-01430

Davis, R. E., Doyle, N. A., Samuel, K. D., Wilkerson, A. H., & Nahar, V. K. (2022). The relationship between trait emotional intelligence and problematic alcohol use among

college students. *Health Promotion Perspectives, 12*(1), 101–109. https://doi.org/10.34172/hpp.2022.13
Di Fabio, A., & Kenny, M. E. (2015). The contributions of emotional intelligence and social support for adaptive career progress among Italian youth. *Journal of Career Development, 42*(1), 48–59. https://doi.org/10.1177/0894845314533420
D'Mello, S., Lehman, B., Pekrun, R., & Graesser, A. (2014). Confusion can be beneficial for learning. *Learning and Instruction, 29*, 153–170. https://doi.org/10.1016/j.learninstruc.2012.05.003
Earley, P. C., & Peterson, R. S. (2004). The elusive cultural chameleon: Cultural intelligence as a new approach to intercultural training for the global manager. *Academy of Management Learning & Education, 3*(1), 100–115. https://doi.org/10.5465/amle.2004.12436826
Efklides, A. (2011). Interactions of metacognition with motivation and affect in self-regulated learning: The MASRL model. *Educational Psychologist, 46*(1), 6–25. https://doi.org/10.1080/00461520.2011.538645
Espinosa, A., & Kadić-Maglajlić, S. (2018). The mediating role of health consciousness in the relation between emotional intelligence and health behaviors. *Frontiers in Psychology, 9*, 2161. https://doi.org/10.3389/fpsyg.2018.02161
Fang, F., Schei, V., & Selart, M. (2018). Hype or hope? A new look at the research on cultural intelligence. *International Journal of Intercultural Relations, 66*, 148–171. https://doi.org/10.1016/j.ijintrel.2018.04.002
Faye, A., Kalra, G., Swamy, R., Shukla, A., Subramanyam, A., & Kamath, R. (2011). Study of emotional intelligence and empathy in medical postgraduates. *Indian Journal of Psychiatry, 53*(2), 140–144. https://doi.org/10.4103/0019-5545.82541
Ferdosi, M., Isfahani, B. N., & Kolahdozan, M. S. (2020). The relationship between personality factors, social support, and regulation with lifestyle. *Evidence Based Health Policy, Management and Economics, 4*(3), 181–188. https://doi.org/10.18502/jebhpme.v4i3.4164
Fernández-Abascal, E. G., & Martín-Díaz, M. D. (2015). Dimensions of emotional intelligence related to physical and mental health and to health behaviors. *Frontiers in Psychology, 6*, 317. https://doi.org/10.3389/fpsyg.2015.00317
Frias-Jamilena, D. M., Sabiote-Ortiz, C. M., Martin-Santana, J. D., & Beerli-Palacio, A. (2018). The effect of cultural intelligence on consumer-based destination brand equity. *Annals of Tourism Research, 72*, 22–36. https://doi.org/10.1016/j.annals.2018.05.009
Gharetepeh, A., Safari, Y., Pashaei, T., Razaei, M., & Kajbaf, M. B. (2015). Emotional intelligence as a predictor of self-efficacy among students with different levels of academic achievement at Kermanshah University of Medical Sciences. *Journal of Advances in Medical Education & Professionalism, 3*(2), 50–55.
Goleman, D. (1998). *Working with emotional intelligence*. NY: Bantam Books.
González-Valero, G., Zurita-Ortega, F., Chacón-Cuberos, R., & Puertas-Molero, P. (2019). Analysis of motivational climate, emotional intelligence, and healthy habits in physical education teachers of the future using structural equations. *Sustainability, 11*(13), 3740. https://doi.org/10.3390/su11133740
Gosling, S. D., Rentfrow, P. J., & Swann, W. B., Jr. (2003). A very brief measure of the Big-Five personality domains. *Journal of Research in Personality, 37*, 504–528. https://doi.org/10.1016/S0092-6566(03)00046-1
Gross, J. J., & Thompson, R. A. (2007). In J. J. Gross (Ed.), *Handbook of emotion regulation* (pp. 3–24). New York: Guilford Press.
Guasch-Ferre, M., & Willett, W. C. (2021). The Mediterranean diet and health: A comprehensive overview. *Journal of Internal Medicine, 290*(3), 549–566. https://doi.org/10.1111/joim.13333
Hanawi, S. A., Saat, N. Z. M., Zulkafly, M., Hazlenah, H., Taibukahn, N. H., Yoganathan, D., … Low, F. J. (2020). Impact of a healthy lifestyle on the psychological well-being of university students. *International Journal of Pharmaceutical Research and Allied Sciences, 9*(2−2020), 1–7.
