Author **Queries**

Article

Journal of Aging and Health
1–21

DOI: 10.1177/0898264314535633
jah.sagepub.com
SAGE

Factor Structure, Evolution, and Predictive Power of Emotional Competencies on Physical and Emotional Health in the Elderly

Carole Fantini-Hauwel, PhD[1] and Moïra Mikolajczak, PhD[2][AQ2][AQ3]

Abstract

Objective: Emotional competence (EC) has been found to be an important predictor of individuals' health. While it is well known that EC predicts important outcomes in young adults, its importance is less clear in the elderly. We aimed to address this gap: Is the structure of EC the same in older as in younger adults? How do EC evolve between 50 and 80 years old? Does the predictive power of EC, regarding physical and emotional adjustment, increase or decrease with age? **Method:** A total of 6,688 participants filled subjective health and EC questionnaires. We gathered their medication consumption over the last 11 years, from the database of health insurance. **Results:** While the structure of ECs remains stable in older adults, it generally declines as people get older, except for emotion regulation, which improves with age. Results also show that EC predicts both physical and emotional health. **Discussion:** These results suggest that the development of specific interventions to improve EC may be useful for the elderly.

[1]Université Libre de Bruxelles, Belgium
[2]Université catholique de Louvain, Louvain-la-Neuve, Belgium

Corresponding Author:[AQ1]
Carole Fantini-Hauwel, Research center of clinical psychology, psychopathology and psychosomatic, Université Libre de Bruxelles, 50 Avenue Franklin Rooselvelt, 1050 Brussels, Belgium.
Email: carole.fantini@ulb.ac.be

Keywords
well-being, emotional competencies, emotional intelligence, health behaviors, developmental course in aging

Although we all experience and witness all sorts of emotions throughout our lives, we markedly differ in the extent to which we attend to, process, and utilize one's and others' affects (Petrides & Furnham, 2003). The concept of emotional competence (EC)—alternately labeled "emotional intelligence" (EI) or "emotional skills"—has been proposed to account for this idea. Individuals with high EC are thought to be able to identify their and others' emotions, express them in a socially acceptable manner, understand their causes and consequences, regulate them when they are not appropriate for the context or their goals, and use them to enhance thoughts and actions (Mayer & Salovey, 1997). While those individuals are able to take advantage of emotions without letting this emotions lead them astray, individuals with low EC have a hard time taking into account the information that emotions convey while, at the same time, being commonly overwhelmed by them (see Mikolajczak, Quoidbach, Kotsou, & Nelis, 2009, for review).

Past debates on the status of EC as intelligence (i.e., is EC an ability?) or trait (i.e., is EC a disposition?) have given birth to a tripartite model of EI (see Mikolajczak, Petrides, Coumans, & Luminet, 2009). Briefly, this model posits three levels of EI: knowledge, abilities, and traits. The knowledge level refers to what people know about emotions and how to deal with emotion-laden situations. The ability level refers to the ability to apply emotion knowledge in an emotional situation and to implement a given strategy. The focus here is not on what people know, but on what they can do. For instance, even though many people know that distraction is an efficient strategy to reduce anger, many are simply not able to distract themselves when angry. The trait level refers to emotion-related dispositions, namely, the propensity to behave in a certain way in emotional situations. The focus here is not on what people know or can do, but on what they do. For instance, some individuals may be able to distract themselves from a situation that makes them angry if they are explicitly asked to do so, while they are unable to distract themselves of their own volition. These three levels of EI are loosely connected: Knowledge does not always translate into abilities, which, in turn, do not always translate into usual behavior. In this article, we will focus on the trait level.

Research suggests that the trait level of EC exerts a considerable impact on people's lives. Specifically, the literature indicates that the level of EC impacts all four of the most major domains in life: psychological, physical, social, and work adjustment. At a psychological level, higher ECs are, for

instance, associated with greater well-being (Schutte, Malouff, Simunek, McKenley, & Hollander, 2002) as well as a decreased risk of developing psychological disorders (e.g., Schutte, Malouff, Thorsteinsson, Bhullar, & Rooke, 2007) or burn-out (Mikolajczak, Menil, & Luminet, 2007). At a social level, higher ECs lead to better peer relationships at school (Petrides, Sangareau, Furnham, & Frederickson, 2006), to a greater likelihood to be chosen as a romantic partner (Schutte et al., 2001) and to more satisfying social and marital relationships in adulthood (e.g., Lopes et al., 2004; Lopes, Salovey, Côté, Beers, & Petty, 2005; Schutte et al., 2001). Workwise, ECs have been found to be associated with superior academic achievement (Leroy & Grégoire, 2007; Petrides, Frederickson, & Furnham, 2004) and higher job performance (see Van Rooy & Viswesvaran, 2004, for meta-analyses; O'Boyle, Humphrey, Pollack, Hawver, & Story, 2011). Finally, at a physical level, ECs have been associated with both subjective (see Schutte et al., 2007, for meta-analyses; Martins, Ramalho, & Morin, 2010) and objective (Mikolajczak, Avalosse, et al., 2014) indicators of health status. ECs also decrease the likelihood of adopting health-damaging behaviors, such as smoking, excessive drinking, and reckless driving (e.g., Brackett, Mayer, & Warner, 2004; Trinidad & Johnson, 2002).

Although ECs have been vastly investigated in childhood and adulthood, there is comparatively less studies addressing the question of ECs in old age. Previous studies, often conducted in laboratory settings, compared younger and older adults' emotional abilities using experimental emotion identification/expression/regulation tasks. These studies have shown that (a) older adults recognize facial emotional expressions less accurately than younger adults, (b) facial emotional expressions of older adults are more blended and difficult to identify by external judges than those of younger adults, and (c) emotion regulation skills appear to improve with age (see Charles & Carstensen, 2007; Consedine & Magai, 2006; Ruffman, Henry, Livingstone, & Phillips, 2008; Scheibe & Carstensen, 2010, for review). The current study aims to complement and extend these findings by investigating how trait EC (i.e., typical rather than maximal performance; see Petrides & Furnham, 2001) evolves with age. To the best of our knowledge, it is the first study that examines not only intrapersonal ECs but also interpersonal ECs.

In this article, we will focus on three important questions that have remained unaddressed so far: First, is the structure of ECs the same in older as in younger adults? That is, can we replicate the intra versus interpersonal structure of EC and distinguish between 5 different ECs? This is an important first thing to check to ensure that the computation of the various EC scores makes the same sense in older adults than in younger ones. We hypothesized to find the same structure of traits. Second, how do ECs evolve between 50 and 80 years of age? Third, does

the predictive power of ECs, regarding physical and emotional adjustment, increase or decrease with age? Given that ECs have been shown to be all the more important as people are vulnerable (Petrides et al., 2004), we hypothesize that the predictive power of ECs will increase with age regarding physical health and decrease with age regarding emotional health. Indeed, the more people age, the more their physical health becomes vulnerable. However, as they get older, their emotional health becomes less vulnerable (see, for example, Consedine & Magai, 2006). Therefore, we hypothesize a moderating effect of age on ECs, such that the importance of ECs for physical health would increase as age increases, and that the importance of ECs for emotional health would decrease as age increases.

