EMOTIONAL INTELLIGENCE AND COGNITIVE ABILITIES

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PUBLISHED IN : Frontiers in Psychology

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EMOTIONAL INTELLIGENCE AND COGNITIVE ABILITIES

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Nowadays, not only psychologists are interested in the study of Emotional Intelligence (EI). Teachers, educator, managers, employers, and people, in general, pay attention to EI. For example, teachers would like to know how EI could affect student's academic results, and managers are concerned about how EI influences their employees' performance. The concept of EI has been widely used in recent years to the extent that people start to applying it in daily life. EI is broadly defined as the capacity to process and use emotional information. More specifically, according to Mayer and Salovey, EI is the ability to: "1) accurate perception, appraise, and expression of emotion; 2) access and/or generation of feelings when they facilitate thought; 3) understand emotions and emotional knowledge; and 4) regulate emotions to promote emotional and intellectual growth" (Mayer and Salovey 1997, p. 10).

When new information arises into one specific area of knowledge, the work of the scientists is to investigate the relation between this new information and other established concepts. In this sense, EI could be considered as a new framework to explain human behaviour. As a young concept in Psychology, EI could be used to elucidate the performance in the activities of everyday life.

Over the past two decades, studies of EI have tried to delimitate how EI is linked to other competences. A vast number of studies have reported a relation between EI and a large list of competences such as academic and work success, life satisfaction, attendee to emotions, assertiveness, emotional expression, emotional-based decision making, impulsive control, stress management, among others. Moreover, recent researches have shown that EI plays an important role in the prediction of behaviour besides personality and cognitive factors.

However, it is not until quite recently, that studies on EI have considered the importance of individual differences in EI and their interaction with cognitive abilities.

The general issue of this Research Topic was to expose the role of individual differences on EI in the development of a large number of competencies that support a more efficient performance in people's everyday life. The present Research Topic provide an extensive review that may give light to the better understanding of how individual differences in EI affect human behaviour. We have considered studies that analyse: 1) how EI contributes to emotional, cognitive and social process beyond the well-known contribution of IQ and personality traits, as well as the brain system that supports the EI; 2) how EI contributes to relationships among emotions and health and well-being, 3) the roles of EI during early development and the evaluation in different populations, 4) how implicit beliefs about emotions and EI influence emotional abilities.

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Editorial: Emotional Intelligence and Cognitive Abilities

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The Editorial on the Research Topic

Emotional Intelligence and Cognitive Abilities

A quarter-century after Peter Salovey and John Mayer introduced the concept of emotional intelligence (EI; Salovey and Mayer, 1990), it remains an important and growing research area. EI is usually analyzed from the perspective of the ability model or mixed models. The ability model focuses on an individual's mental abilities to apply information provided by emotions for the improvement of cognitive processing. Mixed models conceptualize EI as the combination of mental abilities, stable behavioral traits and personality variables (see Mayer et al., 2008). The present research topic brings together 14 articles that, building on previous studies (Mayer et al., 2008; Fernández-Berrocal et al., 2014; Webb et al., 2014), analyze the relevance of EI in different domains of daily life, including health-related outcomes, social functioning, and academic and workplace performance. These articles approach the problem from different theoretical perspectives using different measurements.

The research topic opens with a review by Peña-Sarrionandia et al. on studies that apply the emotion regulation conceptual framework to understanding how emotion regulation processes underlie EI. This review offers an integrated view of the field that may help the reader better understand the other articles in this research topic.

Researchers continue to debate whether EI contributes significantly to emotional, cognitive, and social processes beyond the well-known contribution of IQ and personality traits. The link between cognitive ability and general intelligence is well-established, and evidence also suggests a link between cognitive ability and EI. Checa and Fernández-Berrocal show that the Managing Emotions dimension of EI measured by the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) is negatively related to impulsivity during cognitive tasks. Boyatzis et al. report that the association of general intelligence with the behavioral dimension of EI differs from its association with other EI dimensions. Individuals with greater EI ability (based on the MSCEIT) perceive more available social support, after controlling for fluid intelligence and personality traits (Di Fabio). EI abilities have also been implicated in divergent thinking and motivational state (Takeuchi et al.). At the same time, not all studies suggest a significant contribution of EI beyond IQ or personality. Furnham et al. examine associations of personality traits with self- and other-reported EI (based on the Bar-on EQ-I) in business settings, and they find poor incremental benefit of this EI measure beyond personality testing. Together, these studies suggest that EI is a relevant and useful variable for understanding and explaining various human processes, though further research should clarify its importance relative to IQ and personality.

The importance of EI in cognitive and behavioral processes prompts the question: what is the brain system that supports EI? Studies have implicated the ventromedial and dorsolateral prefrontal cortex (Krueger et al., 2009), as well as the dopaminergic system (Takeuchi et al.).

Recent studies suggest that EI contributes to relationships among emotions, health, and well-being. Some articles in this research topic focus on this contribution in different contexts. Fernández-Abascal and Martin-Diaz suggest that dimensions of self-report EI are better predictors of Mental Health than of Physical Health in adults. Limonero et al. suggest that the Emotional Facilitation and Emotional Understanding branches of MSCEIT are related to previous mood states and to mood recovery after induction of negative mood. Elipe et al. analyze perceived EI as a moderator between cyber-victimization and its emotional impact on university students, while Amdurer et al. provides longitudinal data suggesting that EI predicts career satisfaction and success. Sánchez-Álvarez et al. confirm in a 2-year longitudinal study that positive and negative affect mediate the relationships between EI and life satisfaction in adolescents.

EI also appears to play important roles during early development (Mayer et al., 2008). This provides a clear example of where knowledge about EI may lead to useful interventions to improve quality of life. During middle childhood, reading and discussing children's books with emotional content can improve emotional competence (Kumschick et al.). Efforts to evaluate EI in different populations, such as deaf people (Mestre et al.), may open up promising avenues for designing interventions to improve integration, reduce alienation and enrich quality of life. Indeed, the research topic closes with an article by Cabello and Fernández-Berrocal that provides the first evidence that implicit beliefs about emotions and EI may influence emotional abilities (based on MSCEIT). This may have important consequences for personal and professional EI training.

While this research topic answers some important questions from various perspectives, it does not address several other questions and it also raises new ones. For example, longitudinal and interventional studies should examine how different EI measures may interact with socio-demographic, educational and cultural factors, as well as with psychological factors such as IQ and personality, to impact personal, professional, and social outcomes (Cabello et al.; Cabello and Fernandez-Berrocal, 2015; Peña-Sarrionandia et al.).

We hope that this research topic highlights new knowledge and raises further questions about how individual differences in EI explain differences in cognitive processes and emotion regulation, which can have important real-world consequences.

AUTHOR CONTRIBUTIONS

All authors listed, have made substantial, direct and intellectual contribution to the work, and approved it for publication.

FUNDING

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Integrating emotion regulation and emotional intelligence traditions: a meta-analysis

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Two relatively independent research traditions have developed that address emotion management. The first is the *emotion regulation* (ER) tradition, which focuses on the processes which permit individuals to influence which emotions they have, when they have them, and how they experience and express these emotions. The second is the *emotional intelligence* (EI) tradition, which focuses—among other things—on individual differences in ER. To integrate these two traditions, we employed the process model of ER (Gross, 1998b) to review the literature on EI. Two key findings emerged. First, high EI individuals shape their emotions from the earliest possible point in the emotion trajectory and have many strategies at their disposal. Second, high EI individuals regulate their emotions successfully when necessary but they do so flexibly, thereby leaving room for emotions to emerge. We argue that ER and EI traditions stand to benefit substantially from greater integration.

Keywords: emotional intelligence, emotional competence, emotion regulation, coping, review, meta-analysis

INTRODUCTION

Contemporary accounts of emotions emphasize the important role they play in adaptation (e.g., Cosmides and Tooby, 2000). Numerous studies support this view, showing that emotions facilitate adaptation by optimizing sensory intake (Susskind et al., 2008; Vermeulen et al., 2009), improving detection of threatening stimuli (e.g., Ohman et al., 2001; Williams et al., 2004; Pessoa et al., 2005), readying behavioral responses (e.g., Frijda, 1987; Roseman et al., 1994), assisting decision making (Damasio, 1994), enhancing memory for important events (Phelps, 2006; Luminet and Curci, 2009), and guiding interpersonal interactions (Keltner and Kring, 1998).

It is also evident, however, that emotions are by no means *always* helpful (e.g., Salovey and Mayer, 1990; Parrott, 1993; Gruber et al., 2011). Indeed, emotions can at times lead us to do very unhelpful things. This is the case, for instance, when anger toward a stubborn administrator only worsens our situation, or when excitement leads us to buy a house that we cannot afford. Emotions may thus be said to be *maladaptive* when they are of the wrong type, when they come at the wrong time, or when they occur at the wrong intensity level. At such times, we often try to *regulate* our emotions (Gross, 1998b).

Because our emotions are crucial determinants of how well we function in everyday life, researchers from different perspectives have energetically sought to understand how emotions best can be managed for optimal functioning. In this article, we focus on two relatively independent research traditions that have examined this question. The first is the emotion regulation (ER) tradition, which has mainly focused on *how* a person can effectively manage his/her emotions. The second is the emotional intelligence (EI) tradition, which has focused—among other things—on understanding *who* makes the most of his/her emotions. Thus far, the ER literature principally has been concerned with basic processes, and only recently has begun to place more emphasis on individual differences. Conversely, the EI literature principally has been concerned with individual differences, and only recently has begun to focus on basic processes. The present paper constitutes an attempt to bring these two traditions together in the hopes that they will both inform and benefit from each other. This effort draws upon prior contributions by Barrett and Gross (2001), Barrett and Salovey (2002), and Matthews et al. (2002), who have all underlined the necessity for the science of emotional intelligence to integrate knowledge acquired in other areas of the affective sciences. This effort is predicated on the belief that EI research can reciprocally inform and complement fundamental research traditions such as ER, first by calling attention to the differences among individuals and second, by emphasizing the consequences of such differences in real life settings (e.g., at work, in education, in marital relationships).

THE EMOTION REGULATION (ER) TRADITION

Emotion regulation refers to the processes by which individuals modify the trajectory of one or more component(s) of an emotional response. Emotion regulation can thus serve to influence the type (i.e., which emotion one has), intensity (i.e., how intense the emotion is), time course (i.e., when the emotion starts and how long it lasts), and quality (i.e., how the emotion is experienced or expressed) of the emotion. Such regulation may be

automatic or effortful, conscious or unconscious (Mauss et al., 2006). It occurs every time one (consciously or unconsciously) activates the goal to influence the emotion-generative process (Gross et al., 2011).

Emotion regulation may be intrinsic/intrapersonal (regulating one's own emotions) or extrinsic/interpersonal (regulating someone else's emotions) (Gross and Jazaieri, 2014). In this paper, we will focus on intrapersonal emotion regulation. Although people typically try to decrease the experiential and/or behavioral aspects of negative emotions (Gross et al., 2006), positive emotions are also down-regulated. This is the case when we try to look less happy than we are when we have passed a difficult exam that a friend has failed, when we try to decrease feelings of attraction for a colleague who is married, or when we try to avoid laughing at an inappropriate moment (Giuliani et al., 2008). It is important to note that emotion regulation needn't involve down-regulation. It can also involve maintaining or increasing emotion, as when we maintain enthusiasm in order to achieve a long and difficult task, increase the expression of sadness at a funeral or increase our amusement at a colleague's supposedly funny joke.

The emotion regulation tradition aims to understand the myriad ways individuals regulate their emotions. One critical part of the study of ER has been the conceptual analysis of emotion regulation strategies and the development of a model to organize them. Before presenting this model, it is noteworthy that the ER tradition has learned to avoid classifying ER strategies as *a priori* adaptive or maladaptive. An emotion regulation strategy is said to be contextually adaptive if the resulting emotion meets the regulator's goals, regardless of social norms or long-term adaptive value (Thompson and Calkins, 1996; Gross and Thompson, 2007). If the goal of a boss is to have his subordinates work overtime, his anger up-regulation process will be deemed successful if it results in increased anger and if his subordinates work overtime. The same emotion-regulation strategy can thus be adaptive or maladaptive, depending on the specific individual, the emotion, its intensity, and the context (Bonanno et al., 2004; Sheppes et al., 2011; Aldao and Nolen-Hoeksema, 2012). According to the ER tradition, the adaptive nature of a given emotion-regulation episode is the product of three factors: awareness, goals, and strategies (Gross and Jazaieri, 2014). The awareness of one's emotion and the context in which it occurs makes it possible to determine whether or not the emotion should be regulated (which creates space for flexibility), and to access knowledge about how to do so (Barrett et al., 2001; Farb et al., 2014). The emotion-regulation goal determines whether emotion experience, expression, or physiology must be increased, maintained or decreased in duration and/or intensity. Once the emotion-regulation goal has specified the ends, emotion-regulation strategies specify the means which can be more or less efficient to reach the goal (Gross and Jazaieri, 2014).

The process model of emotion regulation (Gross, 1998b) provides a framework for classifying emotion regulation processes regardless of their potential (mal)adaptive value. This model categorizes strategies according to the point at which they have their primary impact in the emotion generative process. During the milliseconds and seconds following the occurrence of a potentially emotion-eliciting situation (micro-level), there are five

points in time at which individuals might intervene in order to modify their emotion trajectory. These points represent five families of emotion regulation strategies (see **Figure 1**). Although sequential at the micro-level, these strategies can be used in parallel or in any order at the macro-level (i.e., at the level of minutes, hours, or days following the emotional situation). Put differently, if the emotion trajectory was not altered or if the emotion was ill-regulated at the micro-level, one can still regulate it later by using any of the five families of strategies.

SITUATION SELECTION

Situation selection involves choosing or avoiding some activities, people or places as a function of their expected emotional impact. It is placed at the left-most point in **Figure 1** because it affects the situation to which a person is exposed, and thus shapes the emotion trajectory at the earliest possible point. Adaptive situation selection involves knowing oneself and one's needs, forecasting the emotions that various situations are expected to produce (which is not as simple as it may sound; Wilson and Gilbert, 2005), and taking these emotions into account when selecting the situations to which one will be exposed (Loewenstein, 2007; Gross, 2008). Naturally, the costs and benefits in the short and long term must be carefully weighed before making the choice. Two situation selection strategies are confrontation and avoidance.

Confrontation involves choosing to face a situation in spite of the negative emotions it might potentially elicit. This strategy is particularly efficient if the situation is likely to bring long-term benefits. Speaking in public often induces negative emotions in the short term, but avoiding oral presentations in front of one's team might turn counterproductive for future promotions. Two meta-analyses indeed confirm that while confrontation often produces negative emotion in the short-term, it is an efficient strategy to maximize long-term happiness and mental health (Suls and Fletcher, 1985; Aldao et al., 2010).

Avoidance refers to the escape of the situation as a whole. If a situation is unlikely to bring future benefits and if there are no avoidance-related side effects (or if a situation has more detrimental than beneficial effects), then avoidance is often the best strategy. In the other cases, avoidance is likely to become dysfunctional. Research has shown that the chronic use of avoidance is associated with poor indicators of long-term well-being and health (see Suls and Fletcher, 1985; Penley et al., 2002; Aldao et al., 2010 for meta-analyses and reviews).

Although situation selection may be an efficient strategy, one cannot always avoid negative situations/emotions. The families of ER strategies presented next are useful in three main situations: (1) situations that are expected to induce negative emotions but that cannot be avoided due to positive long-term benefits, (2) unexpected situations that cause an unwanted emotion, and (3) situations that induce a conditioned negative emotion.

SITUATION MODIFICATION

Situation modification, shown in **Figure 1**, encompasses the strategies aimed at modifying the situation so as to alter its emotional impact. Three strategies have received special attention: direct situation modification, support-seeking, and conflict resolution.

FIGURE 1 | The process model of emotion regulation (Gross, 1998b, 2014).
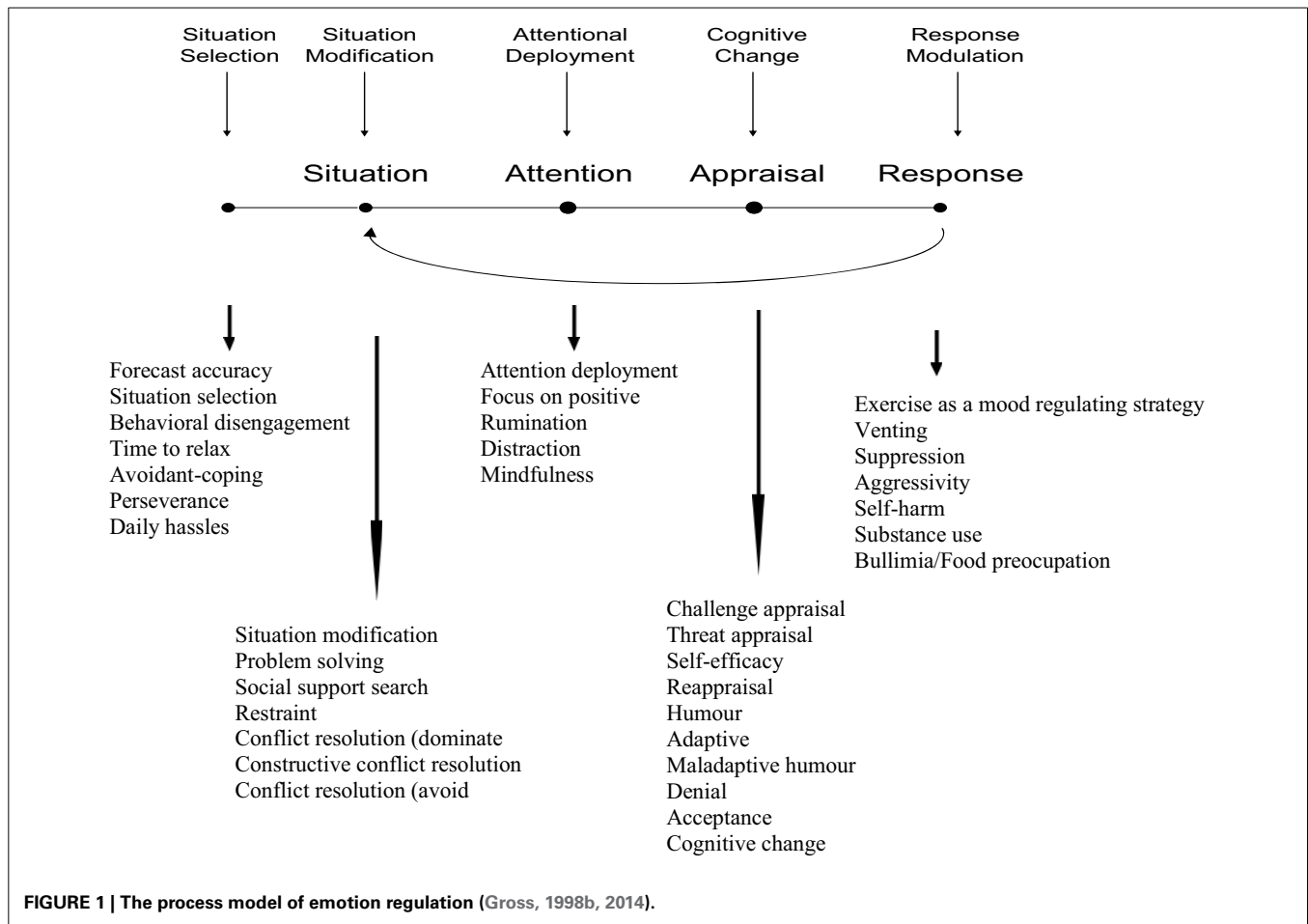
Direct situation modification (also called *problem-focused coping* in the stress tradition; Folkman and Lazarus, 1980) involves taking practical actions that impact directly on the situation (e.g., fixing the broken printer; rehearsing one's presentation). This strategy is usually associated with increased well-being and less psychological disorders (see Aldao et al., 2010 for a meta-analysis) as well as better health outcomes (see Penley et al., 2002 for a meta-analysis).