Hen, M., & Goroshit, M. (2014). Academic self-efficacy, emotional intelligence, GPA and academic procrastination in higher education. *Eurasian Journal of Social Sciences, 2*(1), 1–10.
Ho, A., Minshew, L., & McLaughlin, J. E. (2023). Pedagogical tools and strategies for developing cultural intelligence in pharmacy students and educators. *American Journal of Pharmaceutical Education, 87*(5), Article 100031. https://doi.org/10.1016/j.ajpe.2022.10.007
Hsieh, M. C., Wang, T. S., Fan, C. P., & Huang, C. I. (2014). A study of the emotional intelligence and interpersonal relationships of college students in Southern Taiwan. *Universal Journal of Management, 2*(8), 133–138.
Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1–55. https://doi.org/10.1080/10705519909540118
Iqbal, J., Asghar, M. Z., Ashraf, M. A., & Yi, X. (2022). The impacts of emotional intelligence on students' study habits in blended learning environments: The mediating role of cognitive engagement during COVID-19. *Behavioral Sciences, 12*(1), 14. https://doi.org/10.3390/bs12010014
Jyoti, J., & Kour, S. (2017). Factors affecting cultural intelligence and its impact on job performance: Role of cross-cultural adjustment, experience and perceived social support. *Personnel Review, 46*(4), 767–791. https://doi.org/10.1108/PR-12-2015-0313
Karadağ, T. N. (2022). The effect of cultural intelligence on EFL learners' proficiency. *Eurasian Journal of English Language and Literature, 4*(1), 95–106.
Kashdan, T. B., Goodman, F. R., McKnight, P. E., Brown, B., & Rum, R. (2024). Purpose in life: A resolution on the definition, conceptual model, and optimal measurement. *American Psychologist, 79*(6), 838–853. https://doi.org/10.1037/amp0001223
Kass, A. E., Wildes, J. E., & Coccaro, E. F. (2019). Identification and regulation of emotions in adults of varying weight statuses. *Journal of Health Psychology, 24*(7), 941–952. https://doi.org/10.1177/1359105316689604
Killgore, W. D., Kahn-Greene, E. T., Lipizzi, E. L., Newman, R. A., Kamimori, G. H., & Balkin, T. J. (2008). Sleep deprivation reduces perceived emotional intelligence and constructive thinking skills. *Sleep Medicine, 9*(5), 517–526. https://doi.org/10.1016/j.sleep.2007.07.003
Kim, M. S., & Sohn, S. K. (2019). Emotional intelligence, problem solving ability, self efficacy, and clinical performance among nursing students: A structural equation model. *Korean Journal of Adult Nursing, 31*(4), 380–388. https://doi.org/10.7475/kjan.2019.31.4.380
Kline, R. B. (2023). *Principles and practice of structural equation modeling*. New York, NY: Guilford Publications.
Kokubun, K., Nemoto, K., & Yamakawa, Y. (2023). The association between lifestyles (walking/diet) and cultural intelligence: A new attempt to apply health science to cross-cultural research. *Behavioral Sciences, 14*(1), 28. https://doi.org/10.3390/bs14010028
Kokubun, K., Nemoto, K., & Yamakawa, Y. (2024). Smartphone app for lifestyle improvement improves brain health and boosts the vitality and cognitive function of healthy middle-aged adults. *Brain and Behavior, 14*(5), Article e3500. https://doi.org/10.1002/brb3.3500
Kokubun, K., Toyama, Y., Okamoto, M., & Yamakawa, Y. (2023). *Improvement of lifestyle and cognitive function through quantifying brain health. A paper presented at Society for Neuroscience 2023, Washington, D.C., November 13, 2023*.
Kokubun, K., & Yamakawa, Y. (2019). Association between food patterns and gray matter volume. *Frontiers in Human Neuroscience, 13*, 384. https://doi.org/10.3389/fnhum.2019.00384
Kong, F., Zhao, J., & You, X. (2012). Social support mediates the impact of emotional intelligence on mental distress and life satisfaction in Chinese young adults. *Personality and Individual Differences, 53*(4), 513–517. https://doi.org/10.1016/j.paid.2012.04.021
Kumar, A., Puranik, M. P., & Sowmya, K. R. (2016). Association between dental students' emotional intelligence and academic performance: A study at six dental colleges in India. *Journal of Dental Education, 80*(5), 526–532. https://doi.org/10.1002/j.0022-0337.2016.80.5.tb06112.x