Method[AQ4]

Participants

We randomly extracted three samples of 3,000, 3,000, and 900 participants, respectively, from a large database coming from the "Emotional Competence and Health Study" (see Mikolajczak, Avalosse, et al., 2014). In the latter study, a stratified sample of 200,000 adults (>18 years old) drawn from the database of the largest Mutual Benefit Society in Belgium (i.e., the Mutualité Chrétienne–Christelijke Mutualiteit, abbreviated in MC-CM) was contacted by mail by the MC-CM and invited to complete a survey on emotions and health. The sample was stratified on gender, age, socioeconomic status, and province to be as representative as possible of the Belgian population. Among this sample, 16,999 participants (11.76%) answered the survey. We randomly extracted three samples of participants based on age categories (50-59 years old: n = 3,000; 60-70 years old: n = 3,000; 71-80 years old: n = 900). Sample 3 comprised all of the participants that represented the 71- to 80-year-old group (i.e., 900 individuals) in the database. After eliminating missing data, the overall sample was comprised of 6,688 participants with a mean age of 62.62 ± 7.01 years old (54.75 ± 2.83 for Sample 1, 64.35 ± 2.98 for Sample 2, 74.46 ± 2.46 for Sample 3). The gender repartition in each sample was 38.9% men and 61.1% women in the 50- to 59-year-old group, 47.9% men and 52.1% women in the 60- to 70-year-old group, and 62.2% men and 37.8% women in the 71- to 80-year-old group.

Measures

Demographics. The participants were asked to indicate their province, age, sex, education level, height, and weight (i.e., to compute their body mass index).

Questionnaire. ECs were assessed with the Profile of Emotional Competence (PEC; Brasseur, Grégoire, Bourdu, & Mikolajczak, 2013). This measure consists of 50 five-point items (from *strongly disagree* to *strongly agree*) and was especially designed to provide a separate subscore for each EC. Thus, it provides 10 subscores (e.g., the identification of one's emotions, the identification of others' emotions, an understanding of one's emotions, an understanding of others' emotions, the expression of one's emotions, listening to others' emotions, the regulation of one's emotions, the regulation of others' emotions, the use of one's emotions, and the use of others' emotions) that form 3 global scores: an intrapersonal EC score (α = .86), an interpersonal EC score (α = .89), and a total EC score (α = .92). In the current analyses, we used only the 20 items composing the short version of the PEC (i.e., S-PEC) that we recently validated (Mikolajczak, Brasseur, & Fantini-Hauwel, 2014). The reason why we computed EC scores based on these 20 items only was that it allowed us to validate the use of the S-PEC among older adults.

Physical health

Drug consumption. Participants' consent for coupling the data allowed us to retrieve the drug consumption over the last 11 years from the MC-CM records for each respondent. The drug consumption is expressed in terms of the defined daily dose (DDD), which is a typical indicator of medication consumption that is based on the average maintenance dose per day. The DDDs were obtained separately for each class of the Anatomical Therapeutic Chemical (ATC) Classification System: alimentary tract and metabolism (Drug A), blood and blood-forming organs (Drug B), cardiovascular system (Drug C), dermatological system (Drug D), genitourinary system and sex hormones (Drug G), systemic hormonal preparation (Drug H), anti-infective for systemic use (Drug J), antineoplasic and immunomodulating agents (Drug L), musculoskeletal system (Drug M), nervous system (Drug N), respiratory system (Drug R), and sensory organs (Drug S).

Emotional health. *Trait Positive Emotions* were measured using eight items rated on a 5-point scale (ranging from *never* to *very often*): amazed, relaxed, enthusiastic, easygoing, serene, happy, joyful, and appeased. We used the total positive affect score.

Trait Negative Emotions were evaluated using 21 items rated on a 5-point scale (ranging from *never* to *very often*), representing low and high arousal levels of the most common negative emotions (anger, fear, sadness, shame, guilt, frustration, and disgust). We use not only total negative affect scores but also dimensional scores for sadness, anger, stress, and negative social emotions**[AQ5]**.

Table 1. [AQ26] Age Group Differences on EC: *M SD*, *F* Test. [AQ27]

	50-80	50-59	60-70	71-80	
	n = 6,688	*n* = 2,170	*n* = 3,603	*n* = 915	*F*(2, 6687)
Intrapersonal EC					
Identification					
M	6.71	6.85	6.73	6.31	29.53***
SD	1.81	1.86	1.78	1.73	
Understanding					
M	6.78	6.77	6.84	6.56	8.07***
SD	1.95	1.97	1.94	1.94	
Expression					
M	6.40	6.40	6.46	6.20	6.55***
SD	1.96	2.05	1.94	1.80	
Regulation					
M	6.48	6.31	6.56	6.54	15.14***
SD	1.77	1.81	1.75	1.70	
Utilization					
M	6.80	6.83	6.77	6.82	1.00
SD	1.53	1.54	1.54	1.48	
Interpersonal EC					
Identification					
M	6.76	6.97	6.75	6.31	53.26***
SD	1.62	1.61	1.61	1.64	
Understanding					
M	6.54	6.72	6.52	6.17	36.53***
SD	1.61	1.59	1.60	1.60	
Expression					
M	7.65	7.68	7.66	7.58	1.34
SD	1.51	1.54	1.49	1.52	
Regulation					
M	7.15	7.11	7.20	7.07	4.27**
SD	1.43	1.43	1.41	1.50	
Utilization					
M	6.13	5.97	6.19	6.24	17.41***
SD	1.55	1.60	1.51	1.55	
Intrapersonal EC score					
M	33.17	33.15	33.37	32.42	9.64***
SD	5.88	6.32	5.70	5.45	
Interpersonal EC score					
M	34.24	34.45	34.32	33.38	14.82***
SD	5.22	5.37	5.12	5.16	
Global EC score					
M	67.41	67.60	67.70	65.80	13.84***
SD	9.98	10.57	9.70	9.47	

Note. EC = emotional competence.

**$p \leq .01$. ***$p \leq .001$. [AQ28]

Loneliness. We used the total score for three-Item Loneliness Scale (Hughes, Waite, Hawkley, & Cacioppo, 2004[AQ6]) rated on a 3-point scale (ranging from *hardly ever* to *often*).