Help/support-seeking involves seeking others' assistance in modifying the situation (e.g., asking a classmate for some help in order to finish homework by the deadline or seeking the help of a counselor to deal with a difficult child). Although there are situations in which instrumental benefits come at a certain psychological cost (Nadler, 1991), the ability to seek—and obtain—help from others has long been judged adaptive by clinical and educational psychologists (Wills, 1987; Newman, 1994).

Conflict resolution involves taking steps to modify (defuse) a conflict situation (e.g., the conflict that my husband and I are having concerning whether to send our daughter to boarding school). While many different strategies can be used (Wall and Callister, 1995), they are not all efficient in reducing conflict (Deutsch et al., 2011). Moreover, while some techniques make it possible to achieve one's ends (e.g., I won: my daughter will stay at home), they can be unsuccessful at addressing the relationship

dimensions of the conflict (my husband now agrees with my decision but remains bitter). The opposite could also be true (I may finally agree with my husband but be resentful). Only a few techniques engender satisfaction with both the decision and the relationship (Demoulin, 2014).

Although situation modification strategies make an early impact on the emotion generation process, it is not possible to modify every emotion-eliciting situation: one can neither prevent a sick colleague from coughing loudly every 5 min, nor easily get rid of a tyrannical boss. Other strategies must thus be considered.

ATTENTIONAL DEPLOYMENT

Attentional deployment involves altering how we feel by selecting the information we attend to. It comes after situation modification in **Figure 1**. Existing literature has mainly focused on three forms of attentional deployment: distraction, rumination, and mindfulness.

Distraction involves a shift in attention, either away from the situation altogether or away from emotional aspects of the situation. It therefore includes the physical withdrawal (such as covering the eyes in front of a severely injured body) or the internal redirection of attention (such as focusing on the non-emotional aspects of the situation, or thinking about something else). Distraction has been found to decrease negative emotions

(see Webb et al., 2012 for a meta-analysis), especially when associated with problem-focused coping (Shimazu and Schaufeli, 2007).

Rumination refers to a perseverative focus on thoughts and feelings associated with a negative emotion-eliciting event. It has been found to increase the duration and intensity of negative emotions (Morrow and Nolen-Hoeksema, 1990; Bushman, 2002) and to predict the onset, number and duration of depressive episodes over a 2.5 year follow-up of initially non-depressed individuals (Robinson and Alloy, 2003). Accordingly, this emotion regulation strategy is highly prevalent in clinical populations (see Aldao et al., 2010 for a meta-analysis).

Mindfulness (also called "*mindful attention awareness*" to distinguish it from the ritualized practice of mindfulness meditation) involves purposefully paying attention to the present moment in a non-judgmental way. It consists in observing what is happening moment by moment in one's internal (thoughts, motives, emotions, bodily sensations) and external world, without judging it. Numerous cross-sectional, experience-sampling, experimental and intervention studies show that mindful attention increases happiness (Killingsworth and Gilbert, 2010) and decreases negative affects such as stress, anxiety, or depression (Brown and Ryan, 2003; Hofmann et al., 2010). It is worth noting that the balance between internal attention (what I think/feel) and external attention (what I do) is essential. Simply focusing on one's emotions and sensations does not produce the same benefits and can even be counter-productive (see Webb et al., 2012 for a meta-analysis).

COGNITIVE CHANGE

Cognitive change (shown fourth in line in **Figure 1**) refers to changing the way we think in order to change the way we feel. We can either change how we think about the situation itself or about our capacity to manage its demands. Like the other strategies, cognitive change can be automatic or effortful. As it is difficult to determine whether the conscious appraisal of a situation is the spontaneous initial appraisal of the situation or the product of an automatic reappraisal, we chose to include both appraisals and re-appraisals in this section. The four forms of (re)appraisals that have received the most attention are self-efficacy appraisals, challenge/threat appraisals, positive reappraisal, and acceptance.

Self-efficacy appraisal captures an individual's confidence that s/he is able to deal with the situation (Bandura, 1997). Higher levels of self-efficacy lead to both lower subjective stress and increased cellular immunity (e.g., Wiedenfield et al., 1990).

Challenge and threat appraisals (Lazarus and Folkman, 1984; Tomaka et al., 1997) refer to the gains and losses perceived in an adverse situation. Threat appraisal is thought to occur when an individual appraises a given situation as exceeding his or her resources and/or focuses on the potential/actual losses inherent to the situation (e.g., loss of love and security in the case of a divorce). By contrast, challenge appraisal occurs in situations appraised as taxing resources but in which the individual, while recognizing the potential or actual losses—which makes it different from unrealistic optimism—focuses on the potential or actual gains inherent to the situation (e.g., increase in autonomy and decrease in quarrels in the case of a divorce). Challenge appraisals

lead to less subjective stress and less hypothalamic-pituitary-adrenal axis activation than threat appraisals (e.g., Tomaka et al., 1993; Gaab et al., 2005).

Positive reappraisal refers to reappraising a situation or one's response to it in a more positive way. It may consist for instance in looking for the silver lining in the situation, in putting things into perspective or in reinterpreting one's negative emotional response as normal given the circumstances. Studies have shown that reappraisal strategies generally lead to a decrease in negative emotion experience and expression (see Webb et al., 2012 for a meta-analysis). Findings regarding its efficiency to modify physiology are mixed (Webb et al., 2012). While some studies show that reappraisal decreases neuroendocrine and autonomic responses (e.g., Dandoy and Goldstein, 1990; Abelson et al., 2005; Jamieson et al., 2012; Ben-Naim et al., 2013), other studies show that reappraisal increases them (e.g., Denson et al., 2014. Alternative studies have found that reappraisal neither increases nor decreases these responses (e.g., Gross, 1998a). Future studies should uncover the moderators of its effect.

Acceptance refers to accepting the situation and/or one's incapacity to deal with it. It is especially useful in situations that cannot be easily modified or reappraised (e.g., abuse as a child; incurable disease). The acceptance of uncontrollable negative events and the emotions that they elicit has been found to be protective at both psychological (decreases negative emotions) and physical (provides immunity and decreases pain) levels (e.g., Burns et al., 2002; McCracken and Eccleston, 2003). This strategy is not frequently used by people suffering from psychological disorders (see Aldao et al., 2010 for a meta-analysis).

RESPONSE MODULATION

Response modulation is shown on the right side of **Figure 1**. As this placement indicates, it occurs late in the emotion-generative process, after response tendencies have developed. These strategies can target the experiential (i.e., when one shares one's emotion or drinks a glass of alcohol in order to decrease feelings of anxiety), physiological (i.e., when one smokes marijuana in order to decrease the heart rate, or acts aggressively to defuse physical tension), and/or behavioral (when one attempts to hides one's emotion from others) components of the emotional response. Among response modulation forms, emotion sharing, aggression, substance abuse, and expressive suppression have received the most attention.

Emotion sharing refers to expressing one's emotions in a socially shared language (Rimé, 2007). It typically consists in describing the emotional event that one has just experienced or witnessed. If I just saw a pedestrian hit by a car, I will probably call someone I know to tell him or her about it. People share emotion primarily because they expect it to foster emotional recovery (catharsis effect). Research has however shown that sharing *per se* does not foster emotional recovery. Nevertheless, sharing emotion is beneficial to mental health due to several indirect effects such as the construction or reinforcement of social bonds and the transference of affection and warmth (see Rimé, 2007 for a review).

Verbal/physical aggression is a strategy used to reduce the bodily tension that arises from an emotional situation (which may

or may not be related to the person targeted). Although expressing one's emotions is generally beneficial for both mental and physical health (e.g., Taylor et al., 1997), a number of studies suggest that hostility—and especially its "expressive" dimension—leads to exaggerated cardiovascular reactivity in response to provocative stressors (Suls and Wan, 1993). It also increases the possibility of developing coronary-heart disease (see Miller et al., 1996 for a meta-analysis). Needless to say, this strategy is also very detrimental to social relationships.

Substance use refers to exaggerated consumption of alcohol, drugs, or medicines in order to anesthetize thoughts, feelings, and/or physiological arousal. Although moderate alcohol consumption can have health benefits (for a review, see Baum-Baicker, 1985), the regular use (and thus abuse) of alcohol and drugs as a coping style is associated with poor outcomes in terms of mental and physical health (e.g., Single et al., 2000; Teesson et al., 2000).

Expressive suppression consists of inhibiting the behavioral expression of unwanted emotions (e.g., hiding one's anger). Research has found that suppression is highly prevalent in several psychological disorders (see Aldao et al., 2010 for a meta-analysis). While it does decrease the observable emotion, suppression rarely changes the negative emotion experience (although it may decrease positive emotion). Moreover, it actually *increases* sympathetic activation of the cardiovascular system (e.g., Gross and Levenson, 1993, 1997; Gross, 1998a; Harris, 2001; Demaree et al., 2006; see Webb et al., 2012 for a meta-analysis). This may explain why expressive suppression decreases well-being (Gross and John, 2003) and increases vulnerability to cardiovascular diseases (see Mauss and Gross, 2004 for review).

Finally, it is worth noting that although it has received little attention, physical exercise can also be used as an emotion regulation strategy.

THE EMOTIONAL INTELLIGENCE (EI) TRADITION

A second tradition that has examined emotion management is the EI tradition. This tradition places emphasis on individual differences rather than on basic processes. It argues that the various instances of emotion regulation are not totally independent of one another within a given individual. On the contrary, individuals show some consistency in their regulation habits (i.e., when, how and which emotion component they regulate). Each individual can thus be characterized by a certain emotion regulation style, which contributes to make him/her predictable in the eyes of others and also carries certain consequences for long-term adaptation (e.g., Bar-On, 1997; Mayer and Salovey, 1997; Gross and John, 2003).

The emotional intelligence (EI) tradition aims to provide a scientific framework for studying individual differences with regard to how individuals identify, understand, express, regulate, and use their own emotions and those of others (Mayer and Salovey, 1997; Petrides and Furnham, 2003; Brasseur et al., 2013). One critical part of the study of EI has been the analysis of individual differences in emotion regulation (Akerjordet and Severinsson, 2007; Roberts et al., 2007). Regardless of the EI model or measure, people scoring high on EI tests are assumed to regulate their emotions better than people scoring low on EI tests.

INTELLIGENT EMOTION REGULATION

The emotional intelligence tradition is outcome-oriented rather than process-oriented in the sense that it seeks to capture the *outcome* of emotion regulation. Individuals are said to display intelligent emotion regulation if they are able to use emotion regulation in a flexible manner and in a way that is consistent with their goals and thus adaptive (Mayer and Salovey, 1995; Bar-On et al., 2003; Mayer et al., 2008). Put differently, emotionally intelligent individuals are those who carefully review the context before deciding whether and how they should regulate their emotion. These individuals take into account and maximize intra-individual and inter-individual long-term survival and welfare. For instance, a boss who up-regulates his anger in order to have his subordinates work overtime will be said to be manipulative but not emotionally intelligent because his emotional behavior will most likely impair his social adaptation in the long-term and lead his subordinates to burn-out. Another feature of emotionally intelligent regulation is that it takes into account the emotional display rules of the culture in which one lives.

In accordance with this adaptation-oriented view, EI has been associated with indicators of superior adaptation in many domains of life. Examples of this are higher life satisfaction (e.g., Petrides et al., 2007b; Di Fabio and Saklofske, 2014b), better health, both objectively measured (Mikolajczak et al., in press) and subjectively reported (see Schutte et al., 2007; Martins et al., 2010 for a meta-analyses), increased social support (e.g., Mikolajczak et al., 2007a), better quality of social and marital relationships (e.g., Schutte et al., 2001a; Lopes et al., 2004; Petrides et al., 2006b; Malouff et al., 2014), and enhanced academic and work performance (see Van Rooy and Viswesvaran, 2004; O'Boyle et al., 2011 for a meta-analysis).

EI: TRAIT AND ABILITY PERSPECTIVES

Is EI a form of intelligence as has been suggested by authors such as Salovey and Mayer (1990) or is it a constellation of emotion-related traits as authors like Petrides and Furnham (2003) argue? Is it best measured using intelligence-like tests or using personality-like questionnaires? After nearly two decades of debate on the status of EI as intelligence or trait, a tripartite model of EI has been proposed to reconcile these perspectives (see Mikolajczak et al., 2009b).

This model posits three levels of EI: knowledge, abilities, and traits. The knowledge level refers to what people know about emotions and emotional competencies (e.g., *Do I know how* to express my emotions constructively?). The ability level refers to the capability to apply this knowledge in an emotional situation (e.g., *Am I able to* express my emotions constructively?). The focus here is not on what people know but rather on what they do. For instance, even though people know that they should not shout when angry, many are simply unable to refrain from doing so. The trait level refers to emotion-related dispositions, namely, the propensity to behave in a certain way in emotional situations (*Do I typically* express my emotions in a constructive manner?). The focus here is not on what people know or on what they are able

to do, but on what they typically do. For instance, some individuals might be able to express their emotions constructively if explicitly asked to do so, but they would be unable to do this spontaneously. These three levels of EI are loosely connected. Knowledge does not always translate into ability, and ability does not always translate into typical behavior. These three levels of EI are therefore assessed using different instruments. Knowledge and ability are assessed using intelligence-like tests such as the MSCEIT[1], the STEU[2], or the GERT[3] while usual emotional behavior is usually assessed using personality-like questionnaires such as the TEIQUE[4], the EQ-I[5] or, more recently, the PEC[6].

Davis and Humphrey (2012) confirmed the construct differentiation and complementary theoretical conceptualizations between ability and trait EI. The findings from a large sample of adolescents revealed that the two measures of EI were only weakly associated. Moreover, each measure showed the expected pattern of associations with personality dimensions (to which trait EI was more robustly associated than ability EI) and general cognitive ability GCA (to which ability EI was more strongly linked than trait EI).

The enthusiasm for the study of emotional intelligence stems in part from its practical implications. Outcomes as different as professional success, well-being, social adjustment, and marital satisfaction could be associated and viewed in a new light. Emotional intelligence indeed predicts a significant portion of variance in these outcomes (see, e.g., O'Boyle et al., 2011 regarding work performance, Schutte et al., 2007 regarding mental health; Mikolajczak et al., in press, for physical health, and Malouff et al., 2014 for marital satisfaction). Partly characterizing these differences as a function of individual differences in emotion regulation processes contributes to explaining—and not simply predicting—these social, health, educational, and occupational outcomes. It also allows researchers and practitioners to identify new avenues for intervention.

INTEGRATING EMOTION REGULATION AND EMOTIONAL INTELLIGENCE TRADITIONS

The ER and EI traditions each capture an important aspect of emotion management. Although the ER tradition has shed light on basic emotion regulation processes, it has not placed emphasis on *individual differences* in these processes. By contrast, the EI tradition has documented the consequences of individual differences in emotion regulation on social, health, educational, and occupational outcomes. However, until recently, EI did not primarily focus on the *processes* generating these individual differences in emotion regulation efficiency. The reason for this is historical: the success of EI in organizational settings has led most EI researchers to focus on the development of measures to improve the quality of EI predictions, rather than on underlying processes.

Our goal in this article is to provide a conceptual map and a review of findings useful to anyone interested in individual differences in emotion regulation processes. In the next section, we will use the process model of emotion regulation described above to organize our review of EI findings in emotion regulation. In each sub-section, the studies reviewed have been meta-analyzed in order to provide an estimate of the effect size reported in the **Tables 2**, **3** (for trait and ability EI, respectively). Two complementary points must be outlined from the outset. First, due to the paucity of EI research in childhood, we have focused on adult literature. Second, several constructs (e.g., social intelligence, alexithymia) have frequently been described as quasi measures of EI. However, as there is a distinction between EI and other related constructs (Van Rooy and Viswesvaran, 2004), the current review only includes studies that use measures that specifically refer to measuring "emotional intelligence."

METHOD

Literature search

Relevant studies published until October 2014 were identified using Scopus, PsycINFO, and Pubmed online databases. A combination of the following key words was used: emotional intelligence, emotion regulation, situation selection, situation modification, attention deployment, cognitive change, response modulation, avoidance, forecasting, coping, conflict resolution, problem solving, support seeking, distraction, concentration, rumination, mindfulness, mind wandering, threat appraisal, challenge appraisal, self-efficacy, reappraisal, acceptance, surface acting, suppression, substance use, self-harm. We also wrote to 12 authors of relevant articles and asked for information about unpublished studies between EI and ER (coping). Sixty seven percent of these authors replied but 75% of them did not have unpublished data. We identified four more studies using this method.

Inclusion criteria

Studies were included in the review if they met the following criteria:

1. The study presented a correlation between Emotional intelligence (EI) and (at least) one Emotion Regulation (ER) strategy.
2. The sample was constituted of adults.
3. The article was written in English.
4. The sample was constituted of healthy individuals.

Articles were not included if only one subscale of an EI instrument was used (e.g., Gohm and Clore, 2002; Salovey et al., 2002). Additionally, nine studies were not included because we failed to obtain the necessary information from the authors (Pellitteri, 2002; Bond and Donaldson-feilder, 2004; Morrison, 2008; Deniz et al., 2009; Chow, 2011; Frewen et al., 2012; Gawali, 2012; Gooty et al., 2014; Hen and Goroshit, 2014).

Another study was excluded from the meta-analysis because of its unrealistic effect size (Animasahun, 2008 reported a correlation of 0.955 between EI and conflict resolution behavior).

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[1] Mayer Salovey Caruso Emotional Intelligence Test (Mayer et al., 2002).
[2] Situational Test of Emotional Understanding (MacCann and Roberts, 2008).
[3] Geneva Emotion Recognition Test (Schlegel et al., 2014).
[4] Trait Emotional Intelligence Questionnaire (Petrides, 2009).
[5] Emotional Quotient Inventory (Bar-On, 2004).
[6] Profile of Emotional Competence (Brasseur et al., 2013).

Coding studies

The studies were coded with respect to the sample characteristics, the family of emotion regulation strategy based on Gross's process model (i.e., situation selection, situation modification, attentional deployment, cognitive change, and response modulation), the specific ER strategy used, the type of emotional intelligence measure used (ability or trait), the emotional intelligence scale, and the statistical information required to compute the effect size and confidence interval. One researcher coded the relevant articles (A. P.) and another one (M.M.) checked the coding. The two coders settled any disagreement by consensus. A total of 90 studies were coded to produce 200 effect sizes based on 23,174 participants. Twenty five of the effect sizes refer to the situation selection family, 57 effect sizes to the situation modification family, 21 to the attention deployment family, 51 to the cognitive change family, and 46 to the response modulation family. Results are summarized in **Table 1**.

Statistical analyses

Each study provided us with a measure of association between EI and (at least) one ER strategy. The effect size of EI on this strategy was expressed in Pearson's *r* in the papers and we therefore computed all the individual confidence intervals around *r*. In order to compute these confidence intervals, Fisher's *r*-to-*z'* transformation was used. First, *r* was converted to *z'*. Second, the confidence intervals were computed in terms of *z'*. Taking into account that the *z* for a 95% confidence interval ($Z_{0.95}$) is 1.96 and that the standard error is calculated by the formula $1/\sqrt{N-3}$, the lower limit confidence interval was computed by the next formula: lower limit $z' = z' - (1.96)$ (standard error). Regarding the upper limit confidence interval, the used formula was this: upper limit $z' = z' + (1.96)$(standard error). Finally, these confidence intervals (computed in terms of *z'*) were then back-transformed to *r* getting the confidence intervals in terms of *r*. As readers are usually more familiar with effect sizes expressed in Cohen's "*d*" (whose interpretation is facilitated by Cohen's norms), each effect size "*r*" was then converted into "*d*." The formula for converting between *r* and *d* were taken from Rosenthal (1994, p. 239). In a third step, we aggregated the relevant individual effect sizes to obtain the aggregate effect size of EI on each ER family. When several effects of a given family came from the same study, they were first aggregated and this aggregated effect size was then aggregated with the effect sizes of the other studies. In order to give more weight to the effect sizes coming from studies with larger samples, we used the methods suggested by Lipsy and Wilson (2000): The "Inverse Variance Weight" was used to compute the standard error and the weight of each effect. The aggregated effect size consists of the sum of the weight and the effect size multiplication, divided by the sum of the weights. Finally, confidence intervals were calculated by taking the effect size (Cohen's *d*) and the standard error into account.