Kun, B., & Demetrovics, Z. (2010). Emotional intelligence and addictions: A systematic review. *Substance Use & Misuse, 45*(7–8), 1131–1160. https://doi.org/10.3109/10826080903567855
Labonté, R., Mohindra, K. S., & Lencucha, R. (2011). Framing international trade and chronic disease. *Globalization and Health, 7*, 21. https://doi.org/10.1186/1744-8603-7-21
Law, K. S., Wong, C. S., Huang, G. H., & Li, X. (2008). The effects of emotional intelligence on job performance and life satisfaction for the research and development scientists in China. *Asia Pacific Journal of Management, 25*(1), 51–69. https://doi.org/10.1007/s10490-007-9062-3
LeBreton, J. M., Hargis, M. B., Griepentrog, B., Oswald, F. L., & Ployhart, R. E. (2007). A multidimensional approach for evaluating variables in organizational research and practice. *Personnel Psychology, 60*(2), 475–498. https://doi.org/10.1111/j.1744-6570.2007.00080.x
Li, C., & Dewaele, J. M. (2020). The predictive effects of trait emotional intelligence and online learning achievement perceptions on foreign language class boredom among Chinese university students. Foreign Languages and Foreign. *Language Teaching, 5*, 33–44. https://doi.org/10.13458/j.cnki.flatt.004711
Li, G. S. F., Lu, F. J., & Wang, A. H. H. (2009). Exploring the relationships of physical activity, emotional intelligence and health in Taiwan college students. *Journal of Exercise Science and Fitness, 7*(1), 55–63. https://doi.org/10.1016/S1728-869X(09)60008-3
Li, H. (2024). The smaller you in a bigger world: The relationship between foreign experiences and intellectual humility. *Journal of Studies in International Education*. , Article 10283153241289651. https://doi.org/10.1177/10283153241289651
Li, Y., Schoufour, J., Wang, D. D., Dhana, K., Pan, A., Liu, X., … Hu, F. B. (2020). Healthy lifestyle and life expectancy free of cancer, cardiovascular disease, and type 2 diabetes: Prospective cohort study. *BMJ, 368*. https://doi.org/10.1136/bmj.l6669
Licata, F., Maruca, R., Citrino, E. A., & Bianco, A. (2023). Building a healthy lifestyle: The role of emotional intelligence among Italian university students. *Scientific Reports, 13*(1), Article 17682. https://doi.org/10.1038/s41598-023-44141-3
Liu, Y. S., Lu, C. W., Chung, H. T., Wang, J. K., Su, W. J., & Chen, C. W. (2024). Health-promoting lifestyle and life satisfaction in full-time employed adults with congenital heart disease: Grit as a mediator. *European Journal of Cardiovascular Nursing, 23*(4), 348–357. https://doi.org/10.1093/eurjcn/zvad104
Lopes, P. N., Brackett, M. A., Nezlek, J. B., Schütz, A., Sellin, I., & Salovey, P. (2004). Emotional intelligence and social interaction. *Personality and Social Psychology Bulletin, 30*(8), 1018–1034. https://doi.org/10.1177/0146167204264762
Losenno, K. M., Muis, K. R., Munzar, B., Denton, C. A., & Perry, N. E. (2020). The dynamic roles of cognitive reappraisal and self-regulated learning during mathematics problem solving: A mixed methods investigation. *Contemporary Educational Psychology, 61*, Article 101869. https://doi.org/10.1016/j.cedpsych.2020.101869
Magnusson, P., Westjohn, S. A., Semenov, A. V., Randrianasolo, A. A., & Zdravkovic, S. (2013). The role of cultural intelligence in marketing adaptation and export performance. *Journal of International Marketing, 21*(4), 44–61. https://doi.org/10.1509/jim.13.0055
Martins, A., Ramalho, N., & Morin, E. (2010). A comprehensive meta-analysis of the relationship between emotional intelligence and health. *Personality and Individual Differences, 49*(6), 554–564. https://doi.org/10.1016/j.paid.2010.05.029
McCann, A. S., Tan, L., & Thornton, K. (2023). How's your CQ?: Effect of study abroad and classroom-based cultural experiences on cultural intelligence levels in traditional students. *Frontiers: The Interdisciplinary Journal of Study Abroad, 35*(1), 115–151. https://doi.org/10.36366/frontiers.v35i1.711