Statistical Analyses

To assess the relevance of the S-PEC in older people, we first performed a confirmatory factor analysis (CFA[AQ7]) using maximum likelihood estimations with AMOS 21 (IBM, Inc.) to examine whether or not the third-order latent structure of the S-PEC (two second-order factors—intrapersonal EC and interpersonal EC—and one third-order factor—global EC score) is adequate for people who are 50 years old and above[AQ8].

We then compared the factorial invariance regarding age by using a multigroup CFA that was based on our three samples. The model fit was assessed by using the criteria established by Hu and Bentler (1999) based on the comparative fit index (CFI: good fit: ≥.95, acceptable fit: ≥.90) and the root mean square error of approximation (RMSEA; good fit: <.06, acceptable fit: <.08) with its 90% confidence interval (CI).

Afterward, we assessed the impact of age on EC. To determine whether or not there were any age-related changes on ECs within older adults, a series of ANOVAs were conducted on EC dimensions (i.e., intrapersonal EC, interpersonal EC, and global EC global) with age group (i.e., 50-60, 61-70, and 71-80) as the between-subject factor. Mean, standard deviation, and *F* tests are provided in Table 1. Significant *F* tests were followed up with pairwise comparisons by using Tukey's procedure.

We finally examined whether or not the predictive power of EC increases or decreases with age by testing the moderating effect of age on the relationship between EC and physical and emotional health indicators. This examination was conducted through multiple regressions, following Aiken and West's (1991) recommendations.

Results

Factor Structure of EC in Older Adults

CFA analysis confirms the acceptable fit of the S-PEC, $\chi^2(159) = 3{,}417.07$, CFI = .90, RMSEA = .055, with a 90% CI = [.054, .057]. As previously mentioned (Mikolajczak, Brasseur, & Fantini-Hauwel, 2014), freeing the constraint between error covariances of listening and regulation of others' emotions leads to an ever better fit with $\chi^2(158) = 2{,}555.90$, CFI = .93, RMSEA = .048 with a 90% CI = [.046, .049].

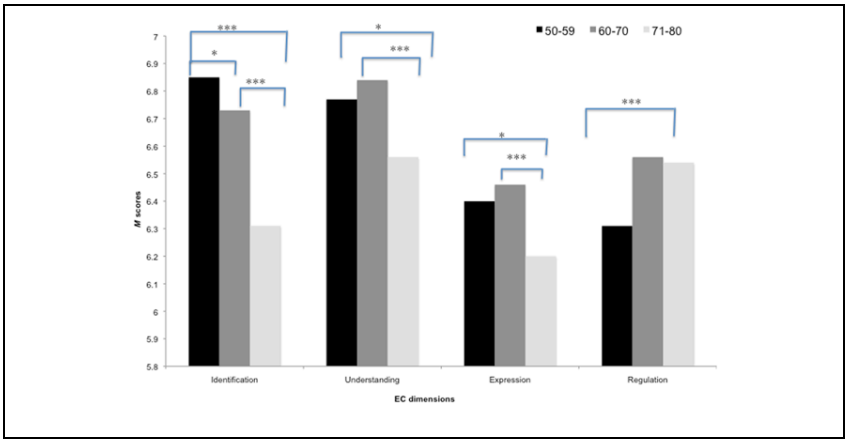

Figure 1. Interaction between age group and intrapersonal ECs.
Note. EC dimensions = emotional competence dimensions.
*$p \leq .05$. **$p \leq .01$. ***$p \leq .001$.

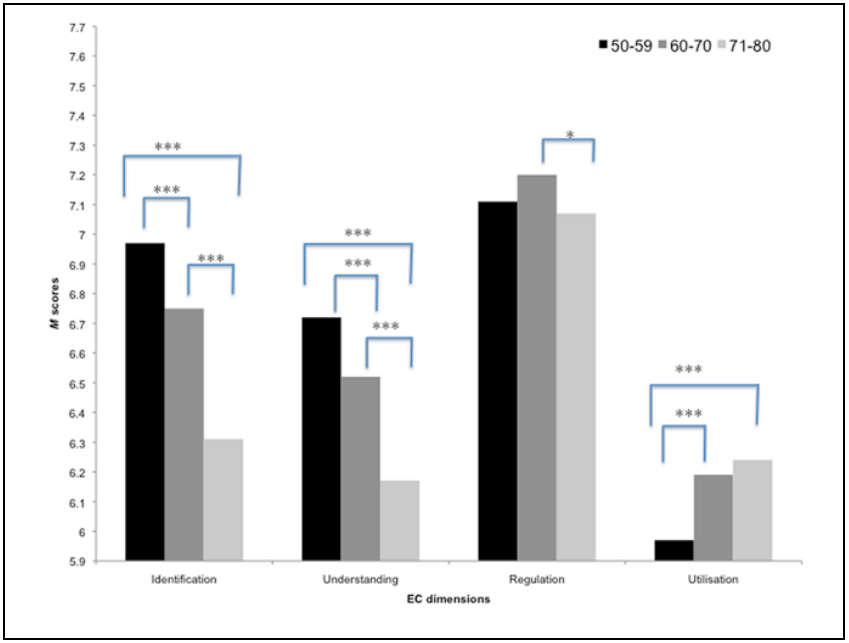

Figure 2. Interaction between age group and interpersonal ECs.
Note. EC dimensions = emotional competence dimensions.
*$p \leq .05$. **$p \leq .01$. ***$p \leq .001$.

Table 2. Significant Main and Moderating Effects of Intrapersonal EC and Age on Physical and Emotional Health.

	Age	Intra-EC	Age × Intra-EC	Slope estimates		*F* test
				M – 1 *SD* / *M* + 1 *SD*		
	β	β	β		R^2	*F*(3, 6684)
Physical health (DDD)						
Drug A	.10***	–.05***	–.01		.01	27.60***
Drug B	.22***	–.08***	–.04***	.27 / .18	.06	142.97***
Drug C	.27***	–.07***	–.03*	.30 / .24	.08	193.00***
Drug D	.03**	–.03*	.01		.002	4.12**
Drug G	–.05***	.01	–.02		.003	7.46***
Drug M	.13***	–.01	.01		.02	38.99***
Drug S	.09***	–.03**	–.00		.008	19.45***
Emotional health						
Drug N	–.06***	–.14***	.03*	–.09 / –.04	.02	53.14***
Positive affect	.12***	.50***	–.005		.26	766.09***
Negative affect	–.15***	–.50***	.04***	–.19 / –.11	.27	824.45
Anxiety–Stress	–.16***	–.43***	.04**	–.20 / –.12	.21	590.74***
Sadness	–.10***	–.43***	.03*	–.13 / –.08	.20	549.63***
Shame and guilt	–.11***	–.38***	.03**	–.15 / –.08	.16	105.76***
Anger	–.10***	–.33***	.02		.12	295.75***
Loneliness	–.08***	–.34***	.03**	–.11 / –.05	.13	318.46***

Note. Drug A: Alimentary tract and metabolism; Drug B: Blood and blood-forming organs; Drug C: Cardiovascular system; Drug D: Dermatological system; Drug G: Genitourinary system and sex hormones; Drug M: Musculoskeletal system; Drug S: Sensory organs; Drug N: Nervous system. EC = emotional competence; DDD = defined daily dose.
*$p \leq .05$. **$p \leq .01$. ***$p \leq .001$.