RESULTS

We review below the findings of the studies that have investigated the relationship between EI and ER. Each family is presented in turn. Each section begins with results relative to trait EI which form the majority of the studies analyzed. The sections then turn

to results regarding ability EI when these are available. The effect sizes (with confidence interval) of EI in each study are reported in **Table 1**. The aggregated effect size (with confidence interval) of EI on each ER family is reported in **Table 2** for trait EI and **Table 3** for ability EI.

EI AND SITUATION SELECTION

As we previously mentioned, selecting situations depending on the expected emotional impact requires being able to accurately forecast how one is likely to feel in different situations, and then use that information to confront situations that are likely to bring long-term benefits, while avoiding the others. Accordingly, we hypothesized that high EI people would make more accurate affective forecasts comparing to their low EI peers. We also hypothesized that high EI individuals would do their best to prevent negative situations to occur (which should result in less daily hassles) but that they not avoid negative/stressful situations if they were to bring long-term benefits. In the latter case, high EI people would on the contrary struggle to deal with the situation rather than giving up their goal.

Empirical evidence suggests that trait EI increases affective forecasting accuracy (Hoerger et al., 2012). It must nonetheless be noted that Dunn et al. (2007) found only a non-significant trend in a smaller sample. Schutte et al. (2009) have shown that people with high trait EI use that knowledge to select situations more effectively (i.e., spend time in situations that boost wanted emotions or prevent unwanted emotions, seek out situations that inspire positive emotions or avoid those that arouse negative emotions). This may explain why two studies (Ciarrochi et al., 2002; Day et al., 2005) found negative correlations between trait EI and the self-reported frequency of various daily hassles such as marital, professional, health, financial and relationship hassles. It is also congruent with the findings that high trait EI people take more time to relax and wind down (Tsaousis and Nikolaou, 2005).

It is noteworthy that high EI individuals do not simply avoid all situations that could cause them negative emotions. As shown in **Table 2**, they actually report using *less* avoidant coping strategies than their peers (Gerits et al., 2004; Petrides et al., 2007a,b; Mikolajczak et al., 2009a, Studies 1 and 2; Rogers et al., 2006; Velasco et al., 2006; Shah and Thingujam, 2008; Kim and Agrusa, 2011; although see Monaci et al., 2013 for insignificant results). This is probably because many situations that cause negative emotions in the short-term have long-term benefits (academic exams for instance). Experimental and field studies support the idea that high trait EI individuals tend to struggle (confront) rather than give up (escape/avoid) in the face of adversity if the confrontation is likely to bring about more substantial long-term benefits. For example, an experimental study by Schutte et al. (2001b) showed that participants who scored higher in trait emotional intelligence solved more problems after encountering a very difficult and frustrating set of problems. This held true even when initial performance was held constant. In the same vein, a field study by Petrides et al. (2006a) showed that trait EI was positively related to the length of musical training among music school students, suggesting that high trait EI individuals do not let themselves be discouraged by the obstacles that stand in their way.

Table 1 | Linking emotional intelligence to the use of emotion regulation strategies.

Authors	N	ER Family	Specific variable	T/A	Measure used	Facet	r	CI r (lower bound)	CI r (upper bound)	d
Schutte et al., 2009	73	SS	Situation selection	T	AES		0.30	0.08	0.49	0.63
Ciarrochi et al., 2002	302	SS	Daily hassles	T	EIS		−0.01	−0.12	0.10	−0.02
Day et al., 2005	133	SS	Daily hassles	T	EQ-I	AGS	−0.43	−0.51	−0.27	−0.94
Kim and Agrusa, 2011	385	SS	Avoidant coping	T	WLEIS		0.15	0.05	0.25	0.30
Shah and Thingujam, 2008	197	SS	Avoidant coping	T	EIS	AGS	−0.08	−0.22	0.06	−0.16
Rogers et al., 2006	253	SS	Avoidant coping	T	SREIT		−0.04	−0.16	0.08	−0.08
Velasco et al., 2006	593	SS	Avoidant coping	T	TMMS-alex F1		−0.16	−0.24	−0.08	−0.32
Petrides et al., 2007a (study 1)	166	SS	Avoidant coping	T	modified EQ-i		−0.34	−0.47	−0.20	−0.72
Petrides et al., 2007a (study2 sample1)	200	SS	Avoidant coping	T	TEIQue-LF		−0.39	−0.50	−0.27	−0.84
Petrides et al., 2007b	274	SS	Avoidant coping	T	TEIQue-LF		0.01	−0.11	0.13	0.02
MacCann et al., 2011	159	SS	Avoidant coping	A	MSCEIT	AGS	−0.21	−0.35	−0.06	−0.43
Gerits et al., 2004	380	SS	Avoidant coping	T	EQ-i		−0.23	−0.32	−0.13	−0.47
Monaci et al., 2013	198	SS	Avoidant coping	T	SEIS		0.01	−0.13	0.15	0.02
Mikolajczak et al., 2009a	490	SS	Avoidant coping	T	TEIQue-ASF		−0.26	−0.34	−0.18	−0.54
Petrides et al., 2006a	37	SS	Perseverance	T	TEIQue-LF		0.53	0.25	0.74	1.25
Dunn et al., 2007	84	SS	Forecast accuracy	A	MSCEIT		−0.19	0.06	0.62	−0.38
Dunn et al., 2007	84	SS	Forecast accuracy	T	SREIS		−0.09	−0.39	0.02	−0.18
Hoerger et al., 2012 (study 1)	81	SS	Forecast accuracy	T	SEI/SREIS/TEIQue		0.22	−0.30	0.13	0.45
Hoerger et al., 2012 (study 1)	81	SS	Forecast accuracy	A	JET+IJI		0.36	−0.01	0.41	0.77
Hoerger et al., 2012 (study 2)	81	SS	Forecast accuracy	T	TEIQue-SF		0.27	0.16	0.54	0.56
Hoerger et al., 2012 (study 2)	81	SS	Forecast accuracy	A	JET + IJI + STEU		0.39	0.07	0.47	0.84
Schutte et al., 2001b	38	SS	Persistence	T	SEIS		0.37	0.19	0.56	0.79
Bastian et al., 2005	246	SS	Behavioral disengagement	T	TMMS + AES	R+C	−0.24	−0.35	−0.12	−0.49
Bastian et al., 2005	246	SS	Behavioral disengagement	A	MSCEIT		−0.16	−0.28	−0.04	−0.32
Tsaousis and Nikolaou, 2005	365	SS	Time to relax	T	TEIQ		0.43	0.35	0.51	0.95
Schutte et al., 2009	73	SM	Modifying situations	T	EIS		0.20	−0.03	0.42	0.41
Moradi et al., 2011	200	SM	Problem-focused coping	T	TMMS	R+C	0.27	0.14	0.40	0.56
Petrides et al., 2007a (study 1)	166	SM	Problem-focused coping	T	modified EQ-i		0.57	0.46	0.67	1.38
Petrides et al., 2007a (study 2. sample 1)	200	SM	Problem-focused coping	T	TEIQue-LF		0.67	0.59	0.75	1.80
Petrides et al., 2007b	274	SM	Problem-focused coping	T	TEIQue-LF		0.64	0.57	0.71	1.66
MacCann et al., 2011	159	SM	Problem-focused coping	A	MSCEIT	AGS	0.14	−0.02	0.29	0.28
Shah and Thingujam, 2008	197	SM	Problem-focused coping	T	EIS	AGS	0.21	0.07	0.34	0.43
Goldenberg et al., 2006	223	SM	Problem-focused coping	T	SREIS		0.55	0.46	0.64	1.31
Goldenberg et al., 2006	223	SM	Problem-focused coping	A	MSCEIT		0.17	0.04	0.30	0.34

(Continued)

Table 1 | Continued

Authors	N	ER Family	Specific variable	T/A	Measure used	Facet	r	CI r (lower bound)	CI r (upper bound)	d
Kluemper, 2008	180	SM	Problem-focused coping	T	WLEIS		0.61	0.51	0.70	1.54
Rogers et al., 2006	253	SM	Problem-focused coping	T	SREIT		0.30	0.19	0.41	0.63
Mikolajczak et al., 2008	203	SM	Problem-focused coping	T	TEIQue-LF		0.40	0.29	0.51	0.87
Salovey et al., 2002 (study 3)	48	SM	Problem-focused coping	T	TMMS	R+C	0.34	0.06	0.57	0.71
Saklofske et al., 2007	362	SM	Problem-focused coping	T	EIS		0.38	0.29	0.46	0.82
Almran and Punamaki, 2008	312	SM	Problem-focused coping	T	EQ-I:YV-S		0.25	0.14	0.36	0.51
Velasco et al., 2006	593	SM	Problem-focused coping	T	TMMS-alex F1		0.20	0.12	0.28	0.41
Rahim and Minors, 2003	222	SM	Problem solving	T	EQ-Index	AGS	0.44	0.33	0.54	0.98
Monaci et al., 2013	198	SM	Direct confrontation	T	SEIS		0.43	0.31	0.54	0.95
Montes-Berges and Augusto, 2007	119	SM	Active coping	T	TMMS-24	R+C	0.05	−0.13	0.23	0.11
Gerits et al., 2004	380	SM	Active coping	T	EQ-I		0.38	0.29	0.46	0.82
Tsarenko and Strizhakova, 2013	252	SM	Active coping	T	SREIS		0.45	0.34	0.54	1.01
Zomer, 2012	300	SM	Active coping	T	TMMS-24	R+C	0.15	0.04	0.26	0.30
Bastian et al., 2005	246	SM	Active coping + planning	T	TMMS + AES	R+C	0.40	0.28	0.51	0.87
Bastian et al., 2005	246	SM	Active coping + planning	A	MSCEIT		0.05	−0.08	0.18	0.10
Bastian et al., 2005	246	SM	Problem Solving Inventory	T	TMMS + AES	R+C	−0.43	−0.53	−0.32	−0.94
Bastian et al., 2005	246	SM	Problem Solving Inventory	A	MSCEIT		−0.04	−0.17	0.09	−0.08
Austin et al., 2010	475	SM	Task-oriented coping	T	EQ:i-S	AGS	0.38	0.30	0.45	0.82
Saklofske et al., 2012	238	SM	Task-oriented coping	T	EQ:i S	AGS	0.48	0.38	0.57	1.09
Kim and Agrusa, 2011	385	SM	Task coping	T	WLEIS		0.54	0.46	0.61	1.28
Mikolajczak et al., 2009a	490	SM	Rational coping	T	TEIQue-ASF		0.46	0.39	0.53	1.03
Monaci et al., 2013	198	SM	Social support	T	SEIS		0.36	0.24	0.48	0.77
Bastian et al., 2005	246	SM	Instrumental social support	T	TMMS+AES	R+C	0.24	0.11	0.35	0.49
Bastian et al., 2005	246	SM	Instrumental social support	A	MSCEIT		0.06	−0.07	0.19	0.12
Zomer, 2012	300	SM	Support from others	T	TMMS-24	R+C	0.11	0.00	0.22	0.21
Gerits et al., 2004	380	SM	Social support seeking	T	EQ-i		0.21	0.11	0.31	0.43
Shah and Thingujam, 2008	197	SM	Social support seeking	T	EIS	AGS	0.07	−0.08	0.21	0.13
Ciarrochi and Deane, 2001	300	SM	Social support seeking	T	EIS	AGS	0.15	0.05	0.25	0.26
Velasco et al., 2006	593	SM	Social support seeking	T	TMMS-alex F1		0.13	0.05	0.21	0.26
Goldenberg et al., 2006	223	SM	Social support seeking	T	SREIS		0.32	0.20	0.43	0.67

(Continued)

Table 1 | Continued

Authors	N	ER Family	Specific variable	T/A	Measure used	Facet	r	CI r (lower bound)	CI r (upper bound)	d
Goldenberg et al., 2006	223	SM	Social support seeking	A	MSCEIT		0.42	0.31	0.52	0.92
Zeidner and Kloda, 2013	200	SM	Conflict res.(constructive)	A	MSCEIT		0.24	0.11	0.37	0.49
Zeidner and Kloda, 2013	200	SM	Conflict res.(avoidance)	A	MSCEIT		−0.39	−0.50	−0.26	−0.84
Jordan and Troth, 2004	350	SM	Conflict res. (integrate)	T	WEIP6		0.35	0.25	0.44	0.74
Jordan and Troth, 2004	350	SM	Conflict res. (avoid)	T	WEIP6		−0.12	−0.23	−0.01	−0.24
Jordan and Troth, 2004	350	SM	Conflict res. (dominate)	T	WEIP6		0.19	0.09	0.29	0.38
Jordan and Troth, 2002	139	SM	Conflict res. (collaborate)	T	WEIP6		0.53	0.40	0.64	1.25
Jordan and Troth, 2002	139	SM	Conflict res. (avoidance)	T	WEIP6		−0.12	−0.28	0.04	−0.24
Jordan and Troth, 2002	139	SM	Conflict resolution (force)	T	WEIP6		0.02	−0.15	0.19	0.04
Jordan and Troth, 2002	139	SM	Conflict res. (accommodate)	T	WEIP6		−0.08	−0.24	0.08	−0.01
Jordan and Troth, 2002	139	SM	Conflict res. (compromise)	T	WEIP6		0.09	−0.08	0.25	0.02
Salami, 2010b	320	SM	Conflict res. (confronting)	T	WLEIS		0.20	0.10	0.30	0.41
Salami, 2010b	320	SM	Conflict res. (withdrawal)	T	WLEIS		0.12	0.01	0.23	0.24
Salami, 2010b	320	SM	Conflict resolution (forcing)	T	WLEIS		0.12	0.01	0.23	0.24
Salami, 2010b	320	SM	Conflict res. (smoothe)	T	WLEIS		0.19	0.08	0.29	0.38
Salami, 2010b	320	SM	Conflict res. (compromise)	T	WLEIS		0.21	0.10	0.31	0.43
Bastian et al., 2005	246	SM	Restraint	T	TMMS+AES		0.08	−0.05	0.21	0.16
Bastian et al., 2005	246	SM	Restraint	A	MSCEIT		−0.04	−0.17	0.09	−0.08
Schutte et al., 2009	73	AD	Attention deployment	T	EIS		0.38	0.17	0.56	0.82
Bastian et al., 2005	246	AD	Mental disengagement	T	TMMS+AES		−0.05	−0.18	0.08	−0.10
Bastian et al., 2005	246	AD	Mental disengagement	A	MSCEIT		−0.05	−0.18	0.08	−0.10
Mikolajczak et al., 2008	203	AD	Trait distraction	T	TEIQue-LF		0.41	0.29	0.52	0.89
Salovey et al., 2002 (study 3)	48	AD	State distraction	T	TMMS	R+C	0.36	0.08	0.59	0.77
Saklofske et al., 2012	238	AD	Distraction	T	EQ-i: S		−0.11	−0.23	0.02	−0.21
Austin et al., 2010	475	AD	Distraction	T	EQ-i: S		0.18	0.09	0.27	0.37
Lanciano et al., 2012	157	AD	Dysfunctional rumination	A	MSCEIT	AGS	−0.44	−0.56	−0.30	−0.98
Petrides et al., 2007b	274	AD	Trait rumination	T	TEIQue-LF		−0.47	−0.56	−0.38	−1.06
Petrides et al., 2007a (study 1)	166	AD	Trait rumination	T	modified EQ-i		−0.53	−0.64	−0.42	−1.25
Mikolajczak et al., 2008	203	AD	Trait Rumination	T	TEIQue-LF		−0.10	−0.24	0.04	−0.20
Ramos et al., 2007	144	AD	State rumination	T	TMMS	R+C	−0.11	−0.27	0.05	−0.21
Salovey et al., 2002 (study 3)	48	AD	State rumination	T	TMMS	R+C	−0.27	−0.51	0.02	−0.55
Salguero et al., 2013	1154	AD	Rumination	T	TMMS-24	R+C	−0.11	−0.17	−0.05	−0.22
Brown and Ryan, 2003	645	AD	Mindful attention	T	TMMS-24	R+C	0.40	0.33	0.46	0.87

(Continued)

Table 1 | Continued

Authors	N	ER Family	Specific variable	T/A	Measure used	Facet	r	CI r (lower bound)	CI r (upper bound)	d
Wang and Kong, 2014	321	AD	Mindful attention	T	WLEIS		0.33	0.23	0.42	0.70
Schutte and Malouff, 2011	125	AD	Mindful attention	T	AES		0.65	0.53	0.74	1.71
Kokinda, 2010	108	AD	Mindful attention	T	AES		0.47	0.31	0.63	1.06
Charoensukmongkol, 2014	317	AD	Mindful attention	T	WLEIS		0.32	0.22	0.42	0.68
Baer et al., 2004 (study 4)	130	AD	Mindful attention	T	TMMS-24	R+C	0.24	0.07	0.40	0.49
Totterdell and Holman, 2003	18	AD	Focus on positive	T	EIS		0.46	−0.01	0.79	1.03
Schutte et al., 2009	73	CC	Cognitive change	T	AES		0.26	0.03	0.46	0.54
Charoensukmongkol, 2014	317	CC	Self-efficacy	T	WLEIS		0.68	0.61	0.74	1.86
Brown et al., 2003	288	CC	Self-efficacy	T	EII-R		0.25	0.14	0.36	0.50
Chan, 2004	158	CC	Self-efficacy	T	EIS		0.32	0.17	0.45	0.66
Martin et al., 2004	140	CC	Self-efficacy	T	EJI		0.54	0.41	0.65	1.27
Durán et al., 2006	373	CC	Self-efficacy	T	TMMS	R+C	0.34	0.24	0.42	0.72
Kaur et al., 2006	117	CC	Self-efficacy	T	EIS		0.42	0.26	0.56	0.92
Villanueva and Sanchez, 2007	70	CC	Self-efficacy	T	SSRI		0.36	0.13	0.54	0.77
Di Fabio and Palazzeschi, 2008	169	CC	Self-efficacy	T	EQ-i		0.34	0.20	0.47	0.72
Adeyemo, 2007	300	CC	Self-efficacy	T	EQ-i		0.17	0.06	0.28	0.34
Mikolajczak et al., 2006	95	CC	Self-efficacy	T	TEIQue-LF		0.66	0.53	0.76	1.75
Mikolajczak and Luminet, 2008 (study1)	27	CC	Self-efficacy	T	TEIQue-LF		0.50	0.15	0.75	1.15
Mikolajczak and Luminet, 2008 (study2)	15	CC	Self-efficacy	T	TEIQue-SF		0.29	−0.27	0.70	0.60
Kirk et al., 2008	207	CC	Self-efficaccy	T	AES		0.73	0.66	0.79	2.13
Kirk et al., 2008	207	CC	Self-efficaccy	A	MSCEIT		0.34	0.22	0.46	0.72
Animasahun, 2008	300	CC	Self-efficacy	T	EIS		0.43	0.33	0.52	0.95
Salami, 2010a	242	CC	Self-efficacy	T	WLEIS		0.08	−0.05	0.21	0.16
Tsarenko and Strizhakova, 2013	252	CC	Self-efficacy	T	SREIS		0.57	0.48	0.65	1.38
Mouton et al., 2013	119	CC	Self-efficacy	T	TEIQue		0.28	0.11	0.44	0.58
Di Fabio and Saklofske, 2014b	164	CC	Core self-evaluation[a]	T	TEIQue/EQ-i		0.56	0.45	0.65	1.35
Di Fabio and Saklofske, 2014b	164	CC	Core self-evaluation	A	MSCEIT		0.02	−0.13	0.17	0.04
Kluemper, 2008	180	CC	Core self-evaluation	T	WLEIS		0.73	0.65	0.79	2.14
Di Fabio and Saklofske, 2014a	194	CC	Self-Efficacy	A	MSCEIT		0.23	0.09	0.35	0.47
Di Fabio and Saklofske, 2014a	194	CC	Self-Efficacy	T	EQ-i		0.67	0.58	0.74	1.80
Mikolajczak and Luminet, 2008 (study2)	15	CC	Ratio challenge/threat	T	TEIQue-SF		0.72	0.33	0.9	2.07
Mikolajczak et al., 2006	70	CC	Challenge appraisal	T	TEIQue-LF		0.02	−0.22	0.26	0.04
Mikolajczak et al., 2006	70	CC	Threat appraisal	T	TEIQue-LF		−0.41	−0.60	−0.20	−0.89
Schutte et al., 2009	73	CC	Reappraisal	T	AES		0.46	0.26	0.62	1.03
Shah and Thingujam, 2008	197	CC	Positive reappraisal	T	EIS	AGS	0.21	0.07	0.34	0.43
Mikolajczak et al., 2008	203	CC	Reappraisal	T	TEIQue-LF		0.46	0.34	0.56	1.03
Velasco et al., 2006	593	CC	Positive reappraisal	T	TMMS-alex F1		0.23	0.15	0.31	0.47
Kafetsios and Loumakou, 2007	475	CC	Reappraisal	T	EQ-I		0.04	−0.08	0.16	0.08
Cabello et al., 2013	866	CC	Reappraisal	T	TMMS-24	R+C	0.34	0.28	0.40	0.72
Coumans, 2005	31	CC	Reappraisal	T	TEIQue-LF		0.02	−0.34	0.38	0.04