McCardle, L., Young, B. W., & Baker, J. (2018). Two-phase evaluation of the validity of a measure for self-regulated learning in sport practice. *Frontiers in Psychology, 9*, 1–17. https://doi.org/10.3389/fpsyg.2018.02641

Messina, M. P., Battagliese, G., D'Angelo, A., Ciccarelli, R., Pisciotta, F., Tramonte, L., … Ceccanti, M. (2021). Knowledge and practice towards alcohol consumption in a sample of university students. *International Journal of Environmental Research and Public Health, 18*(18), 9528. https://doi.org/10.3390/ijerph18189528

Metaj-Macula, A. (2017). Emotional intelligence, its relation with social interaction and perceived social support. *European Journal of Social Science Education and Research, 4*(4), 31–37.

Mikolajczak, M., Avalosse, H., Vancorenland, S., Verniest, R., Callens, M., Van Broeck, N., Fantini-Hauwel, C., & Mierop, A. (2015). A nationally representative study of emotional competence and health. *Emotion, 15*(5), 653–667. https://doi.org/10.1037/emo0000034

Ministry of Health, Labor and Welfare. (2024). *Overview of the 2022 basic survey on wage structure*. Tokyo, Japan: Ministry of Health, Labor and Welfare.

Ministry of Internal Affairs and Communications. (2023). *Demographics*. Tokyo, Japan: Ministry of Internal Affairs and Communications.

Morris, M. C., Tangney, C. C., Wang, Y., Sacks, F. M., Barnes, L. L., Bennett, D. A., & Aggarwal, N. T. (2015). MIND diet slows cognitive decline with aging. *Alzheimer's & Dementia: The Journal of the Alzheimer's Association, 11*(9), 1015–1022. https://doi.org/10.1016/j.jalz.2015.04.011

Muis, K. R., Chevrier, M., & Singh, C. A. (2018). The role of epistemic emotions in personal epistemology and self-regulated learning. *Educational Psychologist, 53*(3), 165–184. https://doi.org/10.1080/00461520.2017.1421465

Munzar, B., Muis, K. R., Denton, C. A., & Losenno, K. (2021). Elementary students' cognitive and affective responses to impasses during mathematics problem solving. *Journal of Educational Psychology, 113*(1), 104–124. https://doi.org/10.1037/edu0000460

Nakao, G. (2019). *Personality and cognitive traits of intercultural competence*. Kyoto, Japan: Kyoto University (Doctoral dissertation).

Nasir, M., & Masrur, R. (2010). An exploration of emotional intelligence of the students of IIUI in relation to gender, age and academic achievement. *Bulletin of Education & Research, 32*(1), 37–51.

National Tax Agency. (2024). *2022 private sector wage survey*. Tokyo, Japan: National Tax Agency.