Multisample analysis was performed to determine whether or not the structure of the S-PEC was invariant across our three samples (50-60, 61-70, and 71-80 years old). First, configural invariance was achieved with $\chi^2(529) = 4{,}300.67$, CFI = .89, RMSEA = .031 with a 90% CI = [.030, .031]. Assuming the configural invariance was correct between the three samples, the measurement weight then did not show any statistical differences, $\Delta\chi^2(10) = 14.21$, $p = .16$. When freeing the constraint between error covariances of listening and regulation of others' emotions, the configural invariance was achieved with $\chi^2(526) = 3{,}336.68$, CFI = .92, RMSEA = .027

with a 90% CI = [.026, .027]. The measurement weight did not also show any statistical differences, $\Delta\chi^2(10) = 17.33$, $p = .07$.

The Impact of Age on EC in Older Adults

As shown in Table 1 and Figures 1 and 2, there was a significant effect of age on all EC dimensions, except for the "utilization of one's emotions" and "listening to others' emotions" dimensions. There was, logically, also a significant effect of age on intrapersonal EC, interpersonal EC, and global EC scores. To avoid unnecessarily lengthening the text, we refer the reader to the table and figures to see the shape of the effects. Interestingly, it is important to note that most ECs deteriorates in old age (71-80 years), except for emotion regulation, which improves regarding one's emotions and remains stable for others' emotions[AQ9]. The ability to use others' emotions also seems to improve with age.

The Moderating Effect of Age on the Relationship Between EC and Physical/Emotional Health

Physical health (DDD). Table 2 describes the significant main and moderating effects of age and intrapersonal EC for the various therapeutic classes. Nonsignificant results involving systemic hormonal preparation, anti-infective for systemic use, antineoplasic and immunomodulatory agents, and respiratory system were not reported.

As expected, age exhibited a significant main positive effect on the consumption of Drugs A, B, C, D, M, and S (i.e., which address the alimentary tract and metabolism, the blood and blood-forming organs, the cardiovascular system, the dermatological system, the musculoskeletal system, and the sensory organs, respectively): The consumption of these substances increases with age. However, there was a significant main negative effect of age on the consumption of Drug G (i.e., which addresses the genitourinary system and sex hormones), which decreases with age. As expected, there was also a significant main negative effect of intrapersonal EC on Drugs A, B, C, D, and S (i.e., which address the alimentary tract and metabolism, the blood and blood-forming organs, the cardiac system, the dermatological system, and the respiratory system, respectively). Thus, the higher the level of intraindividual EC, the lower the DDD consumption. Most importantly, we observed a moderating effect of age on the relation between intrapersonal EC and DDD consumption for Drugs B and C: The effect of intraindividual EC was more important when people grow older (Figures 3 and 4).

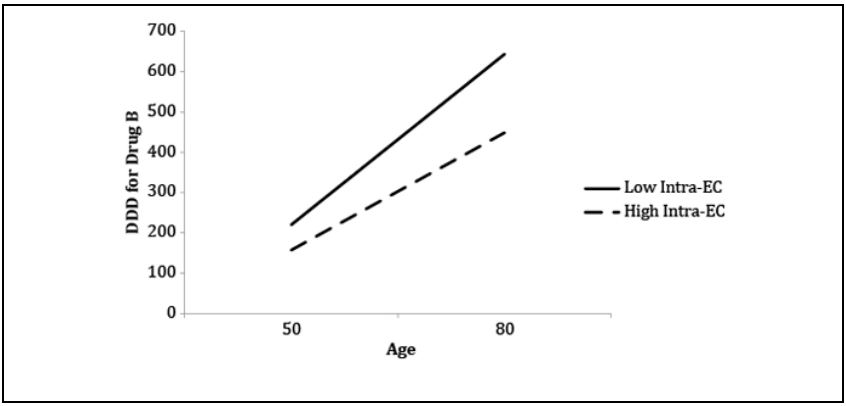

Figure 3. Moderating effect of intrapersonal EC on the relation between age and DDD for Drug B.
Note. EC = emotional competence; DDD = daily drug dose.

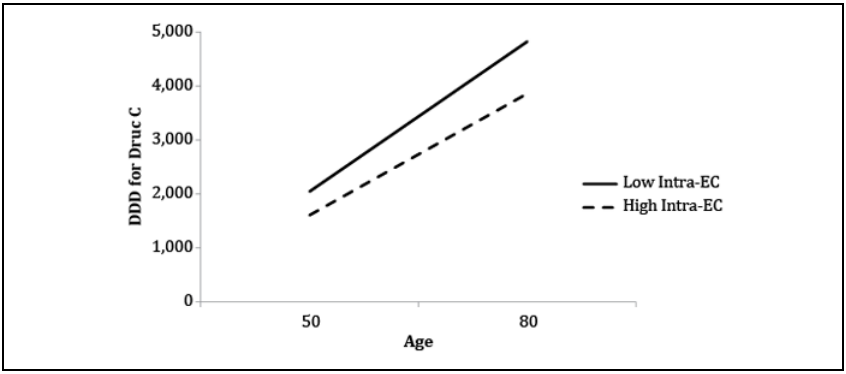

Figure 4. Moderating effect of intrapersonal EC on the relation between age and DDD for Drug C.
Note. EC = emotional competence; DDD = daily drug dose.

Table 3 describes the significant main and moderating effects of age and interpersonal EC for the various therapeutic classes. The effect of age is as described just above. As expected, we found a significant negative main effect of interpersonal EC on Drugs A, C, and D: The higher the interpersonal EC, the lower the DDD consumption. There was also a significant Age × Interpersonal EC interaction on Drugs B and G. For Drug B, the effect of interpersonal EC was more important when people grow older. For Drug G, the effect was stronger for the youngest participants (see Table 3).

Table 3. Significant Main and Moderating Effects of Interpersonal EC and Age on Physical and Emotional Health.