(Continued)

Table 1 | Continued

Authors	N	ER Family	Specific variable	T/A	Measure used	Facet	r	CI r (lower bound)	CI r (upper bound)	d
Totterdell and Holman, 2003	18	CC	Perspective taking	T	EIS		0.21	−0.29	0.62	0.43
Moradi et al., 2011	200	CC	Reappraisal	T	TMMS	R+C	0.45	0.34	0.56	1.01
Bastian et al., 2005	246	CC	Positive interpretation	T	TMMS+AES	R+C	0.50	0.40	0.59	1.15
Bastian et al., 2005	246	CC	Positive interpretation	A	MSCEIT		0.11	−0.02	0.24	0.21
Bastian et al., 2005	246	CC	Adaptive Humour	T	TMMS+AES	R+C	0.14	0.01	0.26	0.28
Bastian et al., 2005	246	CC	Adaptive Humour	A	MSCEIT		0.04	−0.09	0.17	0.08
Zomer, 2012	300	CC	Adaptive Humour	T	TMMS-24	R+C	0.01	−0.10	0.12	0.02
Greven et al., 2008	1038	CC	Adaptive Humour	T	TEIQue-LF		0.45	0.40	0.50	0.99
Greven et al., 2008	1038	CC	Maladaptive Humour	T	TEIQue-LF		−0.27	−0.33	−0.21	−0.55
Tsarenko and Strizhakova, 2013	252	CC	Denial	T	SREIS		−0.09	−0.21	0.03	−0.18
Zomer, 2012	300	CC	Denial	T	TMMS-24	R+C	−0.16	−0.27	−0.05	−0.32
Bastian et al., 2005	246	CC	Denial	T	TMMS+AES		−0.15	−0.27	−0.02	−0.30
Bastian et al., 2005	246	CC	Denial	A	MSCEIT		−0.20	−0.32	−0.08	−0.41
Zomer, 2012	300	CC	Acceptance	T	TMMS-24	R+C	0.09	−0.02	0.20	0.17
Bastian et al., 2005	246	CC	Acceptance	T	TMMS+ AES		0.38	0.26	0.48	0.82
Bastian et al., 2005	246	CC	Acceptance	A	MSCEIT		0.10	−0.03	0.23	0.21
Mikolajczak et al., 2008	203	CC	Acceptance	T	TEIQue-LF		−0.06	−0.20	0.08	−0.12
Bastian et al., 2005	246	RM	Venting	T	TMMS+AES		0.05	−0.08	0.18	0.10
Bastian et al., 2005	246	RM	Venting	A	MSCEIT		0.02	−0.11	0.15	0.03
Zomer, 2012	300	RM	Venting	T	TMMS-24	R+C	−0.27	−0.37	−0.16	−0.56
Schutte et al., 2009	73	RM	suppression (ERQ)	T	EIS		−0.50	−0.66	−0.31	−1.15
Johnson and Spector, 2007	176	RM	Suppression	T	WLEIS		−0.08	−0.23	0.07	−0.16
Austin et al., 2008	247	RM	Suppression	T	TEIQue-SF		−0.45	−0.55	−0.35	−1.01
Mikolajczak et al., 2007b	124	RM	Suppression	T	TEIQue-SF		−0.31	−0.46	−0.14	−0.65
Totterdell and Holman, 2003	18	RM	Suppression	T	EIS		−0.18	−0.60	0.31	−0.36
Velasco et al., 2006	593	RM	Suppression	T	TMMS-alex F1		−0.28	−0.35	−0.21	−0.58
Kafetsios and Loumakou, 2007	475	RM	Suppression (ERQ)	T	EQ-I		−0.08	−0.20	0.04	−0.16
Cabello et al., 2013	866	RM	Suppression	T	TMMS-24	R+C	−0.13	−0.20	−0.06	−0.26
Lee and Ok, 2012	309	RM	Emotional dissonance	T	WLEIS		−0.22	−0.33	−0.11	−0.45
Rivers et al., 2013	243	RM	Aggressive behavior	A	MSCEIT		−0.25	−0.36	−0.13	−0.51
Brackett et al., 2004	330	RM	Deviant behavior	A	MSCEIT		−0.27	−0.37	−0.17	−0.56
Brackett and Mayer, 2003	207	RM	Social deviance	T	EQ-i/SREIT		−0.14	−0.27	0.00	−0.28
Shahzad et al., 2013	140	RM	Aggression	T	TEIQue-ASF		−0.31	−0.45	−0.15	−0.64
Mikolajczak et al., 2009a	490	RM	Self-harm	T	TEIQue-ASF		−0.31	−0.39	−0.23	−0.65
Karim and Shah, 2014	192	RM	Suicidal ideation	A	MSCEIT	AGS	−0.30	−0.42	−0.16	−0.63
Aradilla-Herrero et al., 2014	93	RM	Suicide risk	T	TMMS-24	R+C	−0.21	−0.40	−0.01	−0.43
Gardner et al., 2014	235	RM	Bulimic symptoms	T	MEIA		−0.22	−0.34	−0.10	−0.45
Gardner et al., 2014	235	RM	Bulimic symptoms	A	MSCEIT		−0.07	−0.20	0.06	−0.14
Gardner et al., 2014	235	RM	Binge eating	T	MEIA		−0.21	−0.33	−0.08	−0.43

(Continued)

Table 1 | Continued

Authors	N	ER Family	Specific variable	T/A	Measure used	Facet	r	CI r (lower bound)	CI r (upper bound)	d
Gardner et al., 2014	235	RM	Binge eating	A	MSCEIT		−0.03	−0.16	0.10	−0.06
Pettit et al., 2010	402	RM	Bulimia/Food preocupation	T	TMMS-24	R+C	−0.13	−0.23	−0.03	−0.26
Markey and Vander Wal, 2007	154	RM	Bulimic symptoms	T	EQ- i:S		−0.31	−0.45	−0.16	−0.65
Brackett et al., 2004	330	RM	Illegal drug use	A	MSCEIT		−0.11	−0.22	0.00	−0.22
Brackett et al., 2004	330	RM	Alcohol use	A	MSCEIT		−0.13	−0.24	−0.02	−0.26
Rossen and Kranzler, 2009	150	RM	Alcohol use	A	MSCEIT		−0.21	−0.35	−0.07	−0.43
Tsaousis and Nikolaou, 2005	365	RM	Alcohol units	T	TEIQ		−0.07	−0.17	0.03	−0.14
Austin et al., 2005	115	RM	Acohol consumption	T	REIS		−0.19	−0.37	−0.01	−0.38
Ghee and Johnson, 2008	214	RM	Alcohol consumption	T	EIS		−0.02	−0.15	0.11	−0.04
Riley and Schutte, 2003	141	RM	Acohol consumption	T	EIS		−0.34	−0.48	−0.2	−0.72
Brackett and Mayer, 2003	207	RM	Alcohol consumption	T	EQ-i/SREIT		−0.13	−0.26	0.01	−0.26
Trinidad and Johnson, 2002	205	RM	Alcohol consumption	A	MEIS		−0.12	−0.26	0.01	−0.25
Saklofske et al., 2007	362	RM	Alcohol consumption	T	EIS		−0.05	−0.15	0.05	−0.10
Brackett and Mayer, 2003	207	RM	Illegal drug user scale	T	EQ-i/SREIT		−0.14	−0.27	−0.003	−0.28
Riley and Schutte, 2003	141	RM	Drug abuse	T	EIS		−0.42	−0.55	−0.29	−0.92
Limonero et al., 2006	133	RM	Canabis smoking	T	TMMS	R+C	−0.01	−0.19	0.16	−0.02
Bastian et al., 2005	246	RM	Substance use	T	TMMS+AES		−0.05	−0.18	0.08	−0.10
Bastian et al., 2005	246	RM	Substance use	A	MSCEIT		−0.02	−0.14	0.11	−0.03
Rivers et al., 2013	243	RM	Substance abuse	A	MSCEIT		−0.18	−0.31	−0.06	−0.36
Schutte et al., 2011	100	RM	Alcohol problems	A	MSCEIT		−0.30	−0.46	−0.11	−0.63
Schutte et al., 2011	100	RM	Alcohol problems	T	AES		−0.27	−0.45	−0.08	−0.56
Zomer, 2012	300	RM	Drugs	T	TMMS-24	R+C	−0.11	−0.22	0.00	0.21
Monaci et al., 2013	198	RM	Alcohol use	T	SEIS		−0.05	−0.19	0.09	−0.10
Solanki and Lane, 2010	315	RM	Exercise mood regulating	T	EIS		0.45	0.35	0.53	1.01

SS, Situation Selection; SM, Situation Modification; AD, Attentional Deployment; CC, Cognitive Change; RM, Response Modulation; T/A, Trait or Ability EI measure: T, trait EI measure, A, ability EI measure; AGS, Aggregated Global Score; R + C, Repair + Clarity; AES, Assessing Emotions Scale; EIS, Emotional Intelligence Scale; EQ-i/YV/S, Emotional Quotient Inventory/Young Version/Short; WLEIS, The Wong and Law Emotional Intelligence Scale; SREIT, Self Report Emotional Intelligence Test; TMMS-24, Trait Meta Mood Scale; TEIQ, The Traits Emotional Intelligence Questionnaire; TEIQue/SF/LF/ASF, Trait Emotional Intelligence Questionnaire/Short-Form/Long-Form/Adolescent Short-Form; MSCEIT, The Mayer-Salovey-Caruso Emotional Intelligence Test; SEIS, Schutte Emotional Intelligence Scale; SREIS, Self-Reported Emotional Intelligence Scale; EQ-Index, Emotional Quotient Index; WEIP6, Workgroup Emotional Intelligence Profile-Version 6; EII-R, Emotional Intelligence Inventory Revised; MEIS, Multifactoral Emotional Intelligence Scale; EJI, Emotional Judgment Inventory; SSRI, Schutte Self-Report Inventory; MEIA, Multidimensional Emotional Intelligence Assessment; REIS, Revised Emotional Intelligence Scale; SEI, Survey of Emotional Intelligence. JET, Judgment of Emotions Test; IJI, Interpersonal Judgment Inventory; STEU, Situational Test of Emotional Understanding.

*The forecast accuracy indices were calculated such that higher numbers indicate poorer accuracy.

*a The core self-evaluation construct is a fundamental part of self-evaluated values, efficacy and abilities. It includes self-esteem, self-efficacy, internal locus of control, and absence of pessimism.

Consistent with these results, Bastian et al. (2005)[7] found that EI was associated to "behavioral disengagement" as people with high

EI made an effort to deal with the stressor, and did not give up the attempt to attain goals with which the stressor was interfering.

The studies that investigated ability EI in relation to situation selection strategies show that people with high ability EI make more accurate affective forecasts (Dunn et al., 2007; Hoerger et al.,

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[7]The authors provided us with subcorrelations between Trait EI and the "Behavioral Disengagement" subscale of the COPE.

Table 2 | Linking emotional intelligence (trait) to the use of emotion regulation strategies.

ER family	ER strategy	Number of studies	Total N	Dir. of effect	Effect-size (d)	95% Confidence Interval Interval around d
Situation selection	Forecast accuracy*	1	84	−	−0.18	[−0.40; 0.04]
	Forecast accuracy	2	162	+	0.51	[0.35; 0.66]
	Situation selection	1	73	+	0.63	[0.39; 0.86]
	Daily hassles	2	435	−	−0.30	[−0.39; −0.20]
	Time to relax	1	365	+	0.95	[0.85; 1.06]
	Avoidant-coping	10	3136	−	−0.27	[−0.31; −0.24]
	Perseverance	2	75	+	1.02	[0.78; 1.25]
	Behavioral disengagement	1	246	−	−0.49	[−0.58; −0.40]
Situation modification	Situation modification	1	73	+	0.41	[0.17; 0.64]
	Problem solving	24	6516	+	0.92	[0.90; 0.94]
	Problem solving (negative)	1	492	−	−1.06	[−1.19; −0.93]
	Social support search	8	2437	+	0.38	[0.34; 0.40]
	Constructive conflict resolution	5	1268	+	0.56	[0.50; 0.61]
	Conflict resolution (avoid)	4	948	−	−0.04	[−0.11; 0.02]
	Conflict resolution (dominate)	3	809	+	0.27	[0.20; 0.34]
	Restraint	1	246	+	0.16	[0.03; 0.29]
Attentional deployment	Attention deployment	1	73	+	0.82	[0.59; 1.06]
	Focus on positive	1	18	+	1.04	[0.53; 1.54]
	Rumination	6	1989	−	−0.43	[−0.47; −0.38]
	Distraction	5	1210	+	0.26	[0.21; 0.32]
	Mindfulness	6	1646	+	0.85	[0.80; 0.90]
Cognitive Change	Challenge appraisal	2	85	+	0.35	[0.13; 0.57]
	Threat appraisal	1	70	−	−0.90	[−1.14; −0.66]
	Self-efficacy	20	3727	+	1.08	[1.05; 1.11]
	Reappraisal	10	2902	+	0.61	[0.58; 0.65]
	Adaptive humour	3	1584	+	0.72	[0.67; 0.76]
	Maladaptive humour	1	1038	−	−0.55	[−0.61; −0.49]
	Denial	3	798	−	−0.27	[−0.34; −0.20]
	Acceptance	3	749	+	0.31	[0.23; 0.38]
	Cognitive change	1	73	+	0.54	[0.30; 0.77]
Response modulation	Exercise as a mood regulating strategy	1	315	+	1.01	[0.90; 1.12]
	Venting	2	546	−	−0.26	[−0.35; −0.18]
	Suppression	9	2881	−	−0.43	[−0.47; −0.39]
	Aggressivity	2	347	−	−0.43	[−0.53; −0.33]
	Self−harm	2	583	−	−0.62	[−0.70; −0.53]
	Substance use	13	2729	−	−0.25	[−0.29; −0.21]
	Bulimia/Food preocupation	4	1026	−	−0.40	[−0.46; −0.34]

*The forecast accuracy indices were calculated such that higher numbers indicate poorer accuracy.

2012), use less avoidant coping strategies (MacCann et al., 2011) and strive more to attain their goals (Bastian et al., 2005)[8].

EI AND SITUATION MODIFICATION
We hypothesized that high EI individuals would take steps to modify a disadvantageous situation. We also expect them to make use of both their social skills and their aptitude to express emotions to prompt situation modification when

[8]See footnote 7.

this requires the intervention of a third party. Therefore, we predicted that high EI individuals would use constructive conflict resolutions rather than avoidant ones. Finally, we hypothesized a positive relationship between EI and restraint (i.e., waiting for the appropriate moment to act, avoiding to act prematurely).

Empirical evidence indicates that when confronted with a negative situation, high trait EI individuals are more likely to modify the situation (Schutte et al., 2009) and take action to change things than their low trait EI counterparts (Salovey et al.,

Table 3 | Linking emotional intelligence (ability) to the use of emotion regulation strategies.

ER family	ER strategy	Number of studies	Total N	Dir. of effect	Effect-size (d)	95% Confidence Interval around d
Situation selection	Forecast accuracy*	1	84	−	−0.45	[−0.67; −0.23]
	Forecast accuracy	2	162	+	0.81	[0.65; 0.97]
	Avoidant coping	1	159	−	−0.43	[−0.59; −0.27]
	Behavioral disengagement	1	246	−	−0.32	[−0.44; −0.19]
Situation modification	Problem solving	3	628	+	0.23	[0.15; 0.31]
	Problem solving (negative)	1	246	−	−0.08	[−0.21; 0.05]
	Social support seeking	2	469	+	0.50	[0.41; 0.59]
	Conflict resolution	1	200	+	0.49	[0.35; 0.63]
	Conflict resolution (avoid)	1	200	−	−0.85	[−0.99; −0.71]
	Restraint	1	246	+	0.15	[0.02; 0.28]
Attentional deployment	Rumination	1	157	−	−0.98	[−1.14; −0.82]
	Mental disengagement	1	246	−	−0.10	[−0.23; 0.03]
Cognitive change	Self-efficacy	3	564	+	0.47	[0.33; 0.61]
	Positive interpretation	1	246	+	0.21	[0.08; 0.34]
	Humour	1	246	+	0.08	[−0.05; 0.21]
	Denial	1	246	−	−0.41	[−0.54; −0.28]
	Acceptance	1	246	+	0.21	[0.08; 0.34]
Response modulation	Venting	1	246	+	0.27	[0.14; 0.40]
	Aggressive behavior	2	573	−	−0.54	[−0.62; −0.46]
	Self-harm	1	192	−	−0.63	[−0.77; −0.49]
	Substance use	7	1604	−	−0.27	[−0.32; −0.22]
	Bulimia/Food preocupation	2	470	−	−0.10	[−0.19; −0.01]

The forecast accuracy indices were calculated such that higher numbers indicate poorer accuracy.

2002 (**Study 3**); Rahim and Minors, 2003; Gerits et al., 2004; Bastian et al., 2005[9]; Goldenberg et al., 2006; Rogers et al., 2006; Velasco et al., 2006; Petrides et al., 2007a,b; Saklofske et al., 2007, 2012; Almran and Punamaki, 2008; Kluemper, 2008; Mikolajczak et al., 2008, 2009a; Shah and Thingujam, 2008; Austin et al., 2010; Noorbakhsh et al., 2010; Kim and Agrusa, 2011; Moradi et al., 2011; Zomer, 2012; Monaci et al., 2013; Tsarenko and Strizhakova, 2013; although see Montes-Berges and Augusto, 2007 for null results). The relationship between trait EI and the restraint coping strategy does not reach significance though. Namely, people with high trait EI are not significantly more able than people with low trait EI to await the appropriate opportunity before taking action (that is, holding one-self back and not acting prematurely) (Bastian et al., 2005)[10].

Direct problem solving is not the only strategy used by high trait EI individuals when it comes to modifying a situation. As expected, these individuals also make use of indirect modification strategies. First, high trait EI individuals report being more willing to seek help from friends, family, and health professionals in case of problems (Ciarrochi and Deane, 2001; Gerits et al.,

2004; Bastian et al., 2005[11]; Goldenberg et al., 2006; Velasco et al., 2006; Zomer, 2012; Monaci et al., 2013; although see Shah and Thingujam, 2008, for insignificant results). Note that obtaining adequate support may also be easier for them because EI has been associated with increased perceived quantity and quality of social support (e.g., Austin et al., 2005; Mikolajczak et al., 2007a).

Second, high EI people are, by definition, more able and inclined to freely express both positive and negative emotions which, according to Petrides and Furnham's model (2003), translates into higher assertiveness. Thus, instead of fuming at the cigarette smoke of their neighbor at table, high EI individuals would typically ask to have the cigarette put out. However, studies are needed to further test this claim. Third, EI seems to be related to more constructive conflict resolution strategies, although the pattern of results is not entirely clear (Jordan and Troth, 2002, 2004; Salami, 2010b).