Ng, K. Y., Van Dyne, L., & Ang, S. (2009). From experience to experiential learning: Cultural intelligence as a learning capability for global leader development. *Academy of Management Learning & Education, 8*(4), 511–526. https://doi.org/10.5465/AMLE.8.4.ZQR511

Nunes, I. M., Felix, B., & Prates, L. A. (2017). Cultural intelligence, cross-cultural adaptation and expatriate performance: A study with expatriates living in Brazil. *Revista de Administração (São Paulo), 52*, 219–232. https://doi.org/10.1016/j.rausp.2017.05.010

Nunnally, J., & Bernstein, I. (1994). *Psychometric theory*. New York, NY, USA: McGraw Hill.

Nyberg, S. T., Singh-Manoux, A., Pentti, J., Madsen, I. E., Sabia, S., Alfredsson, L., … Kivimäki, M. (2020). Association of healthy lifestyle with years lived without major chronic diseases. *JAMA Internal Medicine, 180*(5), 760–768. https://doi.org/10.1001/jamainternmed.2020.0618

Oshio, A., Abe, S., & Cutrone, P. (2012). Development, reliability, and validity of the Japanese version of Ten Item Personality Inventory (TIPI-J). *Japanese Journal of Personality/Pasonariti Kenkyu, 21*(1), 40–52. https://doi.org/10.2132/personality.21.40

Ott, D. L., & Michailova, S. (2018). Cultural intelligence: A review and new research avenues. *International Journal of Management Reviews, 20*(1), 99–119. https://doi.org/10.1111/ijmr.12118

Peistaraite, U., & Clark, T. (2020). Emotion regulation processes can benefit self-regulated learning in classical musicians. *Frontiers in Psychology, 11*, Article 568760. https://doi.org/10.3389/fpsyg.2020.568760

Peña-Sarrionandia, A., Mikolajczak, M., & Gross, J. J. (2015). Integrating emotion regulation and emotional intelligence traditions: A meta-analysis. *Frontiers in Psychology, 6*, 160. https://doi.org/10.3389/fpsyg.2015.00160

Pereira, A. (2023). *Parent and child perspectives of engagement in an online intervention to promote self-regulation skills for healthy eating: A qualitative study*. Portugal: Universidade do Minho (Master's thesis).

Perry, N. E., Hutchinson, L. R., Yee, N., & Määttä, E. (2017). Advances in understanding young children's self-regulation of learning. In D. Schunk, & J. Greene (Eds.), *Handbook of self-regulated learning and performance* (2nd ed., pp. 457–472). New York: Routledge (2018).

Pintrich, P. R. (1999). The role of motivation in promoting and sustaining self-regulated learning. *International Journal of Educational Research, 31*(6), 459–470. https://doi.org/10.1016/S0883-0355(99)00015-4

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*(5), 879–903. https://doi.org/10.1037/0021-9010.88.5.879

Pratono, A. H., & Arli, D. (2020). Linking global consumer culture and ethnocentric consumerism to global citizenship: Exploring the mediating effect of cultural intelligence. *International Journal of Sociology and Social Policy, 40*(7/8), 659–675. https://doi.org/10.1108/IJSSP-10-2019-0212

Price, M. J., Mudrick, N. V., Taub, M., & Azevedo, R. (2018). The role of negative emotions and emotion regulation on self-regulated learning with MetaTutor. In , *Proceedings: Vol. 14. Intelligent Tutoring Systems: 14th International Conference, ITS 2018, Montreal, QC, Canada, June 11–15, 2018* (pp. 170–179). Springer International Publishing. https://doi.org/10.1007/978-3-319-91464-0_17.