	Age	Inter-EC	Age × Inter-EC	Slope estimates		*F* test
	β	β	β	*M* – 1 *SD* / *M* + 1 *SD*	R^2	*F*(3, 6684)
Physical health (DDD)						
Drug A	.10***	–.04***	–.01		.01	26.28***
Drug B	.22***	–.06***	–.03*	.25 / .20	.06	133.81***
Drug C	.27***	–.07***	–.02†		.08	190.02***
Drug D	.03**	–.03**	.00		.002	4.77**
Drug G	–.05***	.04**	–.03*	–.02 / –.08	.005	11.16***
Drug M	.13***	–.003	.01		.02	38.70***
Drug S	.09***	–.00	.02†		.008	18.26***
Emotional health						
Drug N	–.06***	–.07***	.006		.009	20.21***
Positive affect	.12***	.38***	–.02		.16	410.83***
Negative affect	–.15***	–.34***	.05***	–.20 / –.11	.14	348.89***
Anxiety–Stress	–.16***	–.25***	.03*	–.19 / –.13	.09	206.93***
Sadness	–.10***	–.28***	.04***	–.14 / –.07	.09	212.44***
Shame and guilt	–.11***	–.29***	.05***	–.17 / –.07	.10	237.30
Anger	–.10***	–.23***	.03**	–.14 / –.07	.06	144.30
Loneliness	–.08***	–.28***	.05***	–.14 / –.04	.08	203.32***

Note. Drug A: Alimentary tract and metabolism; Drug B: Blood and blood-forming organs; Drug C: Cardiovascular system; Drug D: Dermatological system; Drug G: Genitourinary system and sex hormones; Drug M: Musculoskeletal system; Drug S: Sensory organs; Drug N: Nervous system. EC = emotional competence; DDD = defined daily dose.

†$p \leq .06$. *$p \leq .05$. **$p \leq .01$. ***$p \leq .001$.

Emotional health. As can be seen in Table 2, there was both a main effect of age and a main effect of intrapersonal EC on the consumption of psychotropic drugs (Drug N), positive affectivity, negative affectivity, sadness, anger, negative social emotions, stress, and loneliness: The higher the age and the higher the intrapersonal EC, the better the emotional health (i.e., the lower the consumption of Drug N, the higher the positive effect, the lower the negative effects and the loneliness). Moreover, except for positive affectivity and anger, there was also a significant Age × Intrapersonal EC interaction on all variables, indicating that the effect of intrapersonal EC on emotional health is stronger for young people (see Figures 5 and 6). As can be seen in Table 3, the profile of effects for interpersonal EC is the same as for intrapersonal EC (except that the interaction effect failed to reach significance for Drug N, but reached this time significance for anger).

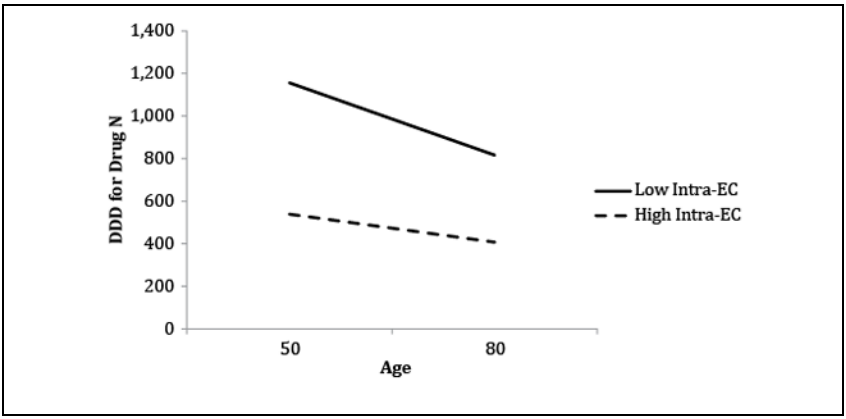

Figure 5. Moderating effect of intrapersonal EC on the relation between age and daily drug doses for Drug N.
Note. EC = emotional competence.

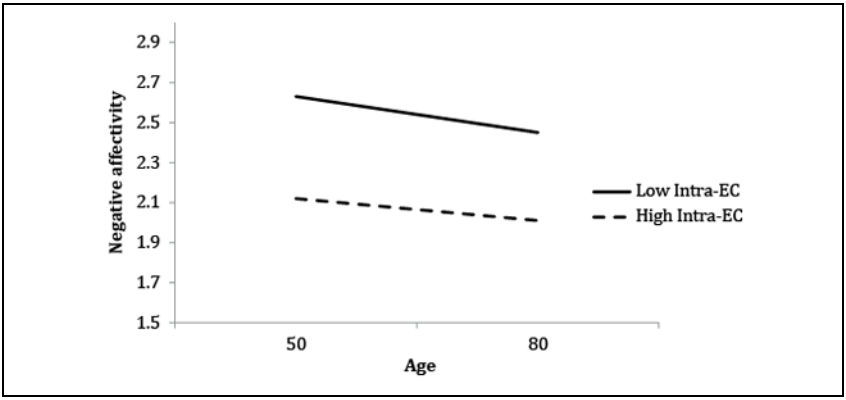

Figure 6. Moderating effect of intrapersonal EC on the relation between age and negative affectivity.

The Relationship Between Ages Differences in EC and Age Differences in Physical/Emotional Health

As suggested by an anonymous reviewer, we finally examined whether age differences in EC accounted for age differences in physical and emotional health. Regarding physical health, mediation analyses (with EC as a mediator of the age–physical health relationship) revealed that if EC was a significant

mediator of the relationship between age and Drugs A, B, C, and D, the effect size was quite trivial (.00-.01, with bootstrap CIs suggesting that the effect for drug consumption did not exceed .01, so a small effect according to Cohen (1992).

Regarding emotional health, mediation analyses revealed that EC did not account for age differences in emotional health except for Drug N consumption. But, here again, the effect was quite marginal (.01 with a bootstrap CI = [.00, .01]).

Discussion

The purpose of the present study was to investigate ECs in a population of 50 to 80 years old. We aimed to answer three questions. First, is the structure of ECs similar between older and younger adults? Second, how do ECs evolve over the 30 years between the ages of 50 and 80? Third, does the predictive power of ECs regarding physical and emotional health increase or decrease with age?

As far as the structure of ECs is concerned, factor analyses showed that the structure of ECs is similar in older and younger adults, and that it remains stable in old age. Analyses also confirmed the relevance of the S-PEC, which was previously validated in younger adults (Mikolajczak, Brasseur, & Fantini-Hauwel, 2014). The S-PEC can now be confidently used with people aged 50 to 80 years. The validation of a short instrument (20 items) to assess ECs in older people is all the more important, who often more difficulties than young people in sustaining attention on a task (Ylikoski et al., 1993)[AQ10].