Regarding ability EI, the results obtained are consistent with those that use trait measures. Higher ability EI is associated with greater use of problem-focused coping (Goldenberg et al., 2006; MacCann et al., 2011; but see Bastian et al., 2005[12] for

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[9]The authors provided us with subcorrelations between Trait EI and the "Active Coping" and "Planning Coping" subscales of the COPE.
[10]The authors provided us with subcorrelations between Trait EI and the "Restraint Coping" subscale of the COPE.

[11]The authors provided us with subcorrelations between Trait EI and the "Instrumental Social Support" subscale of the COPE.
[12]The authors provided us with subcorrelations between Trait EI and the "Active Coping" and "Planning Coping" subscales of the COPE.

non-significant results), although there is no significant relationship between an individual's ability to restrain him or herself (wait for the appropriate moment to act and avoid acting prematurely) and EI (Bastian et al., 2005)[13]. Ability EI also relates to more social support seeking (Goldenberg et al., 2006; although see Bastian et al., 2005[14] for non-significant results) and individuals with high ability EI also use more constructive than avoidant conflict resolution strategies (Zeidner and Kloda, 2013).

EI AND ATTENTIONAL DEPLOYMENT

Given that high EI people are characterized by greater positive trait affectivity, we hypothesized that they would pay greater attention to positive stimuli/events and ruminate less about negative events. It has indeed been shown that rumination on sad or angry events increases the duration and intensity of negative emotions (Morrow and Nolen-Hoeksema, 1990; Bushman, 2002). Unlike rumination, it is not clear how EI should be related to distraction.

Empirical evidence indicates that high trait EI people rely heavily on attentional deployment techniques to regulate their emotions. First, people with higher trait EI report more mindful attention awareness and pay greater, non-judgmental attention to the present moment (Brown and Ryan, 2003; Baer et al., 2004 (Study 4); Kokinda, 2010; Schutte and Malouff, 2011; Charoensukmongkol, 2014; Wang and Kong, 2014). Consistent with this finding, they report ruminating less about negative/stressful events than their lower EI counterparts (Salovey et al., 2002 (Study 3); Petrides et al., 2007a,b; Ramos et al., 2007; Salguero et al., 2013, although see Mikolajczak et al., 2008 for non-significant results). Schutte et al. (2009) show that higher trait EI people report paying greater attention to things that either help arouse the emotions they desire or prevent them from experiencing emotions they seek to avoid. Similarly, Totterdell and Holman (2003) have shown that high trait EI individuals focus more on positive things than people with low trait EI. These individuals also report that they make more use of distraction to regulate their emotions than their peers (Salovey et al., 2002 (Study 3); Bastian et al., 2005[15]; Mikolajczak et al., 2008; Saklofske et al., 2012; although see Austin et al., 2010 for non-significant results).

Results concerning ability EI seem to be less consistent. While Lanciano et al. (2012) found that high ability EI individuals ruminate less than their equivalents, Bastian et al. (2005)[16] showed no significant relationship between ability EI and mental disengagement. Future studies need to examine further the relationship between ability EI and attentional deployment strategies.

EI AND COGNITIVE CHANGE

We predicted a positive relationship with challenge appraisal because high EI individuals' positive dispositions should lead them to consider not only the potential losses but also potential gains inherent to a situation. Likewise, we predicted a positive link between EI and self-efficacy because high EI individuals' previous successful attempts to regulate their emotions should enhance their confidence to deal with negative events. We also predicted a positive relationship with strategies such as reappraisal and adaptive humor which are useful when the situation cannot be prevented, directly modified, or cognitively avoided (e.g., an academic exam). Finally, we predicted a positive relationship between trait EI and acceptance, but only for problems that could not be modified or reappraised (e.g., being diagnosed with terminal cancer).

Empirical studies show that trait EI is related to how one views a given situation. When asked in January (exam period) how threatening/challenging they appraised the exam session, high EI freshmen judged it as much less threatening than their low EI peers (Mikolajczak et al., 2006). These findings were replicated twice in a laboratory setting. Mikolajczak and Luminet (2008) found that high EI individuals tended to appraise an upcoming arithmetic task as a challenge whereas low trait EI individuals tended to appraise it as a threat.

In addition to influencing how people perceive a given situation, EI also affects how one views one's ability to manage the demands the situation poses (naturally, the two are related). In the above-mentioned study (Mikolajczak et al., 2006), when asked at the beginning of the academic year about their self-efficacy to manage the January exam session, high EI freshmen reported higher self-efficacy than low EI individuals. This was all the more interesting as there was no correlation between trait EI and general cognitive ability (IQ; e.g., Mikolajczak et al., 2007a). In order to rule out potentially confounding variables such as prior knowledge of the subjects or social support, the study was replicated within a laboratory setting (two studies). High trait EI people reported greater self-efficacy to deal with the tasks (analysis of the psychological profile of a movie character in Study 1; an arithmetic task in Study 2) than their low trait EI peers (Mikolajczak and Luminet, 2008). These results are consistent with many others that reveal a relationship between trait EI and self-efficacy (see Adeyemo, 2007 for self-efficacy to pass university exams; Brown et al., 2003 for career decision-making self-efficacy; Animasahun, 2008 for generalized self-efficacy; Chan, 2004 for general self-efficacy; Charoensukmongkol, 2014 for general self-efficacy; Di Fabio and Palazzeschi, 2008 for self-efficacy of teachers to deal with their classroom; Di Fabio and Saklofske, 2014a,b for core self-evaluation and career decision self-efficacy; Durán et al. (2006) for general self-efficacy and self-efficacy to succeed at university; Kaur et al., 2006 for self-efficacy to restrain from gambling; Kirk et al., 2008 for emotional self-efficacy; Kluemper, 2008 for core self-evaluation; Martin et al., 2004 for self-efficacy in counseling; Mouton et al., 2013 for self-efficacy among physical education teachers; Tsarenko and Strizhakova, 2013 for consumer self-efficacy; and Villanueva and Sanchez, 2007 for self-efficacy to perform a laboratory task and to coach and lead followers to perform a laboratory task; although see Salami, 2010a for a non-significant effect of trait EI on general self-efficacy).

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[13]The authors provided us with subcorrelations between Trait EI and the "Restraint Coping" subscale of the COPE.

[14]The authors provided us with subcorrelations between Trait EI and the "Instrumental Social Support" subscale of the COPE.

[15]The authors provided us with subcorrelations between Trait EI and the "Mental Disengagement" subscale of the COPE.

[16]See footnote 15.

When the initial[17] appraisal of a situation and of one's ability to manage it is not sufficient to achieve the desired emotional state, individuals with higher trait EI report being more prone to change the way they think in order to feel or prevent particular emotions (Schutte et al., 2009). In line with this, high trait EI people report greater use of reappraisal strategies than low EI people (Totterdell and Holman, 2003; Bastian et al., 2005[18]; Velasco et al., 2006; Mikolajczak et al., 2008; Shah and Thingujam, 2008; Schutte et al., 2009; Moradi et al., 2011; Cabello et al., 2013 although see Kafetsios and Loumakou, 2007, for unsignificant correlations). It must be noted that these results were not replicated by Coumans (2005) who asked participants about the utilization of several coping strategies after a forced failure in a cognitive task. She found that high EI individuals were not more likely than their low EI peers to report using positive reappraisal strategies such as self-esteem rebuilding, putting things into perspective, trying to accept the situation as a part of life, or looking for the silver lining. Future studies are clearly needed to delineate the moderators and boundary conditions of this effect. It is worth noting that the tendency of high EI people to change the way they think in order to modify their feelings does not go as far as denying the problem. Indeed, people with high trait EI report using less denial strategies (Bastian et al., 2005[19]; Zomer, 2012; Tsarenko and Strizhakova, 2013). Besides positive reappraisal, it seems that higher trait EI is associated with greater use of humor (Bastian et al., 2005[20]; Greven et al., 2008; although see Zomer, 2012 for non-significant results) and less maladaptive humor (Greven et al., 2008). Finally, it must be noted that to date, how trait EI relates to acceptance remains unclear. Although Bastian et al. (2005)[21] found that high EI individuals reported accepting life events more easily, two other studies found no significant correlation between high EI and acceptance (Mikolajczak et al., 2008; Zomer, 2012).

As regards ability EI, these studies are consistent with the results obtained using trait measures in various ways. First, there is a positive relationship between high ability EI and self-efficacy (Kirk et al., 2008; Di Fabio and Saklofske, 2014a,b). Second, people with a high ability EI score report using less denial compared to their peers (Bastian et al., 2005)[22]. However, the relationship between ability EI and positive interpretation, acceptance and humor is not significant (Bastian et al., 2005)[23].

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[17]The terms initial appraisal and reappraisal are used here for conceptual clarity. In practice, however, it is difficult to distinguish initial appraisal from reappraisal because appraisals are not a single perception emerging directly after encountering the potentially stressful situation then stopping. Rather, appraisals are continuously updated as the situation and one's own actions/feelings change over time.

[18]The authors provided us with subcorrelations between Trait EI and the "Positive Reinterpretation" subscale of the COPE.

[19]The authors provided us with subcorrelations between Trait EI and the "Denial" subscale of the COPE.

[20]The authors provided us with subcorrelations between Trait EI and the "positive reappraisal" and "Humour" subscales of the COPE.

[21]The authors provided us with subcorrelations between Trait EI and the "Acceptance" subscale of the COPE.

[22]See footnote 19.

[23]The authors provided us with subcorrelations between Trait EI and the "positive reappraisal," "acceptance," and "Humour" subscales of the COPE.

EI AND RESPONSE MODULATION

Because high EI people are expected to have achieved their regulatory goal (namely, the desired emotional state) through the use of the four families of strategies reviewed above, we predicted a negative relationship between trait EI and response-modulation strategies.

As predicted, there is a negative relationship between EI and most response modulation strategies, or at least those strategies whose relationship with EI has been investigated. The only exception concerns "exercise as a mood-regulation strategy," which shows a positive correlation with trait EI (Solanki and Lane, 2010). To the best of our knowledge, no study has yet examined the relationship between EI and the social sharing of emotions. We would nevertheless expect a negative relationship between EI and the number of times a given emotional episode is shared. Indeed, the more intense the emotion, the greater the extent of sharing (Rimé, 2009). As high scoring EI people have more (and more functional) strategies at their disposal to regulate their emotions, we would expect that they would have less need for emotion sharing. Moreover, we would expect them to better choose the recipient and moment for sharing; they would thus feel better listened to, thereby reducing the need for further sharing.

While no study on trait EI and social sharing exists, two studies have examined the relationship between trait EI and venting (i.e., expressing negative feelings, usually one's anger). Consistent with our expectations, one study found that higher trait EI participants were less likely to vent (Zomer, 2012). However, the other study found no relationship between trait EI and venting (Bastian et al., 2005)[24].

A number of studies have analyzed EI and other response-modulation strategies such as expressive suppression, aggression, and substance abuse. As far as expressive suppression is concerned, high trait EI people report suppressing their emotions less (Totterdell and Holman, 2003; Velasco et al., 2006; Johnson and Spector, 2007; Mikolajczak et al., 2007b; Austin et al., 2008; Schutte et al., 2009; Lee and Ok, 2012; Cabello et al., 2013; although see Kafetsios and Loumakou, 2007 for null findings), probably because they have already achieved their desired emotional state and/or because they value genuine emotion expression. Two pieces of evidence support the hypothesis that high trait EI individuals' lesser use of suppression is attributable to a lesser need rather than a lesser capacity. First, although high trait EI people report making less use of suppression, they do not report feeling less capable than their low EI peers to use it when required (Mikolajczak et al., unpublished data). Second, in a study of service workers' emotional labor[25], high trait EI employees reported experiencing less emotional dissonance (i.e., dissonance between their inner feelings and the feelings required by organizational display rules) than low EI people. High EI individuals thus needed to perform reappraisal and suppression less frequently than low EI individuals (Mikolajczak et al., 2007b).

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[24]The authors provided us with subcorrelations between Trait EI and the "Venting" subscale of the COPE.

[25]Emotional labor refers to the act of managing emotions and emotional expressions in order to be consistent with organizational "display rules," defined as the organizationally required emotions during interpersonal service transactions (Hochschild, 1983).

As expected, trait EI was also negatively linked to both verbal and physical aggression (Brackett and Mayer, 2003; Shahzad et al., 2013), suggesting that high EI people can defuse their anger and frustration through other means. We must draw attention to the fact that people with high trait EI do not seem to turn their aggressiveness against themselves. There is indeed a negative correlation between trait EI and self-harm (Mikolajczak et al., 2009a), including suicidal attempts (Aradilla-Herrero et al., 2014). High EI people do not therefore need to resort to self-harm to reduce unwanted emotions.

Finally, trait EI is negatively associated with the consumption of alcohol (Brackett and Mayer, 2003; Austin et al., 2005; Schutte et al., 2011; although see Tsaousis and Nikolaou, 2005; Saklofske et al., 2007; Ghee and Johnson, 2008; Monaci et al., 2013 for null results), suggesting that high trait EI people do not need alcohol to anesthetize their feelings. Moreover, they do not seem to (ab)use food to regulate their emotions as there is a negative relationship between trait EI and both Body-Mass Index (Swami et al., 2010), binge eating (Gardner et al., 2014), and bulimia (Markey and Vander Wal, 2007; Pettit et al., 2010; Gardner et al., 2014). It must be noted that the findings on the relationship between trait EI and the use of cannabis and other drugs are inconsistent. While some studies have found the expected negative relationship (Brackett and Mayer, 2003; Riley and Schutte, 2003; Tsaousis and Nikolaou, 2005; Limonero et al., 2006; Rivers et al., 2013), other studies have found non-significant correlations (Bastian et al., 2005[26]; Limonero et al., 2006; Saklofske et al., 2007; Zomer, 2012).

Regarding ability EI, results are more or less consistent with studies that have used trait measures. There is no significant association between ability EI and venting emotions (Bastian et al., 2005)[27]. Subjects with high EI ability display less aggressive behavior (Brackett et al., 2004; Rivers et al., 2013), less suicidal ideation, fewer suicidal attempts (Karim and Shah, 2014) and are less likely to use drugs (Trinidad and Johnson, 2002; Brackett and Mayer, 2003; Brackett et al., 2004; Rossen and Kranzler, 2009; Schutte et al., 2011; Rivers et al., 2013; although see Bastian et al., 2005[28] for null results). The correlation between ability EI and bulimic symptoms and binge eating is non-significant (Gardner et al., 2014).

TOWARD A PROCESS CONCEPTION OF EI

Our review suggests that different levels of EI are associated with different patterns of emotion regulation use. In particular, high EI individuals shape their emotion trajectory at the earliest possible point. This hardly implies that they only expose themselves to positive situations. Indeed, high EI individuals confront rather than avoid negative situations if this may lead to more considerable or sustainable long-term benefits (e.g., university exams). However, when caught in a negative situation, high EI individuals use all possible means to modify the situation and alter its emotional impact. If possible, they directly attempt to modify the situation (e.g., study sufficiently in order to make the examination less stressful). They also seek and make use of their social support (e.g., call parents for reassurance or ask a friend to explain to them a poorly understood subject). If high EI individuals cannot modify a situation, they are likely to try and transform it indirectly. For instance, they can achieve this by expressing their emotions (e.g., telling a professor that they feel stressed in order to make him or her more compassionate and sensitive). If there is no way to modify the situation (e.g., if they anticipate that telling the professor how stressed they are would make him or her react negatively), high EI individuals distract themselves instead of ruminating about it. In addition, they strive to remain confident about their ability to cope with the situation. They also try to change the way they perceive the situation in order to change how they feel about it (e.g., thinking that the exam is nothing more than a test of knowledge and that the stakes are ridiculously low compared to people risking their lives during the war). Because high EI individuals are able to alter the trajectory of their emotional experience early on, they do not need to suppress their behavioral emotional manifestations (e.g., control one's hand or voice trembling) or anesthetize their feelings using alcohol, food, or self-harm.

Because different forms of emotion regulation have divergent outcomes, the *consequences* of a potentially emotion-eliciting event should be markedly different for high and low EI people. Since high levels of emotional intelligence are associated with strategies traditionally viewed as adaptive (i.e., generally associated with decreased subjective experience and peripheral physiological arousal), high EI individuals are expected to display less emotional reactivity in response to negative emotion-eliciting situations.

One approach to examining this issue is using stressful laboratory tasks. These situations typically involve a task (e.g., public speaking, arithmetic) to be performed under stressful conditions (e.g., the presence of an evaluative audience, time pressure). This paradigm is of interest as it induces negative emotions but, at the same time, creates implicit pressure toward emotion regulation because performance is impaired by excessive emotional reactivity. Using a similar paradigm on several occasions, Mikolajczak and colleagues repeatedly found that high EI individuals displayed lesser emotional reactivity than low EI individuals. Specifically, compared to low EI participants, high EI participants displayed less mood deterioration (Mikolajczak et al., 2007c, 2009b), less emotional intensity, action tendencies, bodily sensations (Mikolajczak et al., 2007a), and less cortisol secretion (Mikolajczak et al., 2007c) in response to the stressor. Consistent with these findings, other researchers have found that high EI people display less regret after failed negotiations than their low EI peers (Sevdalis et al., 2007). This higher ego-resiliency has also been revealed by Schutte et al. (2002). Their study found that following a negative mood-induction using the Velten method (sentences meant to provoke a drop in self-esteem), there was a lesser decrease in positive affect and self-esteem among higher trait EI individuals than among lower trait EI individuals. An important question raised by these studies is whether high trait EI individuals regulate their emotions better than

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[26]The authors provided us with subcorrelations between Trait EI and the "Alcohol/Drug Use" subscale of the COPE.

[27]The authors provided us with subcorrelations between Trait EI and the "Venting" subscale of the COPE.

[28]See footnote 26.

their lower counterparts, or whether they are merely less reactive to affective stimuli/situations in general. The results of a second type of studies provide preliminary evidence that trait EI is not associated with uniform lower sensitivity to affective cues. Rather, it appears to be linked to a relatively flexible functioning, promoting either increased or decreased sensitivity to affect-laden stimuli, depending on the context.

The studies reviewed above examined sensitivity to *stressful* situations, which, by definition, threaten one's goals and integrity, and therefore call for immediate mood regulation. By contrast, a second kind of studies did not involve any implicit or explicit pressure toward emotion regulation. These studies simply presented research participants with neutral, negative (e.g., sad, anger-eliciting) and/or cheerful (e.g., amusing) video clips. Contrary to "stress-inducing" studies, the second type of studies either found no clear moderating effect of EI on immediate reactivity to the videos (Ciarrochi et al., 2001) or found higher EI scores associated with *increased* reactivity (Petrides and Furnham, 2003). These results suggest that EI is actually sensitive to affective cues and leaves room for emotions to emerge. Nevertheless, these studies also show that high EI individuals are more likely to implement efficient regulation strategies after the negative videos than their low EI peers. Specifically, Ciarrochi et al. (2001) found a significant moderating effect of EI on the valence of stories composed following the clips, suggesting that high EI participants are more able to generate positive stories in order to maintain a positive mood/repair a negative mood than low EI people. Likewise, Petrides and Furnham (2003) found that high EI individuals were more able to use subsequent cheerful videos to repair their mood than low EI people.

Taken together, these findings suggest that trait EI is associated with differences in emotion regulation rather than with differences in reactivity to emotion-laden stimuli (see also Sevdalis et al., 2007). Early EI theorists proposed that the salient feature of "emotionally intelligent regulation" was its flexibility: EI could not be characterized by a constant regulation resulting in the absence of emotion. On the contrary, emotionally intelligent individuals could be quite open to emotions, take advantage of the information they convey, and efficiently regulate this information when it became redundant or inappropriate (Mayer and Salovey, 1997). The findings reviewed above are clearly in line with this conceptualization.

FUTURE DIRECTIONS IN THE STUDY OF EMOTIONAL INTELLIGENCE AND EMOTION REGULATION

In the previous section, we analyzed how EI relates to emotion regulatory processes and outcomes. It is noteworthy that although many processes were reviewed, not all emotion-regulation processes were mentioned because some processes were not investigated in relation to EI. Some of the processes awaiting investigation in relation to EI include those pertaining to interpersonal emotion regulation (see, e.g., Rimé, 2007 for the benefits of the social sharing of emotions) or to the processing of emotional information (see, e.g., Philippot et al., 2003 for the benefits of specificity in emotional information processing). In addition to

highlighting the need to further address these specific issues, the present review also opens up broad avenues for future research. In the following sections, we will present several promising directions, each of which is likely to broaden and extend our understanding of the relationship between EI and emotion regulation.