Ramadania, R., Suh, J., Rosyadi, R., Purmono, B. B., & Rahmawati, R. (2023). Consumer ethnocentrism, cultural sensitivity, brand credibility on purchase intentions of domestic cosmetics. *Cogent Business & Management, 10*(2), Article 2229551. https://doi.org/10.1080/23311975.2023.2229551

Randrianasolo, A., Semenov, A., Arnold, M., & Reynolds, K. (2020). A model of cultural intelligence and global identity. *Journal of Consumer Marketing, 37*(7), 821–832. https://doi.org/10.1108/JCM-05-2019-3244

Rehg, M. T., Gundlach, M. J., & Grigorian, R. A. (2012). Examining the influence of cross-cultural training on cultural intelligence and specific self-efficacy. *Cross Cultural Management: An International Journal, 19*(2), 215–232. https://doi.org/10.1108/13527601211219892

Richards, J. M., & Gross, J. J. (2000). Emotion regulation and memory: The cognitive costs of keeping one's cool. *Journal of Personality and Social Psychology, 79*(3), 410–424. https://doi.org/10.1037//0022-3514.79.3.410

Rivera-Pérez, S., Fernandez-Rio, J., & Iglesias Gallego, D. (2021). Effects of an 8-week cooperative learning intervention on physical education students' task and self-approach goals, and emotional intelligence. *International Journal of Environmental Research and Public Health, 18*(1), 61. https://doi.org/10.3390/ijerph18010061

Rockstuhl, T., Hong, Y. Y., Ng, K. Y., Ang, S., & Chiu, C. Y. (2010). The culturally intelligent brain: From detecting to bridging cultural differences. *NeuroLeadership Institute, 3*(1–15).

Rodríguez-González, P., Cecchini, J. A., Méndez-Giménez, A., & Sánchez-Martínez, B. (2021). Intrinsic motivation, emotional intelligence and self-regulated learning: A multilevel analysis. *Revista Internacional de Medicina y Ciencias de la Actividad Física y el Deporte, 21*(82), 235–252. https://doi.org/10.15366/rimcafd2021.82.003

Rogowska, A. M., Tataruch, R., Niedźwiecki, K., & Wojciechowska-Maszkowska, B. (2022). The mediating role of self-efficacy in the relationship between approach motivational system and sports success among elite speed skating athletes and physical education students. *International Journal of Environmental Research and Public Health, 19*, 2899. https://doi.org/10.3390/ijerph19052899

Şahin, F., Gurbuz, S., & Köksal, O. (2014). Cultural intelligence (CQ) in action: The effects of personality and international assignment on the development of CQ. *International Journal of Intercultural Relations, 39*, 152–163. https://doi.org/10.1016/j.ijintrel.2013.11.002

Saito, T., Murata, C., Saito, M., Takeda, T., & Kondo, K. (2018). Influence of social relationship domains and their combinations on incident dementia: A prospective cohort study. *Journal of Epidemiology and Community Health, 72*(1), 7–12. https://doi.org/10.1136/jech-2017-209811

Salavera, C., Usán, P., & Jarie, L. (2017). Emotional intelligence and social skills on self-efficacy in Secondary Education students. Are there gender differences? *Journal of Adolescence, 60*, 39–46. https://doi.org/10.1016/j.adolescence.2017.07.009

Schutte, N. S., Malouff, J. M., Thorsteinsson, E. B., Bhullar, N., & Rooke, S. E. (2007). A meta-analytic investigation of the relationship between emotional intelligence and health. *Personality and Individual Differences, 42*(6), 921–933. https://doi.org/10.1016/j.paid.2006.09.003

Serafin, N. (2021). Metacognitive self as an important attribute of an athlete. *Antropomotoryka. Journal of Kinesiology and Exercise Sciences, 31*(94), 47–50. https://doi.org/10.5604/01.3001.0015.7317

Setti, I., Sommovigo, V., & Argentero, P. (2022). Enhancing expatriates' assignments success: The relationships between cultural intelligence, cross-cultural adaptation and performance. *Current Psychology, 41*(7), 4291–4311. https://doi.org/10.1007/s12144-020-00931-w

Shamsuddin, N., & Rahman, R. A. (2014). The relationship between emotional intelligence and job performance of call centre agents. *Procedia-Social and Behavioral Sciences, 129*, 75–81. https://doi.org/10.1016/j.sbspro.2014.03.650

Shetty, C. S., Venkatappa, K. G., Parakandy, S. G., Sparshadeep, E. M., & Das, S. K. (2013). Assessment of emotional intelligence in first year medical students: A questionnaire based study. *IOSR Journal of Dental and Medical Sciences, 3*(4), 23–26. https://doi.org/10.9790/0853-0342326