Regarding the evolution of ECs in the elderly, our results allow to refine and qualify the conclusions of previous studies, which found that EC increase with age (e.g., Brasseur et al., 2013). While there may be a small positive linear correlation between EC and age when all adults are taken into account (i.e., from 18 years old to 90), our analyses within the elderly population show a more nuanced profile: identification, expression, and understanding of emotions deteriorate in old age (71-80) while emotion regulation improves. The fact that these ECs go in opposite directions should be puzzling, because emotion regulation has been thought to depend on the ability to identify, understand, and express emotions (Mayer, Salovey, Caruso, & Sitarenios, 2001). Nonetheless, our results are fully consistent with previous studies showing on one hand that alexithymia increases with age (e.g., Mattila, Salminen, Nummi, & Joukamaa, 2006[AQ11]) and that older people have more difficulty identifying emotions in lexical and facial stimuli than do younger people (e.g., Isaacowitz et al., 2007; see Ruffman et al., 2008, for

meta-analysis), and on the other hand that older participants report fewer negative emotional experiences and better emotional control (e.g., Gross et al., 1997). This profile of results (note that our study is the first one to have investigated all 10 ECs at once) provides support for both the neuropsychological perspective and the sociocognitive theories of emotion and aging. The neuropsychological perspective on aging suggests that impairment in cognitive functioning, such as cognitive control, processing speed, attention, or memory (Braver & Barch, 2002; Prull, Gabrieli, & Bunge, 2000), should lead to a decrease in ECs with age (Orgeta & Phillips, 2007; Sullivan & Ruffman, 2004). However, the socioemotional perspective (Carstensen, Isaacowitz, & Charles, 1999) on aging suggests that the growing personal experiences of interpersonal relations accumulated through age, as well as the perceived boundaries of time, should lead to a specific increase in emotion regulation with age (Carstensen & Mikels, 2005). This is exactly what we observed: a general decline in ECs, as predicted by the neuropsychological perspective, but a specific increase in emotion regulation, as predicted by the socioemotional selectivity and the selective optimization with compensation (Baltes & Baltes, 1990; Carstensen, 1995) theories. The fact that emotion regulation can improve while other emotional abilities decline clearly shows that emotion regulation does not fully depend on the other ECs, as previously thought. It also shows that a deficit in emotion identification, understanding, or expression does not automatically lead to a deficit in emotion regulation, as nevertheless suggested by several researchers in the domain of alexithymia (Taylor, Bagby, & Parker, 1997**[AQ12]**). This result is thus informative for understanding emotion regulation in younger people. Contrary to what even we thought thus far, it may not be necessary to improve emotion identification, understanding, and expression to improve emotion regulation.

Regarding our third question, namely, the predictive power of EC in the elderly, our results first show that, as expected, ECs influence both emotional and physical health: As was found in younger adults (Mikolajczak, Avalosse, et al., 2014), older adults with higher EC have a better emotional health and take fewer medication. The finding that ECs influence physical health is not that surprising. Indeed, emotions influence health via multiple pathways: (a) physiological pathways, such as sympathetic (see Kreibig, 2010, for review) or neuroendocrine (Aguilera, Kiss, Luo, & Akbasak, 1995; Buchanan, al'Absi, & Lovallo, 1999; Leonard, 2005) activation, immune changes (see Kiecolt-Glaser, McGuire, Robles, & Glaser, 2002; Segerstrom & Miller, 2004, for review), DNA damage (Irie et al., 2001; see Gidron, Russ, Tissarchondou, & Warner, 2006, for review), and gut-permeability (see Collins, 2001); and (b) health-behavior pathways such as risky behaviors

(Cooper, Agocha, & Sheldon, 2000) or alcohol abuse (Cooper, Frone, Russell, & Mudar, 1995). On the whole, negative emotions have a deleterious impact on health, whereas positive emotions have a protective one (see Salovey, Rothman, Detweiler, & Steward, 2000, for review). Considering that people with high ECs experience more positive emotions and fewer negative emotions, less physiological activation in negative conditions (e.g., Mikolajczak, Roy, Luminet, Fillee, & de Timary, 2007), and fewer health-damaging behaviors (Brackett et al., 2004), the effects observed in this study were expected and are perfectly in line with current models of health and illness as the product of complex interaction between psychosocial and biological factors (see Engel, 1980, for a more complete account of the biopsychosocial model of health).

Moderation analysis also showed that the importance of EC varies according to the variable and age group considered. Taken together, the results suggest that the predictive power of EC increases with age regarding physical health and decreases with age regarding emotional/mental health (including consumption of class N drugs, that is, psychotropic drugs). Looking at this question another way, we see that the most vulnerable age group vis-à-vis physical health is the 71- to 80-year-old group. And it is precisely for this group that EC appears to make the biggest difference. By contrast, regarding emotional health, the most vulnerable age group is the 50- to 59-year-old group. And it is precisely for this group that EC makes the biggest difference. We can therefore conclude that EC is all the more protective for people who are vulnerable.

As far as we know, this is the first study that has ever examined the impact of EC on health indicators in the elderly. The fact that older adults with high ECs take fewer drugs is particularly important, because the consumption of medication linearly increases with age, especially for drugs related to the blood and blood-forming organs, as well as the drugs related to the cardiovascular system. Observing that ECs significantly moderate the consumption of these two types of drugs is therefore particularly interesting. Indeed, contrary to other moderators (e.g., level of education, socioeconomic status) EC is a moderator on which we can potentially act. Previous studies in younger adults, at least, have shown that ECs can be developed through psychological interventions, with a significant positive impact on mental and physical well-being (Kotsou, Nelis, Grégoire, & Mikolajczak, 2011; Nelis et al., 2011). The current results strongly call for the development and validation of such interventions in the elderly.

Although informative, the current results suffer from some limitations. First, the response rate was admittedly low (11%), raising the possibility

that our sample is not fully representative of the elderly population. However, the large size of the remaining sample (N = 6,688) suggests that our conclusions have some validity. Second, our results were collected in only one country (i.e., Belgium). Yet, we do not see any peculiarities of the Belgian population that would prevent the generalization of the results to other occidental countries. Third, as pointed by an anonymous reviewer, there is ambiguity between age and cohort effects. With the data used in this study, it is not possible to distinguish between these two types of effects when interpreting age differences. Replication studies that would be either longitudinal or conducted in a few decades will have to remedy to this weakness. Fourth, health care consumption is an objective but nonetheless indirect indicator of health status. Some people (e.g., homeless) are in very bad health condition but do not consult doctors. Others are in objectively good health condition but make overuse of health care (due to a need for attention, hypochondria, etc.). Fortunately, the former constitute only a minority of people (probably not represented in our sample) as the social security system in Belgium makes health care easily accessible. The latter may be more represented in our sample but are unlikely to have severely biased the results. Indeed, while it is true that these people may have biased the results related to doctor consultations, they are less likely to have biased those related to reimbursed drug consumption or hospitalizations because only "true" health problems lead to the prescription of reimbursed medicines or to hospitalization.