UP-REGULATION vs. DOWN-REGULATION

The studies reviewed above have focused on the down-regulation of negative emotions, by far the most common target of emotion regulation efforts (Gross et al., 2006). However, although this is a reasonable starting point, much remains to be done. As emphasized elsewhere (Gross, 2014), emotion regulation can occur anywhere in the 2 × 2 matrix formed by crossing negative and positive emotions with up- and down-regulation. Consequently, people not only try to decrease negative emotions (Gross et al., 2006), they also try to increase positive ones (Quoidbach et al., 2010, 2015). On some occasions, they also strategically increase negative emotions (e.g., anger when collecting debts, Sutton, 1991; anger before engaging in a confrontational task, Tamir et al., 2008; worry and fear when anticipating a threatening task, Tamir et al., 2007), or decrease positive emotions (e.g., amusement during a serious meeting; Gruber et al., 2011).

We believe that research on individual differences in emotion regulation would greatly benefit from integrating research all four facets of the emotion regulation goals matrix. For instance, are high EI individuals are as efficient in *up*regulating negative emotions as in *down*regulating them? The up- and down-regulation of *positive* emotions must also be examined. This kind of research is especially warranted as it is not obvious, for instance, that EI will be conductive of efficient down-regulation of *positive* emotions. It may well be the case that high trait EI individuals experience difficulties in down-regulating positive emotions and up-regulating negative emotions. Studies that delve deeper into these questions are crucial as this issue has both theoretical and practical implications.

At the theoretical level, it is important to know whether an individual can perform at above average levels in each of the 2 × 2 ER matrix cells, or whether the price to pay for above average down-regulation of negative emotions/up-regulation of positive emotions is below average up-regulation of negative emotions/down-regulation of positive emotions. If the latter is true, EI definitions and theories should be amended accordingly. At the practical level, if measures of trait EI capture people who are skilled in the down-regulation of negative emotions/up-regulation of positive emotions but whose down-regulation of positive emotions/up-regulation of negative emotions is impaired, then those scoring high on EI measures would not be suitable candidates for positions such as bill collectors, funeral directors and so on. Research is also needed to understand how EI affects composite instances of emotion regulation. Indeed, individuals sometimes try to regulate multiple and conflicting emotions such as simultaneous feelings of pride about one's achievement and sadness/concern about the failure of a friend, or both joy and guilt when one indulges in some forbidden pleasure.

AUTOMATIC vs. EFFORTFUL EMOTION REGULATION

Contemporary dual-process models contrast automatic (also called implicit or non-conscious) processes with deliberate (also called explicit, conscious or controlled) processes (e.g., Strack and Deutsch, 2004). Whereas deliberate processes require attentional resources, are volitional, conscious, and goal-driven, automatic processes require neither attention nor intention, occur outside of awareness, and are stimulus driven.

The notion that relatively high-level self-regulatory processes such as emotion regulation can be performed automatically may seem counterintuitive (Bargh, 2004). However, there is ample evidence that the full sequence of goal pursuit—from goal setting to the completion of the goal—can proceed outside of conscious awareness. For instance, Bargh et al. (2001) have shown that priming the goal of achievement led research participants to outperform a control group on a variety of tasks, and subliminal priming of cooperation led participants to make a greater number of cooperative responses in a "commons dilemma" situation. Interestingly, participants behaved in line with these goals without knowing *why* or even *that* they were acting this way. Even more remarkable, the outcomes were the same when the goal was primed and operated outside of awareness as when the goal was explicitly stated in the task instructions (see Fitzsimons and Bargh, 2004 for a review).

The few studies that have investigated whether emotion regulation can also operate automatically have provided preliminary support for this idea. For instance, Mauss et al. (2007) have shown that participants primed with emotion control reported less anger than participants primed with emotion expression following an anger-induction manipulation.

EI research to date has not sought to determine whether emotion regulation processes displayed by high vs. low EI people are automatic or effortful. One may be inclined to conclude that high EI is associated with largely automatic regulation processes. There are two main arguments in favor of this view. First, as suggested by Bargh and Williams (2007), insofar as an individual performs emotion regulation routinely and in a relatively consistent manner, this process must follow the principles of skills acquisition and become progressively more automatic. Second, and according to the same authors, automatic emotion regulation processes are much more consistent and reliable than conscious processes and have the advantage of operating effectively even in the presence of cognitive load (because automatic processes do not require attentional resources). Thus, insofar as high EI individuals are able to regulate their emotions while under a cognitive load (e.g., preparing a public speech in Mikolajczak et al., 2007c, or reading sentences in Schutte et al., 2002), one might reasonably assume that emotion regulation processes occur somewhat automatically.

But things may not be quite so simple. As stated above, automatic processes occur outside of awareness and are thus stimulus-driven, which in the case of emotion regulation means "driven by emotion." If regulatory processes were automatically initiated in response to emotions, this would leave little room for flexibility. Yet we earlier demonstrated that high EI individuals are rather open to emotions, which they regulate only when these are deemed problematic in a particular context. In view of this

consideration, we are forced to conclude that high EI individuals' emotion regulatory processes cannot be fully automatic. Further research is thus needed to understand which stimuli/contexts give rise to automatic vs. effortful emotion regulation, as well as the moment when automatic processes take place (too early in the case of overly controlled individuals, too late or never in low EI individuals?).

LONG-TERM MENTAL AND PHYSICAL HEALTH CONSEQUENCES

We have provided some evidence that high EI individuals are open to emotions and leave room for their emergence. Thus, they do not *always* regulate their emotions, but appear to know how to do so efficiently when necessary. Although findings reported so far seem to associate EI with the wise utilization of emotion regulation, the ultimate evidence in favor of the adaptive nature of EI would be to show that it correlates with superior indicators of adaptation, such as better mental and physical health.

A recent meta-analysis of the relationships between EI and health (105 effect sizes, 19,815 participants; by Martins et al., 2010) showed that EI was positively associated with mental health ($r = 0.36$) and self-reported physical health ($r = 0.27$). Mikolajczak et al. (in press) recently confirmed the positive association between trait EI and health using objective indicators of physical health available from participants' Mutual Benefit Society records (i.e., doctor consultations, hospitalization, drug consumption) ($r = 0.11$). This relationship between trait EI and physical health is not surprising as mounting evidence suggests that different emotion regulation strategies exert a distinct influence on physical health (Gross, 2013). For instance, researchers found that reappraisal was associated with lower levels of C-reactivity protein, whereas suppression was associated with higher levels of C-reactivity protein (Appleton et al., 2013). In another study, Kubzansky et al. (2011) found that self-regulation (understood as a psychological asset that enables individuals to manage feelings, thoughts, impulses, and behavior, with the capacity to regulate emotions serving as a central component) predicted a decreased subsequent risk of heart attacks and coronary heart disease in men, even when controlling for traditional coronary risk factors.

Several other factors may explain this relationship between EI and *physical* health. First, if high EI individuals regulate their emotions at the earliest possible point, they should experience less prolonged arousal in response to a negative situation/stimuli and thus be protected vis-à-vis the deleterious consequences of chronic arousal on physical health (e.g., coronary heart disease, gastro-intestinal disorders, asthma, psoriasis, migraine etc; Chrousos, 2000; Thurin and Baumann, 2003). Second, if high EI people do not need alcohol and drugs to anesthetize unwanted feelings, they should be consequently less at risk for substance-use related health problems such as cirrhosis of the liver, pancreatitis, and polyneuropathy. Third, their increased emotion regulation efficiency should have a positive effect on their sleep, which is known to be crucial to health (Belloc and Breslow, 1972; Pilcher and Ott, 1998; Gottlieb et al., 2006). Brown and Schutte (2006) indeed showed that higher trait EI is associated with better quality and more refreshing sleep.

REGULATION STRATEGIES vs. REGULATION STYLES

Authors in the ER tradition have repeatedly warned against classifying strategies as irremediably (i.e., always) good or bad (Barrett and Gross, 2001; Gross and Thompson, 2007). They argue that the efficiency of a strategy depends on the context and the angle from which we see things (Aldao et al., 2015).

To illustrate, we can take the example of a man who prides himself on being strong and independent, and thus suppresses his anger and sadness when his girlfriend confesses that she cheated on him. The success or value of this strategy depends on the criteria adopted. In this case, his reaction could be deemed successful with respect to the regulator's goals (the strategy used allows him to meet his goal: appearing strong and independent in the eyes of his girlfriend), with respect to some social norms (i.e., his reaction is aligned with social norms concerning avoidance of unmanly reactions such as crying and violent reactions such as hitting), and with respect to the relationship from a short-term perspective (the strategy used makes it possible to avoid a fight). This same strategy could be deemed unsuccessful with respect to the relationship from a long-term perspective (his girlfriend does not get a chance to know how hurt he really is. She might therefore cheat on him again, leading eventually to a breakup), and possibly with respect to the man's long-term adaptation (by hiding his emotions, he prevents people from sensing his needs and exposes himself to further negative emotions, thereby endangering his long-term well-being and health).

Whereas we believe that it is crucial to understand that a given emotion regulation *strategy* cannot be considered as adaptive or maladaptive *per se*—namely, irrespective of the context, the temporal perspective, and the individual's goals—this review nonetheless supports the idea that different emotion regulation *styles* (i.e., the repeated use of a given emotion regulation pattern) carry different consequences for longer-term adaptation. Inasmuch as EI predicts successful adaptation in a number of domains (e.g., work performance, marital/social relationships), the fact that it is positively associated with some strategies (e.g., problem-focused coping, reappraisal) and negatively with others (e.g., rumination, substance use) suggests that some regulation *styles* are more adaptive than others. This view is consistent with preliminary empirical evidence obtained in the emotion regulation tradition (e.g., Gross and John, 2003; John and Gross, 2007) and the accumulated evidence in coping research (e.g., Zeidner and Endler, 1996) and in other specific domains (e.g., Nolen-Hoeksema et al., 1993 regarding rumination).

REAL-WORLD CONSEQUENCES OF EMOTION REGULATION FAMILIES

The foregoing theoretical consideration suggests that research in the ER tradition would benefit from delving more deeply into the investigation of the consequences of different emotion regulation styles for adaptation. For instance, what are the relative costs and benefits of each regulation family? Aldao et al.'s (2010) meta-analysis showed that some ER strategies are most represented in psychopathological groups, thereby suggesting that these may be less effective. The meta-analysis carried out by Webb et al. (2012) nicely complemented these findings by comparing the relative efficiency of the various ER strategies regarding experimentally-induced emotions. A meta-analysis that could compare the relative short- and long-term efficiency of ER strategies regarding real-life events is needed to complete the picture, but the current paper provides a preliminary idea of what the findings may look like (at least in the long-term perspective).

We further believe that the real-world contexts explored by EI researchers constitute a crucial testing-ground for the predictions made in the ER tradition. Gross (2002) and Gross and John (2003) have investigated the social consequences of the use of reappraisal and suppression but this work should be extended to other regulation strategies and other domains of life. One important issue to be addressed concerns the outcomes of different emotion regulation styles in family, friendship, educational, and work settings. For instance, do people who chronically use reappraisal have better social and marital relationships? Are they more efficient at work than those who use distraction or emotion expression? Another issue that needs to be addressed concerns the *nature* of the benefits/costs of each regulation style. Indeed, as we have emphasized above, strategies can be differentially successful depending on the criteria adopted (short term vs. long term, self vs. other vs. the relationship, emotion regulation vs. task efficiency). Accordingly, it is conceivable that reappraisal and distraction are equally efficient in decreasing the negative affect induced by a given task, but that the former is more efficient than the latter regarding one's performance of the task. Studies such as these are needed to determine whether some strategies are more successful than others in maximizing adaptation in a large number of domains.

Finally, it is possible that the key to successful adaptation lies not only in the use of effective strategies but also in the breadth of one's ER repertoire and in the flexibility with which one uses these regulation strategies. Studies are urgently needed to address strategic flexibility, namely the ability to modify one's regulation style when it is not appropriate for the situation at hand (Bonanno et al., 2004; Aldao et al., 2015). Strategic flexibility seems indeed essential for one's adaptation to a complex and changing environment such as ours, in which a usually functional regulation style can at times turn out to be dysfunctional (e.g., the rigid utilization of a usually functional regulation style such as problem-focused coping can have serious costs in uncontrollable situations such as an incurable disease).

CONCLUDING COMMENT

In this article, we have drawn together two relatively independent research traditions that both capture an important aspect of emotion management. The ER tradition has shed light on emotion regulation processes while the EI tradition has documented the consequences of individual differences in emotion regulation on social, health, educational and work outcomes.

The goal of the present paper was to use the ER conceptual framework (i.e., the process model of emotion regulation) to characterize and organize the emotion regulation processes underlying the construct of emotional intelligence. The benefit for the EI tradition is an enhanced understanding of *why* high levels of EI are associated with better outcomes, whereas the benefit for the ER tradition is a better understanding of the social, health, educational, and occupational consequences of certain emotion regulation styles.

Although much research remains to be done to clarify the relationship between emotional intelligence and emotion regulation, the present paper suggests that EI is a useful construct to capture individual differences in emotion regulation. This probably explains why trait EI has demonstrated incremental validity to predict emotion-related processes and outcomes over and above the five-factor model of personality in many studies (e.g., Petrides and Furnham, 2003; Petrides et al., 2006a, 2007a; Mikolajczak et al., 2007a,c). It is our hope that this article will help to bridge the gap between ER and EI traditions and stimulate research on individual differences in emotion regulation processes and their real-world consequences.

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Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The Role of Intelligence Quotient and Emotional Intelligence in Cognitive Control Processes

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The relationship between intelligence quotient (IQ) and cognitive control processes has been extensively established. Several studies have shown that IQ correlates with cognitive control abilities, such as interference suppression, as measured with experimental tasks like the Stroop and Flanker tasks. By contrast, there is a debate about the role of Emotional Intelligence (EI) in individuals' cognitive control abilities. The aim of this study is to examine the relation between IQ and EI, and cognitive control abilities evaluated by a typical laboratory control cognitive task, the Stroop task. Results show a negative correlation between IQ and the interference suppression index, the ability to inhibit processing of irrelevant information. However, the Managing Emotions dimension of EI measured by the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT), but not self-reported of EI, negatively correlates with the impulsivity index, the premature execution of the response. These results suggest that not only is IQ crucial, but also competences related to EI are essential to human cognitive control processes. Limitations and implications of these results are also discussed.

Keywords: interference suppression, impulsivity, Stroop, emotional intelligence, intelligence, cognitive abilities

INTRODUCTION

The relation between intelligence quotient (IQ) and cognitive control skills is well established (Blair, 2006; Shamosh and Gray, 2008). The IQ is commonly divided into two factors: fluid and crystallized intelligence. Fluid intelligence refers to the capacity to solve and think logically about novel problems. It is independent of the acquired knowledge. It is measured by a non-verbal test that requires abstract reasoning, such as a Matrices test. These tests are designed to reduce the influence of culture, educational level and verbal comprehension. On the other hand, crystallized intelligence depends on experience and knowledge and it could be defined as the ability to use these factors. Generally, Vocabulary and Verbal tests are used as a measure of this aspect of intelligence (Cattell and Raymond, 1963; Sternberg, 1999, 2005). Two important cognitive control abilities are filtering out interfering information and controlling impulsiveness. Interference suppression, i.e., filtering out interfering information, is a process that requires sustained attention in order to process relevant information and ignore irrelevant information. Furthermore, impulsivity could be considered as the consequence of dysfunctional inhibitory processes and strong impulses (premature execution of the response) and is modulated by dispositional and situational variables (Hofmann et al., 2009). These abilities are often measured by laboratory tasks such as the Stroop and Flanker tests. The common key to these tasks is that the participants must filter out interfering information as quickly as possible.

It is well-known that IQ, both fluid and crystallized intelligence is positively associated with some cognitive control processes (Detterman and Daniel, 1989; Duncan, 2000; Klingberg et al., 2005; Checa and Rueda, 2011; Duan and Shi, 2011; Rueda et al., 2012). The interference tasks require similar processes to be solved as those involved in the Matrices test of intelligence (fluid intelligence). Both tasks require processes such as representing information, attending to relevant information and inhibiting premature responses. Moreover, resolving interference tasks not only requires one to solve and think logically, but also it is an important ability to use previous experience and knowledge. The relation between IQ and cognitive control abilities could be suggesting that when resolving interference tasks, it is important to combine abstract reasoning (Matrices) and learned knowledge (Vocabulary). The association between IQ and cognitive control processes could be explained by assuming that crystallized intelligence may partially depend on fluid intelligence (Carroll, 1993), that is, a combination of both intelligences is important to resolve interference. However, the relation between impulsivity and IQ are more divergent. While some studies show a negative relation between impulsivity and IQ (Corr and Kumari, 1998; Lozano et al., 2014) others show that impulsivity is relatively independent of IQ (Plomin and Buss, 1973; Messer, 1976; Larsen, 1982).

Moreover, interference suppression and impulsivity have been related negatively to emotion regulation. Interference suppression has been associated with disruptive behavior and poor sociability in school (Checa et al., 2008), presence of externalizing and internalizing behavior problems (Olson et al., 2005; Valiente et al., 2007; Eisenberg et al., 2009). Impulsivity has also been conceptually and empirically linked to gratification delay, which requires the capacity to control impulses and postpone an immediate reward in order to obtain a larger reward (Mischel et al., 1989). Casey et al. (2011) showed that preschool children with less capacity to control impulses, as measured by delayed gratification tasks, display low self-control as adults 40 years later.

In contrast, there has been less research on the relation between Emotional Intelligence (EI) and performance of cognitive control tasks. EI constitutes another form of intelligence and the most widely applied theoretical models are mixed models and the ability model (Mayer et al., 2008). Mixed models conceptualize EI as a conglomeration of mental abilities and personality traits such as optimism, motivation, and stress tolerance (Mayer et al., 2008; Webb et al., 2013). The ability model, in contrast, defines EI as the integration of several capacities: "the ability to perceive accurately, appraise, and express emotion; the ability to access and/or generate feelings when they facilitate thought; the ability to understand emotion and emotional knowledge; and the ability to regulate emotions to promote emotional and intellectual growth" (Mayer and Salovey, 1997). In this research, we followed the EI ability model.

In recent years, there has been increasing interest in studying how these individual differences in EI affect cognitive skills and self-regulation. Emotionally intelligent people may use the capacity to adapt to others' strategy and context in order to attain their goals (Ford and Tamir, 2012). Some research has explored the influence of EI on cognitive processes, such as decision making and problem solving (Day and Carroll, 2004; Jordan and Troth, 2004; Reis et al., 2007; Demaree et al., 2010; Fernández-Berrocal et al., 2014; Webb et al., 2014). EI enhances the ability to learn and solve problems. People with a higher EI are able to generate a mood that allows them to do better on challenging cognitive tasks. Schutte and colleagues showed that participants with a higher self-reported EI resolved more cognitive tasks and did so better than those with a lower EI (Schutte et al., 2001). Also, the degree to which people focus on their feelings (Salovey et al., 1995), has also been associated with a better performed emotional Stroop task in general (Coffey et al., 2003). Additionally, and consistent with the idea that EI involves both crystallized and fluid components (Webb et al., 2013), the meta-analytic evidence indicates that ability EI using the Mayer-Salovey-Caruso Emotional Intelligent Test (MSCEIT) is positively correlated with verbal intelligence (0.26) and non-verbal intelligence (0.27; Kong, 2014).

EI is also important in self-regulated behavior, which can include impulse control. For instance, the EI ability to manage emotions using the MSCEIT is associated with aggression, and irresponsible behavior, such as alcohol and drug abuse (Riley and Schutte, 2003; Lomas et al., 2012; García-Sancho et al., 2014; Kopera et al., 2015). In recent years, a specific impulsive behavior has become extended in the population, the abuse of Smartphones and the Internet, and has also been related to low EI abilities (Billieux et al., 2008; Beranuy et al., 2009).