Siekanska, M., Wilson, S. G., Blecharz, J., & Young, B. W. (2023). Examining the validity of the polish short form version of the self-regulated learning—Sport practice survey among competitive athletes. *Frontiers in Psychology, 14*, Article 1132608. https://doi.org/10.3389/fpsyg.2023.1132608

Singh, P., & Singh, A. (2023). Emotion regulation difficulties and health-risk behaviours in adolescents. *Behaviour Change, 40*(2), 86–102. https://doi.org/10.1017/bec.2022.5

Statistics Bureau, Ministry of Internal Affairs and Communications. (2023). *Population estimates for 2023*. Tokyo, Japan: Statistics Bureau, Ministry of Internal Affairs and Communications.

Sun-Hee, K. I. M. (2022). The mediating effect of self-regulated learning on the relationships among emotional intelligence, collaboration, and clinical performance in Korean nursing students. *Journal of Nursing Research, 30*(3), Article e212. https://doi.org/10.1097/jnr.0000000000000494

Tang, Y., & He, W. (2023). Relationship between emotional intelligence and learning motivation among college students during the COVID-19 pandemic: A serial mediation model. *Frontiers in Psychology, 14*, Article 1109569. https://doi.org/10.3389/fpsyg.2023.1109569

Toering, T., Elferink-Gemser, M. T., Jonker, L., van Heuvelen, M. J. G., & Visscher, C. (2012). Measuring self-regulation in a learning context: Reliability and validity of the self-regulation of learning self-report scale (SRL-SRS). *International Journal of Sport and Exercise Psychology, 10*, 24–38. https://doi.org/10.1080/1612197X.2012.645132

Tonidandel, S., & LeBreton, J. M. (2011). Relative importance analysis: A useful supplement to regression analysis. *Journal of Business and Psychology, 26*, 1–9. https://doi.org/10.1007/s10869-010-9204-3

Tonidandel, S., & LeBreton, J. M. (2015). RWA web: A free, comprehensive, web-based, and user-friendly tool for relative weight analyses. *Journal of Business Psychology, 30*, 207–216. https://doi.org/10.1007/s10869-014-9351-z

Toyota, H., & Yamamoto, K. (2011). Development of a Japanese Version of Wong and Law Emotional Intelligence Scale. *Departmental Bulletin Paper, 20*, 7–12.

Tsaousis, I., & Nikolaou, I. (2005). Exploring the relationship of emotional intelligence with physical and psychological health functioning. *Stress and Health, 21*(2), 77–86. https://doi.org/10.1002/smi.1042

Tseng, C. N., Gau, B. S., & Lou, M. F. (2011). The effectiveness of exercise on improving cognitive function in older people: A systematic review. *The Journal of Nursing Research, 19*(2), 119–131. https://doi.org/10.1097/JNR.0b013e3182198837

Tullis, J. G. (2018). Predicting others' knowledge: Knowledge estimation as cue utilization. *Memory & Cognition, 46*(8), 1360–1375. https://doi.org/10.3758/s13421-018-0842-4

Tullis, J. G., Fiechter, J. L., & Benjamin, A. S. (2018). The efficacy of learners' testing choices. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 44*(4), 540–552. https://doi.org/10.1037/xlm0000473

Turan, S., Demirel, Ö., & Sayek, İ. (2009). Metacognitive awareness and self-regulated learning skills of medical students in different medical curricula. *Medical Teacher, 31*(10), e477–e483. https://doi.org/10.3109/01421590903193521

Walker, S. N., Sechrist, K. R., & Pender, N. J. (1987). The health-promoting lifestyle profile: Development and psychometric characteristics. *Nursing Research, 36*(2), 76–81.