Conclusion

The current study adds to the existing literature in three ways. First, by validating a short 20-item measure of EC, it will help reduce the cognitive cost of testing for older adults, thereby facilitating the study of EC in the elderly. Second, it showed that, contrary to what current theories of EC hold, emotion regulation can be decoupled from emotion identification, understanding, and expression. Third, it shows that EC significantly predicts emotional and physical health in the elderly. The more vulnerable that people are, the more important their level of EC is. The latter finding invites the development and validation of psychological interventions to increase EC in the elderly.

Declaration of Conflicting Interests [AQ13]

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding[AQ14]

The authors received no financial support for the research, authorship, and/or publication of this article.

References

Aguilera, G., Kiss, A., Luo, X., & Akbasak, B. S. (1995). The renin-angiotensin system and the stress response. *Annals of the New York Academy of Sciences, 771*, 173-186.

Aiken, L. S., & West, S. G. (1991). *Multiple regressions: Testing and interpreting interactions*. Thousand Oaks: Sage Publications.

.[AQ15]

Baltes, P., & Baltes, M. (1990). Psychological perspectives on successful aging: The model of selective optimization with compensation. In P. B. Baltes & M. M. Baltes (Eds.), *Successful aging: Perspectives from the behavioral sciences* (pp. 1–34). New York: Cambridge University Press.

[AQ16]

Brackett, M. A., Mayer, J. D., & Warner, R. M. (2004). Emotional intelligence and its relation to everyday behaviour. *Personality and Individual Differences, 36*, 1387-1402.

Brasseur, S., Grégoire, J., Bourdu, R., & Mikolajczak, M. (2013). The Profile of Emotional Competence (PEC): Development and validation of a self-reported measure that fits dimensions of emotional competence theory. *PLoS ONE, 8*, e62635.

Braver, T. S., & Barch, D. M. (2002). A theory of cognitive control, aging cognition, and neuromodulation. *Neuroscience & Biobehavioral Reviews, 26*, 809-817.

Buchanan, T. W., al'Absi, M., & Lovallo, W. R. (1999). Cortisol fluctuates with increases and decreases in negative affect. *Psychoneuroendocrinology, 24*, 227-241.

Carstensen, L. L. (1995). Evidence for a life-span theory of socioemotional selectivity. *Current Directions in Psychological Science, 4*, 151-156.

Carstensen, L. L., Isaacowitz, D., & Charles, S. T. (1999). Taking time seriously: A theory of socioemotional selectivity. *American Psychologist, 54*, 165-181.

Carstensen, L. L., & Mikels, J. A. (2005). At the intersection of emotion and cognition aging and the positivity effect. *Current Directions in Psychological Science, 14*, 117-121.

Charles, S. T., & Carstensen, L. L. (2007). Emotion regulation and aging. In JJ Gross (Ed.) *Handbook of Emotion Regulation*, pp. 307–20. New York: Guilford

.[AQ17]

Cohen, J. (1992). A power primer. Psychological Bulletin, 112(1), 155-159

Collins, S. M. (2001). IV. Modulation of intestinal inflammation by stress: Basic mechanisms and clinical relevance. *American Journal of Physiology—Gastrointestinal and Liver Physiology, 280*, G315-G318.

Consedine, N. S., & Magai, C. (2006). Emotional development in adulthood: A developmental functionalist review and critique. In C. Hoare (Ed.), *Handbook of adult development and learning* (pp. 123-148). New York, NY: Oxford University Press.

Cooper, M. L., Agocha, V. B., & Sheldon, M. S. (2000). A motivational perspective on risky behaviors: The role of personality and affect regulatory processes. *Journal of Personality, 68*, 1059-1088.

Cooper, M. L., Frone, M. R., Russell, M., & Mudar, P. (1995). Drinking to regulate positive and negative emotions: A motivational model of alcohol use. *Journal of Personality and Social Psychology, 69*, 990-1005.

Engel, G. L. (1980). The clinical application of the biopsychosocial model. *American Journal of Psychiatry, 137*, 535-544.

Gidron, Y., Russ, K., Tissarchondou, H., & Warner, J. (2006). The relation between psychological factors and DNA-damage: A critical review. *Biological Psychology, 72*, 291-304.

Gross, J. J., Carstensen, L. L., Pasupathi, M., Tsai, J., Götestam Skorpen, C., & Hsu, A. Y. C. (1997). Emotion and aging: Experience, expression, and control. *Psychology and Aging, 12*, 590-599. doi:10.1037/0882-7974.12.4.590

Hu, L. Ä., & 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*, 1-55. doi:10.1080/10705519909540118

Hughes, M. E., Waite, L. J., Hawkley, L. C., & Cacioppo, J. T. (2004). A Short Scale for Measuring Loneliness in Large Surveys Results from two Population-Based Studies. *Research on aging*, *26*(6), 655-672.

Irie, M., Asami, S., Nagata, S., Ikeda, M., Miyata, M., & Kasai, H. (2001). Psychosocial factors as a potential trigger of oxidative DNA damage in human leukocytes. *Cancer Science, 92*, 367-376.

Isaacowitz, D. M., Löckenhoff, C. E., Lane, R. D., Wright, R., Sechrest, L., Riedel, R., & Costa, P. T. (2007). Age differences in recognition of emotion in lexical stimuli and facial expressions. *Psychology and Aging, 22*, 147-159.

Kiecolt-Glaser, J. K., McGuire, L., Robles, T. F., & Glaser, R. (2002). Emotions, morbidity, and mortality: New perspectives from psychoneuroimmunology. *Annual Review of Psychology, 53*, 83-107.

Kotsou, I., Nelis, D., Grégoire, J., & Mikolajczak, M. (2011). Emotional plasticity: Conditions and effects of improving emotional competence in adulthood. *Journal of Applied Psychology, 96*, 827-839.

Kreibig, S. D. (2010). Autonomic nervous system activity in emotion: A review. *Biological Psychology, 84*, 394-421.

Leonard, B. E. (2005). The HPA and immune axes in stress: The involvement of the serotonergic system. *European Psychiatry, 20*(Suppl. 3), S302-S306. doi:10.1016/S0924-9338(05)80180-4

Leroy, V., & Grégoire, J. (2007). *Influence of individual differences on emotional regulation in learning situation, and consequences on academic performance*.

Paper presented at the European Association for Research on Learning and Instruction, Budapest, Hungary, 28 August-1st september 2007..[AQ18]

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*, 1018-1034.