The aim of this study is to examine the relation between IQ and EI, and cognitive control abilities. It is novel to include a task-based measure of EI that allows more fine-grained investigation of the association between cognitive control and different aspects of EI. Three scores are derived from the Stroop task, including two interference indices (incongruent minus congruent trials) obtained for each participant, both in reaction times (RT) and errors (ER), and an impulsivity index, which is obtained by subtracting the mean RT for errors from the mean RT for correct responses. We explore the relation among the three cognitive control indices derived from the Stroop task, the IQ as measured by the Kaufman Brief Intelligence Test (K-BIT; Kaufman and Kaufman, 2000), and two commonly employed measures of EI following the ability model: the MSCEIT (Mayer et al., 2002; Extremera et al., 2006) and the Schutte Emotional Intelligence Scale (SEIS; Schutte et al., 1998). Many studies have shown that the process involved in resolving interference in a cognitive task is similar to the process involved in resolving the IQ test. For that reason, we expect that IQ will be related to performance in cognitive control tasks when the interference has to be resolved. Although many studies only examined the relation between cognitive control and fluid intelligence, we are interested in the relation between cognitive control and both crystallized and fluid intelligence. Like Carroll (1993), we think that crystallized intelligence (Vocabulary) may depend partly on fluid intelligence (Matrices), and that similar processes involved in resolving crystallized and fluid intelligence tasks are needed to resolve interference tasks. On other hand, there is evidence suggesting a positive relation between cognitive control and EI. We are interested in exploring the relation between EI

measured by MSCEIT and two specific cognitive control indices: impulsivity and interference suppression. Moreover, there is data regarding the relation between cognitive control and emotional regulation. For that reason, we expect that both impulsivity and interference suppression, should also be negatively associated with self-regulation of emotions in the EI measures, such as Managing Emotions in the MSCEIT.

METHODS

Procedure

Participants were tested at the Emotion Laboratory of the University of Málaga. Upon arrival, participants were informed of the general procedure of the sessions and given a few minutes to get comfortable in the laboratory setting before starting. The study involved two sessions. The first session took ~2 h, including time for instructions and breaks between questionnaires. Participants filled in the EI questionnaires (MSCEIT and SEIS) and completed the intelligence test (KBIT). In the second session, 1 week later, participants were verbally instructed on how to complete the experimental tasks (Stroop: described below). Task completion required about 1 h. The experimenter was present in the testing room throughout the sessions, but did not provide feedback to the participants apart from encouraging them to complete the task during breaks.

Participants

Ninety-two undergraduate students from the University of Málaga participated in this study (73 women; mean age: 22 years; $SD = 2.6$ years). The age range was from 20 to 38 years. All participants came from Spain, and their first language was Spanish. The participants gave their written consent prior to participation. Participation in the study was voluntary.

The study was carried out in accordance with the Declaration of Helsinki. Ethics approval was obtained from the Research Ethics Committee, University of Málaga.

Instruments

Kaufman Brief Intelligence Test (KBIT; Kaufman and Kaufman, 2000)

The KBIT is an individually administered test with two subscales, Vocabulary and Matrices. The Vocabulary Scale is a measure of language and experience-related knowledge, and the Matrices Scale assesses abstract reasoning or fluid intelligence skills. The test provides scores for the two subscales as well as a composite IQ score. The Spanish version of this instrument has shown satisfactory psychometric properties (Cronbach alphas), Vocabulary $\alpha = 0.76$, Matrices $\alpha = 0.82$, and Composite IQ $\alpha = 0.83$. In this study, we focused on the Vocabulary and Matrices Scales of the KBIT, and not on the total measure of KBIT, in order to know separately the relation between cognitive control and crystallized intelligence, the ability to use the previous knowledge (Vocabulary), and the relation between cognitive control and fluid intelligence, that includes abstract reasoning and problem solving in novel situations independently of experience (Matrices).

Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT v. 2.0; Mayer et al., 2002)

EI ability was measured using a Spanish translation of the MSCEIT that has similar psychometric properties to the original instrument (Extremera et al., 2006). This test has been validated for adults aged 17 years and older. The MSCEIT is not a self-reported measure. The MSCEIT uses two tasks to measure each of the four branches of EI (Perceiving, Facilitating, Understanding, and Managing Emotions), comprising a total of eight tasks. The instrument provides separate scores for each branch as well as an overall score for total EI; scores can be calculated based on expert or consensus norms. These two types of norms strongly correlate with each other ($r > 0.90$; Mayer et al., 2003), and the correlation between the two varies between 0.76 and 0.91 for each of the four branches separately (Mayer et al., 2003). In the present study, we used consensus norms to calculate scores for each of the four branches and for total EI. Scores computed by the test publishers are standardized ($M = 100$, $SD = 15$), and the split half reliability is 0.93, based on the consensus criterion.

Schutte Emotional Intelligence Scale (SEIS; Schutte et al., 1998)

This scale is used to assess perceived EI. The SEIS is a self-report measure of EI consistent with the Salovey and Mayer (1990) model. The measure includes 33 items, which respondents rate on a five-point Likert scale (1 = *strongly disagree*; 5 = *strongly agree*). Prior work with the SEIS has found evidence of discriminant and criterion validity (Ciarrochi et al., 2002; Saklofske et al., 2003). We used the total score of the SEIS in this study. The Spanish version of this instrument has shown satisfactory psychometric properties (Ferrándiz et al., 2006). Cronbach's alpha in this study was 0.87.

Numerical Stroop Task

We used the numerical Stroop paradigm. Each trial started with a fixation point of 1500 ms duration. The target was presented until a response was given or for 800 ms, the target display consisted of two numbers. For half of the trials, the display was congruent, the numerically larger number was also physically larger (2, 6); and for the other half of the trial, it was incongruent, the numerically larger number was physically smaller (2, 6). The distance between the two numbers was two units, to control for the distance effect. The participants were required to indicate the numerically larger number. Thus, they had to press the left hand key "c" when the larger number was on the left or the right hand key "m" when the larger number was to the right. Following the response, a 500-ms feedback was provided. The feedback was a written word ("correct" for correct response; "error" for incorrect response; and "late" for omissions or off-time responses). After the feedback disappeared, the screen remained empty for a variable duration, randomly selected between 1000 and 1500 ms. Then the next trial began. Participants completed 336 trials divided into four blocks with small breaks between blocks. The dependent measures were RTs and the percentage of errors both in congruent and incongruent trials. We calculated two interference scores: interference in RT by subtracting the mean RT for incongruent trials from the mean RT for congruent

trials, and interference in percentage of errors (% errors) by subtracting the percentage of errors for incongruent trials from the percentage of errors for congruent trials. We also obtained an index of impulsivity by subtracting the mean RT for error responses from the mean RT for correct responses.

RESULTS

Descriptive statistics on all measures are presented in **Table 1**.

Behavioral Task: Stroop

We conducted t-tests with RTs and percentage of errors as dependent measures when checking the effects of the Stroop task. For RT, results revealed a significant effect of condition type (congruent and incongruent), $t_{(91)} = 26.6$, $p < 0.0001$, $d = 1.37$, indicating faster responses in congruent (417 ms; $SD = 33.2$) compared to incongruent (472 ms; $SD = 45.4$) trials. Using the percentage of errors as dependent variables, we found a significant mean effect of condition type, $t_{(91)} = 23.5$, $p < 0.0001$, $d = -2.83$, indicating a smaller percentage of errors in congruent (2.9%; $SD = 2.6$) compared to incongruent trials (17.5%; $SD = 6.8$). The effect sizes for these analyses were found to exceed Cohen's convention for a larger effect ($d = 0.80$; Cohen, 1988).

We also examined differences in RT for correct compared to incorrect responses. Participants were faster when their responses were incorrect (351 ms; $SD = 60$) compared to correct (433 ms; $SD = 94$) responses, $t_{(91)} = 9.5$, $p < 0.0001$. The effect size was larger for this analysis ($d = 1.05$).

Correlations

The correlation results are shown in **Table 2**. We have used the Cohen's effect size ranged from 0.10 (weak) to 0.50 (stronger). A correlation coefficient of 0.30 is considered a moderate correlation (Cohen, 1988). Correlations among the interference and impulsivity indices and the four MSCEIT branches and

intelligence showed that impulsivity was negatively correlated with Managing Emotions, $r = -0.23$, $p < 0.05$, whereas interference (RT) was negatively correlated with Vocabulary, $r = -0.25$, $p < 0.05$, and Matrices, $r = -0.24$, $p < 0.05$. The Vocabulary measure of KBIT was also positively related to Facilitating Emotions, $r = 0.22$, $p < 0.05$, and Understanding Emotions, $r = 0.28$, $p < 0.01$. SEIS did not correlate with either interference or impulsivity scores.

Principle Component Factor Analysis (PCA)

We conducted PCA using Varimax rotation with the data as exploratory analysis of the association found in the correlational analysis between EI and impulsivity and IQ and interference. Initially, the factorability was examined. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.58, although values between 0.5 and 0.7 are considered quite low (Hutchenson and Sofrionou, 1999), the commonly recommended value is 0.5. Bartlett's test of sphericity was significant [$\chi^2_{(10)} = 60.04$, $p < 0.001$]. Two components were found: (a) Vocabulary and Matrices scores of the KBIT and the RT interference index, and (b) EI Managing Emotions and impulsivity index. The Vocabulary and Matrices scores of intelligence and the RT interference scores loaded highly on the first component (Eigenvalue = 1.66, explained variance = 33.36%), with rotated component loadings of 0.79 for Vocabulary, 0.77 for Matrices, and −0.61 for the RT interference. This component was interpreted as a cognitive component. The Managing Emotions and impulsivity scores loaded high on the second component (Eigenvalue = 1.24, explained variance = 24.74%) with rotated component loadings of 0.76 for Managing Emotions and −0.80 for impulsivity. This component was interpreted as the emotional component.

DISCUSSION

In the present study, we analyzed the relationship among IQ and EI, and cognitive control abilities using the interference and impulsivity indices obtained with Stroop tasks.

We observed that IQ, both Vocabulary and Matrices scores, correlated negatively with the interference index measured by the Stroop task, whereas Managing Emotions of the MSCEIT was related negatively to the impulsivity index. In this study the correlations ranged from $r = 0.22$ to $r = 0.28$, correlation coefficients indicated that a small/medium correlation exists. These coefficients are similar to those reported for other studies (Friedman et al., 2006; Billieux et al., 2008; Duan and Shi, 2011). Moreover, the PCA yielded two separate components: cognitive and emotional. Whereas, Vocabulary, Matrices and interference scores load on the first component, the second component is made up of impulsivity and Managing Emotions scores. Data from the correlations and from PCA both suggest an interesting association between the two types of intelligence and the two types of control processes. Our data suggests that impulsivity (premature execution of the response), but not interference (ability to inhibit processing of irrelevant information), is important for regulation of emotional information. However, interference, but not impulsivity, is

TABLE 1 | Descriptive statistics of the measures.

	Mean	Min	Max	SD
STROOP TASK				
Interference RT	54.3	17.0	95.5	19.5
Interference % errors	14.7	1.2	29.8	6.0
Impulsivity	82.5	2.0	42.6	8.3
MSCEIT				
Perceiving emotions	0.5	0.3	0.1	0.1
Facilitating emotions	0.4	0.3	0.5	0.0
Understanding emotions	0.5	0.4	0.6	0.0
Managing emotions	0.4	0.1	0.5	0.1
SEIS				
Total	4.0	2.4	4.7	0.4
KBIT				
Vocabulary	98.3	72	122	9.4
Matrices	98.7	72	116	7.9
Total	195.3	123	229	18

TABLE 2 | Pearson correlation between Stroop task, emotional, and cognitive intelligences.

	1	2	3	4	5	6	7	8	9	10
STROOP										
1. RT Interference										
2. Interference % errors	0.11									
3. Impulsivity	0.03	−0.12								
MSCEIT										
4. Perceiving emotions	−0.11	0.01	−0.06							
5. Facilitating emotions	0.11	0.07	−0.04	0.40**						
6. Understanding emotions	−0.06	−0.01	−0.13	0.22*	0.00					
7. Managing emotions	0.09	−0.04	−0.23*	0.12	0.18	0.05				
SEIS										
8. SEIS	0.07	0.13	−0.06	0.12	0.15	−0.11	0.14			
KBIT										
9. Vocabulary	−0.25*	−0.02	−0.12	0.15	0.22*	0.28**	−0.07	0.11		
10. Matrices	−0.24*	0.01	−0.01	−0.08	−0.06	0.14	−0.12	−0.01	0.42**	
11. Total	−0.27**	0.04	−0.04	−0.07	−0.05	0.19	−0.07	0.05	0.54**	0.68**

*$p = 0.05$. **$p = 0.01$.

related to IQ. These associations may not have a unique or simple explication.

One explication about the two relations between: (a) IQ: Vocabulary and Matrices scores and the interference suppression and (b) EI: Managing Emotions and the impulsivity could be found in the processes employed to carry out each one of these abilities. We used to think, as other authors claim (Dempster, 1991; Das, 2002), that interference or the ability to resist/suppress interference is an important component of intelligence. First, we found a relation between the intelligence scores of Matrices and the suppression of interfering information, like many other authors in the literature (Detterman and Daniel, 1989; Checa and Rueda, 2011; Duan and Shi, 2011; Rueda et al., 2012). The correlation between interference and Matrices ranged from $r = 0.26$ to $r = 0.59$. The first hallmark of fluid intelligence is abstract reasoning (Sternberg, 1999, 2005). We considered that interference, as a measure of cognitive control, is particularly important when it comes to solving tasks with a high load of reasoning, such as the task involved in the Matrices subscale of the KBIT. Solving information interference tasks requires representing information, attending to relevant elements and inhibiting task-irrelevant elements as well as other potentially distracting information. Although obviously, fluid intelligence is not reducible to interference, the mental process responsible for cognitive monitoring and control could be similar to that involved in the Matrices subscales. Using the Stroop test, we found divergent results. Whereas, Duan and Shi (2011) found that Stroop interference correlated with Raven's Progressive Matrices ($r = −0.26$), Friedman et al. (2006) and Benedek et al. (2014) failed to report a significant correlation between Raven's Progressive Matrices and Stroop interference. The inconsistent findings in the literature may be due to the dependent variables used in the Stroop tasks. Whereas, in the present study and in the studies of Checa and Rueda (2011) and Duan and Shi (2011), the interference index in the cognitive tasks was calculated as

the RT for incongruent trials minus the RT for congruent trials, Friedman et al. (2006) calculated the interference index as the RT for incongruent trials minus the RT for neutral trials. The same measures of interference must be used to clarify this aspect in the future research. Many studies examining the relations between cognitive control and intelligence have focused on fluid intelligence and have largely ignored crystallized intelligence. We are also interested in examining the relation between crystallized intelligence (Vocabulary) and interference, as we expect that both Matrices and Vocabulary scores of intelligence are related to interference. In the literature reviewed, the correlation between Vocabulary and interference ranged from $r = 0.16$ to $r = 0.35$. For instance, Checa and Rueda (2011) showed that high Vocabulary scores are related to resolving interference in a Flanker task ($r = −0.35$). Friedman et al. (2006), using a naming Stroop task, found a correlation between interference and Vocabulary ($r = 0.16$). It could indicate that similar processes involved in resolving matrices and verbal/vocabulary test of intelligence are needed to resolve interference tasks. Our results also reveal a positive correlation between fluid (Matrices) and crystallized (Vocabulary) intelligence. It seems that crystallized intelligence may depend partly on fluid intelligence (Carroll, 1993). In contrast, we have not found a relation between impulsivity and both fluid and crystallized intelligence as other studies show (Corr and Kumari, 1998; Lozano et al., 2014). Our data is in line with some evidence that shows that impulsivity is relatively independent of IQ when impulsivity is measured with the reaction time tasks (Plomin and Buss, 1973; Messer, 1976; Larsen, 1982). Our measure of impulsivity seems to be more related to speedy response execution, while IQ seems to be related to information processing.

Previous findings have suggested a relationship between the MSCEIT and both fluid and crystallized intelligence (Webb et al., 2013; Kong, 2014). In our study, we found a positive correlation between the MSCEIT and Vocabulary scores of intelligence

(KBIT), but not with Matrices scores. The current findings support a positive stronger association of EI with crystallized than with fluid intelligence. In any case, these associations between crystallized intelligence and EI should be considered with caution because the sample characteristics (e.g., high percentage of females) limit the possibility of generalizing the results. Regarding impulsivity, our data indicates that impulsivity correlates negatively with the Managing Emotions branch of the MSCEIT. Impulsivity could be seen as a response inhibition or a prevention of premature execution of the response: stopping or postponing a response (Nigg, 2001). In the present study, we found a negative correlation between the Managing Emotion measures of the MSCEIT and impulsivity. This data is congruent with studies from the cognitive literature showing that individuals who exhibited more impulsive behaviors displayed poor emotional control, using the same index of impulsivity as the one used in the present research (Pailing et al., 2002; Checa et al., 2014). Impulsivity has been related to emotion regulation even in early infancy. Children who showed short latency to grasp objects, or impulsivity, at six, ten, and 13 months also showed high anger frustration and aggression at age 7 years (Derryberry and Reed, 1996; Rothbart et al., 2000). The relation between impulsivity and emotion regulation seems to become stable over time. Impulsive children show low emotion regulation in their mid-forties (Casey et al., 2011). From the EI literature, there is evidence that EI is a determinant factor for impulse control. Lower EI, using self-reported measures, has been associated with behaviors reflecting a lack of control of impulsivity, such as drug, alcohol, Smartphone, and Internet abuse (Billieux et al., 2008; Beranuy et al., 2009). Using the MSCEIT, the relevance of managing emotions to deal with aggression or to regulate conflictive behaviors has been pointed out (Lomas et al., 2012; García-Sancho et al., 2014). It is important to note the relevance of the measure used in our study. Although the relation between emotional regulation and impulsivity has been found before, this is to our knowledge, the first testing of the relation using execution measures: impulsivity, as measured by a Stroop task, and emotion regulation, as measured by the Managing Emotions scale of the MSCEIT. In the EI literature, impulsive behaviors such as abuse of technology, alcohol, drugs, bullying, and aggression are usually assessed through questionnaires, but not through a behavioral performance task, such as the Stroop. We suggest that all measures used in this study based in the participant's execution reflect more objectively the processes implicated in each task examined. Self-report of EI seems to assume that participants can accurately assess and report their abilities. In contrast, the Managing Emotions of the MSCEIT is a measure based on participants' performance revealing EI abilities to resolve the task and emotional problems of the test. Some evidence shows that the MSCEIT measures EI abilities more accurately and reliably than self-report of EI (Brackett et al., 2006; Goldenberg et al., 2006; Webb et al., 2013; Cabello and Fernández-Berrocal, 2015). Moreover, when we used execution measures to evaluate IQ, EI and cognitive control processes in the same sample an interesting association appears between IQ and EI and the cognitive processes related to each other. This is exciting but only speculative and

needs to be supported by future research using the same measures.

Evidence suggests a positive relation between EI in general and cognitive control (Day and Carroll, 2004; Jordan and Troth, 2004; Reis et al., 2007; Demaree et al., 2010; Fernández-Berrocal et al., 2014; Webb et al., 2014), but this study demonstrated that it is specifically a negative association between Managing Emotions and impulsivity. However, we did not find any association between self-reported measures of EI (SEIS) and impulsivity. It could be due to both Managing Emotions and impulsivity being measured based on participant's performance. Using the MSCEIT give us the opportunity to know which of the abilities of the EI could be associated with control. In the MSCEIT, the ability to regulate emotion is evaluated by the Managing Emotions ability. Moreover, the indices measured in the Stroop task target the processes involved in controlling the information (interference) or the response (impulsivity) in a controlled situation, in other words, the ability of the person to regulate or manage information and response. However, the rest of the EI abilities could be related to other cognitive processes. For example, we suggest that the ability of Perceiving Emotions could be related to some cognitive processes such as target detection.