Wang, Y. (2017). Construction elements and path of practical education model in universities. *Eurasia Journal of Mathematics, Science and Technology Education, 13*(10), 6875–6882. https://doi.org/10.12973/ejmste/78525

Wen, Y., Chen, H., Pang, L., & Gu, X. (2020). The relationship between emotional intelligence and entrepreneurial self-efficacy of Chinese vocational college students. *International Journal of Environmental Research and Public Health, 17*(12), 4511. https://doi.org/10.3390/ijerph17124511

Wigfield, A., & Eccles, J. S. (2000). Expectancy–value theory of achievement motivation. *Contemporary Educational Psychology, 25*(1), 68–81. https://doi.org/10.1006/ceps.1999.1015

Wijaya, J. H. (2023). *Lifestyle transformation in Indonesia: The impact of foreign cultures in the era of globalization*. https://doi.org/10.2139/ssrn.4511264 (SSRN, 4511264).

Wilson, S. G., Young, B. W., Hoar, S., & Baker, J. (2021). Further evidence for the validity of a survey for self-regulated learning in sport practice. *Psychology of Sport and Exercise, 56*, Article 101975. https://doi.org/10.1016/j.psychsport.2021.101975

Winne, P., & Azevedo, R. (2022). Metacognition and self-regulated learning. In *, Vol. 3. The Cambridge handbook of the learning sciences* (pp. 93–113). https://doi.org/10.1017/9781108888295.007

Wittgens, C., Muehlhan, M., Kräplin, A., Wolff, M., & Trautmann, S. (2022). Underlying mechanisms in the relationship between stress and alcohol consumption in regular and risky drinkers (MESA): Methods and design of a randomized laboratory study. *BMC Psychology, 10*(1), 233. https://doi.org/10.1186/s40359-022-00942-1

Wong, C.-S., & Law, K. S. (2002). *Wong and Law Emotional Intelligence Scale (WLEIS)*. APA PsycTests. https://doi.org/10.1037/t07398-000 (database record).

Yenice, N., Özden, B., & Alpak Tunc, G. (2018). The predictive level of motivation toward science learning of emotional intelligence of secondary school students. *Cukurova University Faculty of Education Journal, 47*(2), 873. https://doi.org/10.14812/cuefd.389051

Yu, C. P., Lin, C. M., Tsai, M. J., Tsai, Y. C., & Chen, C. Y. (2017). Effects of short forest bathing program on autonomic nervous system activity and mood states in middle-aged and elderly individuals. *International Journal of Environmental Research and Public Health, 14*(8), 897. https://doi.org/10.3390/ijerph14080897

Zare, J., Delavar, K. A., Derakhshan, A., & Pawlak, M. (2024). The relationship between self-regulated learning strategy use and task engagement. *International Journal of Applied Linguistics*. https://doi.org/10.1111/ijal.12535

Zdravković, S., & Peković, J. (2021). The impact of the metacognitive and behavioral factors of cultural intelligence on foreign brand acceptance. *The European Journal of Applied Economics, 18*(1), 73–88. https://doi.org/10.5937/EJAE18-26618

Zheng, J., Lajoie, S., & Li, S. (2023). Emotions in self-regulated learning: A critical literature review and meta-analysis. *Frontiers in Psychology, 14*, Article 1137010. https://doi.org/10.3389/fpsyg.2023.1137010

Zhou, J., & Wang, X. (2022). The influence of Chinese college students' meta-cognitive strategy and motivational beliefs on their study habits. *The Asia-Pacific Education Researcher, 31*(2), 93–103. https://doi.org/10.1007/s40299-020-00541-x

Zimmerman, B. J. (1989). A social cognitive view of self-regulated academic learning. *Journal of Educational Psychology, 81*(3), 329–339. https://doi.org/10.1037/0022-0663.81.3.329

Zimmerman, B. J. (1990). Self-regulated learning and academic achievement: An overview. *Educational Psychologist, 25*(1), 3–17. https://doi.org/10.1207/s15326985ep2501_2

Zimmerman, B. J., & Moylan, A. R. (2009). Self-regulation: Where metacognition and motivation intersect. In D. J. Hacker, J. Dunlosky, & A. C. Graesser (Eds.), *Handbook of metacognition in education* (pp. 299–315). New York, NY: Routledge/Taylor & Francis Group.

Zimmerman, B. J., & Schunk, D. H. (2011). *Handbook of self-regulation of learning and performance*. New York, NY: Routledge/Taylor & Francis Group.