Lopes, P. N., Salovey, P., Côté, S., Beers, M., & Petty, R. E. (2005). Emotion regulation abilities and the quality of social interaction. *Emotion, 5*, 113-118.

Martins, A., Ramalho, N., & Morin, E. (2010). A comprehensive meta-analysis of the relationship between emotional intelligence and health. *Personality and Individual Differences, 49*, 554-564.

Mattila, A., Salminen, J., Nummi, T., & Joukamaa, M. (2006). Age is strongly associated with alexithymia in the general population. *Journal of psychosomatic research*, *61*(5), 629-635..

Mayer, J. D., & Salovey, P. (1997). What is emotional intelligence. In P. Salovey & D. Sluyter (Eds.), *Emotional development and emotional intelligence: Educational implications* (pp. 3-31). New York, NY: Basic Books.

Mayer, J. D., Salovey, P., Caruso, D. R., & Sitarenios, G. (2001). *Emotional intelligence as a standard intelligence*. Emotion, *1,* 232-242 [AQ19]

Mikolajczak, M., Avalosse, H., Vancorenland, S., Verniest, R., Callens, M., Van Broeck, N, Fantini-Hauwel, C & Mierop, A. (Submitted). *A nationally representative study of emotional competence and health*.[AQ20]

Mikolajczak, M., Brasseur, S., & Fantini-Hauwel, C. (2014). Measuring intrapersonal and interpersonal EQ: The Short Profile of Emotional Competence (S-PEC). *Personality and Individual Differences, 65*, 42-46.[AQ21]

Mikolajczak, M., Menil, C., & Luminet, O. (2007). Explaining the protective effect of trait emotional intelligence regarding occupational stress: Exploration of emotional labour processes. *Journal of Research in Personality, 41*, 1107-1117.

Mikolajczak, M., Petrides, K. V., Coumans, N., & Luminet, O. (2009). The moderating effect of trait emotional intelligence on mood deterioration following laboratory-induced stress. *International Journal of Clinical and Health Psychology, 9*, 455-477.

Mikolajczak, M., Quoidbach, J., Kotsou, I., & Nelis, D. (2009). *Les compétences émotionnelles*. Paris, France: Dunod.[AQ22]

Mikolajczak, M., Roy, E., Luminet, O., Fillee, C., & de Timary, P. (2007). The moderating impact of emotional intelligence on free cortisol responses to stress. *Psychoneuroendocrinology, 32*, 1000-1012. doi:S0306-4530(07)00196-5 [pii] 10.1016/j.psyneuen.2007.07.009

Nelis, D., Kotsou, I., Quoidbach, J., Hansenne, M., Weytens, F., Dupuis, P., & Mikolajczak, M. (2011). Increasing emotional competence improves psychological and physical well-being, social relationships, and employability. *Emotion, 11*, 354-366.

O'Boyle, E. H., Humphrey, R. H., Pollack, J. M., Hawver, T. H., & Story, P. A. (2011). The relation between emotional intelligence and job performance: A meta-analysis. *Journal of Organizational Behavior, 32*, 788-818.

Orgeta, V., & Phillips, L. H. (2007). Effects of age and emotional intensity on the recognition of facial emotion. *Experimental Aging Research, 34*, 63-79.

Petrides, K. V., Frederickson, N., & Furnham, A. (2004). The role of trait emotional intelligence in academic performance and deviant behavior at school. *Personality and Individual Differences, 36*, 277-293.

Petrides, K. V., & Furnham, A. (2001). Trait emotional intelligence: Psychometric investigation with reference to established trait taxonomies. *European Journal of Personality, 15*, 425-448.

Petrides, K. V., & Furnham, A. (2003). Trait emotional intelligence: Behavioural validation in two studies of emotion recognition and reactivity to mood induction. *European Journal of Personality, 17*, 39-57.

Petrides, K. V., Sangareau, Y., Furnham, A., & Frederickson, N. (2006). Trait emotional intelligence and children's peer relations at school. *Social Development, 15*, 537-547.

Prull, M. W., Gabrieli, J. D. E., & Bunge, S. A. (2000). *Age-related changes in memory: A cognitive neuroscience perspective, In Craik, Fergus I. M. (Ed); Salthouse, Timothy A. (Ed), (2000). The handbook of aging and cognition (2nd ed.), (pp. 91-153). Mahwah, NJ, US: Lawrence Erlbaum Associates Publishers* .[AQ23]

Ruffman, T., Henry, J. D., Livingstone, V., & Phillips, L. H. (2008). A meta-analytic review of emotion recognition and aging: Implications for neuropsychological models of aging. *Neuroscience & Biobehavioral Reviews, 32*, 863-881.

Salovey, P., Rothman, A. J., Detweiler, J. B., & Steward, W. T. (2000). Emotional states and physical health. *American Psychologist, 55*, 110-121.

Scheibe, S., & Carstensen, L. L. (2010). Emotional aging: Recent findings and future trends. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 65*, 135-144.

Schutte, N. S., Malouff, J. M., Bobik, C., Coston, T. D., Greeson, C., Jedlicka, C., . . . Wendorf, G. (2001). Emotional intelligence and interpersonal relations. *Journal of Social Psychology, 141*, 523-536.

Schutte, N. S., Malouff, J. M., Simunek, M., McKenley, J., & Hollander, S. (2002). Characteristic emotional intelligence and emotional well-being. *Cognition & Emotion, 16*, 769-785.

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*, 921-933.

Segerstrom, S. C., & Miller, G. E. (2004). Psychological stress and the human immune system: A meta-analytic study of 30 years of inquiry. *Psychological Bulletin, 130*, 601-630.

Sullivan, S., & Ruffman, T. (2004). Emotion recognition deficits in the elderly. *International Journal of Neuroscience, 114*, 403-432.

Taylor, G. J., Bagby, R. M., & Parker, J. D. A. (1997). *Disorders of affect regulation: Alexithymia in medical and psychiatric illness*. Cambridge University Press.[AQ24]

Trinidad, D. R., & Johnson, C. A. (2002). The association between emotional intelligence and early adolescent tobacco and alcohol use. *Personality and Individual Differences, 32*, 95-105.

Van Rooy, D. L., & Viswesvaran, C. (2004). Emotional intelligence: A meta-analytic investigation of predictive validity and nomological net. *Journal of Vocational Behavior, 65*, 71-95.

Ylikoski, R., Ylikoski, A., Erkinjuntti, T., Sulkava, R., Raininko, R., & Tilvis, R. (1993). White matter changes in healthy elderly persons correlate with attention and speed of mental processing. *Archives of Neurology, 50*, 818-824. **[AQ25]**