In summary, data from our study provides evidence that people with higher IQs also resolve the interference Stroop tasks better. In the recent past, mounting evidence indicates that, although IQ is not reducible to interference, the ability to suppress interfering information is important to resolve tasks requiring abstract reasoning (IQ; Detterman and Daniel, 1989; Checa and Rueda, 2011; Duan and Shi, 2011; Rueda et al., 2012). Second, our data also shows a negative relation between EI abilities, specifically Managing Emotions, and impulsivity. Again, these data indicate that people who exhibit more emotion regulation are less impulsive when responding to cognitive tasks such as the Stroop task. We could consider this measure of impulsivity and Managing Emotions in EI as evaluating the same construct; emotional control that operates in "hot" situations but not reducible to each other. This negative relation between Managing Emotions in EI and impulsivity has to be replicated in future investigations using different samples.

LIMITATIONS AND FUTURE DIRECTIONS

The sample is small. This problem limits the future performance of further confirmatory analysis. The future studies have to replicate the results in a larger sample in order to generalize from a sample to the population. Concerning the Principal Component Analysis, it has to be seen as exploratory analysis in order to confirm the existence of two factors, which explain the 58% of variability. Moreover, inconsistency when measuring the same construct is a problem when comparing our results and the results shown in the literature. For example, we failed to find a relation between interference and emotional control although this relation has been found in the literature (Oldehinkel et al., 2004; Olson et al., 2005; Simonds et al., 2007; Checa et al., 2008). Also, self-reported EI in general or dimensions, such as Appraisal of Emotions or Emotional Attention (Austin, 2004), have also been related to performance in the Stroop task (Coffey

et al., 2003). However, we found that interference is related to intelligence but not to emotion regulation as measured by the MSCEIT, as we expected. Previous research has provided support for the relation between self- or other-reported cognitive control, which includes interference suppression, and emotion regulation (Olson et al., 2005; Checa et al., 2008). We suggest that the discrepancy found could be due to the different methods used to evaluate both emotion regulation and cognitive control. The above-mentioned studies used self-reports or parents' reports of cognitive control, and they not only measured interference suppression, but also attention control (the capacity to control attention and to shift attention when desired) and activation control (the capacity to perform an action when there is a strong tendency to avoid it). Also, these cognitive ability measures are evaluated in the cited studies through a broad range of everyday situations, whereas our measure of interference is related to performance in the laboratory setting. Again, we recommend that future research use the same measures to assess cognitive control abilities, such as interference and impulsivity, and emotional abilities, such as Managing Emotions of the MSCEIT.

In summary, our data suggests that not only IQ is fundamental to human cognitive control processes, but also points out the significance of exploring the influence of EI.

ACKNOWLEDGMENTS

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Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

EI competencies as a related but different characteristic than intelligence

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Amid the swarm of debate about emotional intelligence (EI) among academics are claims that cognitive intelligence, or general mental ability (*g*), is a stronger predictor of life and work outcomes as well as the counter claims that EI is their strongest predictor. Nested within the tempest in a teapot are scientific questions as to what the relationship is between *g* and EI. Using a behavioral approach to EI, we examined the relationship of a parametric measure of *g* as the person's GMAT scores and collected observations from others who live and work with the person as to the frequency of his or her EI behavior, as well as the person's self-assessment. The results show that EI, as seen by others, is slightly related to *g*, especially for males with assessment from professional relations. Further, we found that cognitive competencies are more strongly related to GMAT than EI competencies. For observations from personal relationships or self-assessment, there is no relationship between EI and GMAT. Observations from professional relations reveal a positive relationship between cognitive competencies and GMAT and EI and GMAT for males, but a negative relationship between EI and GMAT for females.

Keywords: emotional intelligence, cognitive ability, emotional intelligence competency, social intelligence competency, cognitive competency

INTRODUCTION

General cognitive ability (*g*) has been consistently shown to predict job performance in many studies and meta-analyses over the decades (Nisbett et al., 2012). But in the last 10–15 years, emotional intelligence (EI) has also been shown to predict job performance in an increasing number of studies (Fernández-Berrocal and Extremera, 2006; Joseph and Newman, 2010; O'Boyle et al., 2011; Joseph et al., 2014). A debate has emerged as to whether these two individual characteristics are the same, different, or complimentary. A meta-analysis of published papers as of 2009 claimed that *g* showed more predictive ability of job performance than EI (Joseph and Newman, 2010), although both were significant. In some recent studies EI has been shown to have greater predictive ability than *g* (Côté and Miners, 2006; Boyatzis et al., 2012). This study is an attempt to examine the relationship between a behavioral approach to EI and *g* and help create a more comprehensive perspective on these characteristics and the implications for future research.

A major criticism of the EI concept was found in Matthews et al. (2002), but they confused theoretical distinctions and measurement issues. More recently, Webb et al. (2013) said, "Although there is general agreement that the ultimate relevance of EI lies in its ability to predict important life outcomes (e.g., quality of interpersonal relationships, academic or occupational success), debate persists in how best to operationalize…and measure EI…" (p. 154). The debate is confusing at times because EI itself has been conceptualized and measured in various ways.

In some approaches, EI is viewed as the ability to be aware of and manage one's emotions and those of others which have

been called stream 1 and stream 2 measures (Ashkanasy and Daus, 2005; O'Boyle et al., 2011). For example, Mayer et al. (1999) see their concept of ability EI as a formal type of intelligence specialized in the field of emotions and thus related to *g*. Initially, while they had no intention to relate EI to job and life outcomes, later studies have shown ability EI to associate with performance but not as strongly as other approaches (O'Boyle et al., 2011; Miao et al., unpublished). Another perspective sees EI as a set of self-perceptions, which are different from but related to personality traits (Bar-On, 1997) more than *g*. Although this approach along with some measures known as Trait EI (Petrides and Furnham, 2001) have been shown to predict job performance (O'Boyle et al., 2011), they also show a consistently strong relationship to personality traits (Webb et al., 2013). Regardless, it has been filed under the uninformative label of "mixed models" (Mayer et al., 1999).

Another way to understand EI involves observing behavioral manifestations of EI, in terms of how a person acts, as seen by others (Boyatzis, 2009; Cherniss, 2010; Cherniss and Boyatzis, 2013). Known as behavioral EI, it offers a closer link to job and life outcomes. Notably, it has been shown to predict job performance above and beyond *g* and personality (Boyatzis and Goleman, 2007). Nonetheless, this approach has been clustered incorrectly with self-perception approaches and filed under the same label of mixed models (Mayer et al., 1999), also called stream 3 (Ashkanasy and Daus, 2005; O'Boyle et al., 2011).

Although many issues emerging from these varied studies and meta-analyses call for further research, in this paper, we focus on examining the relationship between behavioral EI and *g*, and assessing the potential moderator effects of gender and type of observer or rater.

BEHAVIORAL EI

Because all of the papers in this special issue of Frontiers in Psychology are devoted to EI and *g*, we will forego an in-depth review of the literature on EI, and instead focus directly on behavioral EI. As mentioned above, EI competencies can be viewed as the behavioral level of EI (Boyatzis, 2009; Cherniss, 2010; Cherniss and Boyatzis, 2013). Competencies have been derived inductively from studies of human performance in many occupations and in many countries (Boyatzis, 2009). Because the identification of a competency and its refinement emerges from performance based criterion sampling, they are expected to be closely related to job and life outcomes. As a result, the EI competencies were discovered and measured as behaviors which were later clustered around intent and became each competency (Boyatzis, 2009).

In Boyatzis and Goleman (2007), EI includes two factors, EI and social intelligence (SI) competencies. EI includes competencies called emotional self-awareness, emotional self control, adaptability, achievement orientation, and positive outlook. In their model, SI includes: empathy, organizational awareness, influence, inspirational leadership, conflict management, coach and mentor, and teamwork. For this paper, we are treating EI and SI competencies as a single construct of EI. When universities wish to use this EI model for student development and/or outcome assessment, two cognitive competencies which have a history of predicting effective leadership, management and professional performance are added. They are: systems thinking and pattern recognition (Boyatzis, 2009).

Behavioral EI as seen and measured through others' assessment (as compared to self-assessment) shows a consistent prediction or relationship to job and life outcomes (Boyatzis, 1982, 2006; McClelland, 1998; Nel, 2001; Cavallo and Brienza, 2002; Dulewicz et al., 2003; Law et al., 2004; Sy et al., 2006; Dreyfus, 2008; Hopkins and Bilimoria, 2008; Koman and Wolff, 2008; Williams, 2008; Boyatzis and Ratti, 2009; Ramo et al., 2009; Ryan et al., 2009, 2012; Young and Dulewicz, 2009; Boyatzis et al., 2011, 2012; Aliaga Araujo and Taylor, 2012; Gutierrez et al., 2012; Sharma, 2012; Amdurer et al., 2013; Victoroff and Boyatzis, 2013; Mahon et al., 2014; Badri, unpublished). Boyatzis et al. (2012) showed behavioral EI predicted job performance with significant unique variance, controlling for *g* and personality.

According to the dominant classification in Ashkanasy and Daus (2005), there are three different streams of EI research. Salovey and Mayer's Ability EI as measured by the MSCEIT is stream 1. Although it has shown relationships with school (Brackett et al., 2004), job and life outcomes (Mayer et al., 2008), these were not of primary consideration in its development (Mayer et al., 1999). Whereas ability EI shows no relationship to personality measures, it has shown consistent prediction of *g*, even when controlling for personality (Webb et al., 2013).

Self-perceptions and peer-report measures based on the Ability EI model are clustered within stream 2 (Ashkanasy and Daus, 2005). These measures such as the Trait EI Questionnaire (TEIQue; Petrides and Furnham, 2000, 2001), show similar validity patterns to the MSCEIT but are not as strongly related to *g*, nor job and life outcomes, yet they do show a significant relationship to personality (Webb et al., 2013).

Meanwhile, stream 3 (Ashkanasy and Daus, 2005) clusters both those EI measures based on self-perception and others' behavioral assessments (i.e., 360°, coded behavior from audiotape or videotape work samples or simulations). Consequently, there is a partition in results within this stream: some measures such as the ESCI (Boyatzis and Goleman, 2007) show a strong relationship and unique variance to life and job outcomes beyond *g* and personality (Byrne et al., 2007; Downey et al., 2011), while others such as the EQ-i (Bar-On, 1997) show a consistent relationship in predicting personality (Joseph and Newman, 2010; O'Boyle et al., 2011). We therefore, claim that clustering self-perception and coded or other perception measures confuses these relationships.

Instead, we support Fernández-Berrocal and Extremera's (2006, p. 8) comprehensive view of the EI field by which all "approaches try to discover the emotional components that underlie *emotionally intelligent* people and the mechanisms and processes that set off the use of these abilities in our everyday life" (emphasis added). In the authors' review of the first 15 years of EI research, behavioral EI as seen by others in 360° assessments is considered separately from self-perception approaches focused on moods and internal states, as well as personality traits such as Bar-On's (1997, 2007; Fernández-Berrocal and Extremera, 2006). Therefore, Boyatzis (2009) extends the work of Fernández-Berrocal and Extremera (2006) to propose an organization of the literature that is framed by the three existing methodological themes: EI ability methods; EI self-perception methods; and EI behavior methods.

In sum, the relationships of EI assessed at any level or with any method are still debated with comparative arguments about its link to *g* and personality. In this paper, we will focus on the relationship between behavioral EI and a measure of *g*.

GENERAL COGNITIVE ABILITY (*g*) AND INTELLIGENCE

According to Carroll's (1993) model of intelligence, the various mental abilities are structured hierarchically. General cognitive ability, located at its apex, is "the general efficacy of intellectual processes" (Ackerman et al., 2005, p. 32). Also known as general mental ability, general intelligence, or simply *g*, it is a well-researched construct with a large body of evidence supporting its predictive validity for such important outcomes as job performance and career success (e.g., O'Reilly III and Chatman, 1994; Schmidt and Hunter, 1998; Ferris et al., 2001). As a global ability, *g* can be thought of as the underlying common factor to all types of cognitive processing (i.e., verbal, mathematical, spatial, logical, musical, and emotional). From this perspective, *g* cannot be observed nor measured directly, it must be inferred from the positive correlations among distinct ability measures (Spearman, 1904; Jensen, 1998). As such, *g* subsumes different sets of abilities, each corresponding to a specialization of general intelligence.

General cognitive ability can be assessed through a variety of measures, such as IQ tests (Jensen, 1992; i.e., Ravens Progressive Matrices, Wechsler, Stanford Binet; Nisbett et al., 2012). Similarly, standardized admissions tests have been shown to "fit the general requisites of a measure of general cognitive ability" (O'Reilly III and Chatman, 1994). They also measure verbal and mathematical or quantitative reasoning skills separately. These tests such as the SAT, GRE, GMAT, MCAT, LSAT, and DAT are usually found to have

strong correlations with the more direct measures of *g*, (Detterman and Daniel, 1989).

The GMAT is a standardized test that assesses a person's analytical, writing, quantitative, verbal and reading skills for admission into graduate management programs worldwide. Although the GMAT is not formally validated as a measure of general cognitive ability, it is strongly correlated with the Scholastic Aptitude Test (SAT; e.g., Gottesman and Morey, 2006), which is shown to be a valid measure of *g* (Frey and Detterman, 2004). Considering the structural similarity of these tests (both consist of multiple choice questions that measure verbal and quantitative skills) and the general consensus that the *g*-factor can be measured by obtaining factorial scores across tests of different specific aptitudes, usually verbal and quantitative (O'Reilly III and Chatman, 1994), Hedlund et al. (2006, p. 102) concluded that "like the SAT, the GMAT can be characterized as a traditional measure of intelligence, or a test of general cognitive ability (*g*)." Indeed numerous studies have already used the GMAT as a measure of *g* (e.g., O'Reilly III and Chatman, 1994; Kumari and Corr, 1996; Mueller and Curhan, 2006), the latest of which is a study published in *Intelligence* (Piffer et al., 2014).

We suggest that the EI competencies may show a small, if any relationship to *g*. In fact, correlations between behavioral EI competencies coded from audiotapes of critical incident interviews about work samples and GMAT were not significant ($r = -0.015$, $n = 200$, $p = $ ns; Boyatzis et al., 2002). In assessing predictors of sales leadership effectiveness in the financial services industry, Boyatzis et al. (2012) reported that EI as assessed by others showed a non-significant correlation with Ravens Progressive Matrices ($r = 0.04$, $n = 60$, $p = $ ns).

In the inductive competency studies, two cognitive competencies repeatedly appeared to differentiate effective performance of managers, executives and professionals (Boyatzis, 1982, 2009; Spencer and Spencer, 1993). They were systems thinking and pattern recognition. The former is defined as seeing phenomenon as a series of causal relationships affecting each other. The latter is defined as perceiving themes or patterns in seemingly random information. As competencies, they are assessed both with a self-assessment and with observations of others as to how often a person demonstrates these behaviors. They are not defined or assessed as an intelligence measure but an indication of how often a person appears to be using these thought processes. As such, we expect them to be related to *g* more than EI competencies even though they are not a measure of *g*.

This leads us to the first two hypotheses for this study:

Hypothesis 1: EI competencies will have a slight relationship to g.
Hypothesis 2: Cognitive competencies will be more related to g than EI competencies.

SELF AND MULTI-RATER ASSESSMENTS

Differences in raters or sources of assessment are likely to play an important role in the findings. Self-perception and multi-rater assessment are different approaches to perceiving and collecting observations of a person's behavior (Luthans et al., 1988; Church, 1997; Furnham and Stringfield, 1998; Antonioni and Park, 2001; Taylor and Hood, 2010).

Self-assessment measures generally address how individuals respond to questions pertaining to their own emotions, perceptions or thoughts. These measures are easier and faster to administer than others, allowing for low costs of administration (Saris and Gallhofer, 2007). Social desirability is often an issue in self-reported measures (Paulhus and Reid, 1991). That is, respondents may base their answers on a desired state that often leads to inflated views of themselves. The validity of these measures can be improved by including questions that help control for social desirability (e.g., Paulhus and Reid, 1991; Steenkamp et al., 2010).

Used as a stand-alone measure, self-assessment of personality traits, attitudes or behavioral tendencies show acceptable validity (e.g., Furnham et al., 1999; Petrides and Furnham, 2000; Furnham, 2001; Petrides et al., 2006; Bar-On, 2007). Similarly, self-assessed measures of EI show acceptable validity (Bar-On, 1997; Petrides and Furnham, 2000, 2001). However, with regard to EI, self-assessments are also used in combination with others' ratings. Notably, the difference between self and others' perceptions is known as the self-other-agreement. This difference is a highly reliable measure of self-awareness (Yammarino and Atwater, 1997).

Multi-rater or multi-source assessments involve different raters from work such as a person's peers, collaborators, subordinates or bosses, and possibly raters from one's personal environment. Raters provide observations of a person's behavior (i.e., what they have *seen* the person do). Research on social cognition reveals that people give more weight to their own thoughts and feelings than to their behavior when forming self-perceptions, but this effect is reversed when forming perceptions of others (Vazire, 2010). Different types of raters may offer unique information about the person being assessed (Borman, 1997). People may behave differently depending on the situation (e.g., at home vs. work; Lawler, 1967).

Other behavioral assessments such as coding from audio or videotapes of critical incidents or simulations may be considered "pure" behavioral measures, but even these measures require people to code them. In the coding, observers are engaged in subjective perceptions and labeling. In such qualitative research, the scholars increase confidence in the data reported by assessing inter-rater reliability. In 360° assessments, greater confidence in the data is developed from a consensual perception of multiple raters. In EI studies, both types of measures attempt to assess how a person has been acting as seen by others (i.e., a behavioral approach to measurement of EI).

A number of studies show that there are differences among boss's, peers' and subordinates' views, and sometimes even others like consultants, customers or clients. Atkins and Wood (2002) claimed specific types of raters were best positioned to observe and evaluate certain types of competencies depending on the personal and working relationships they had with the person being evaluated. For example, subordinates were found to be the best evaluators of competencies such as coaching and developing people, when compared to bosses or peers (Luthans et al., 1988). Similarly Gralewski and Karwowski (2013) showed how, even though teachers are often accurate at assessing the intelligence and academic achievement of their students (Südkamp et al., 2012), they lack the ability to assess less conventional skill areas, such as

students' creativity. Different sources of raters might interpret the same observed behavior in different ways (Tsui and Ohlott, 1988). At the same time each rater source may have idiosyncratic tendencies leading to different observations and measurement error, like errors of leniency, central tendency, and range restriction (Saal et al., 1980). These are likely to be moderated by cultural assumptions (Ng et al., 2012). The research in assessing performance as well as skills and behavior with 360° assessments is summarized in Bracken et al. (2001). Social identity theory would contend that people find more legitimacy in assessing themselves with regard to those of higher status rather than merely more power (Taylor and Hood, 2010), suggesting that raters from work will be more potent than those from home.

Outside of family business, consulting or family therapy, the sources or raters that have been studied do not include family or friends (Bracken et al., 2001), with the exception of Rivera-Cruz (2004). She reported that female managers showed more EI competencies (as seen by others) at home versus work. In a desire to be comprehensive in assessments, data was collected in this study from a wide range of a person's relations – those from work and from their personal life (Boyatzis, 2009).

With regard to intelligence, it is expected that professional sources (i.e., sources from work) will have more of an opportunity to see and label behavior related to cognitive ability rather than those at home or in one's personal life.

This leads us to the third hypothesis for this study:

Hypothesis 3: Among personal, professional and self-assessment of a person's competencies, professional sources will show the strongest relationship of EI and cognitive competencies to g.

GENDER DIFFERENCES

In self-assessment, an extensive body of literature validated by a recent meta-analysis showed strong evidence of male hubris and female humility: the tendency of males to have inflated views of their abilities, opposite to females' propensity to under-estimate their worth (Furnham, 2001; Szymanowicz and Furnham, 2011). At the same time, there may be a gender bias in the type of *g* measures themselves as Furnham (2001) proposes that results may be based on the fact that most of these measures are "male normative". That is, they include specific tasks, such as spatial processing or mathematical reasoning at which males have been shown to do better than females.

As to others' ratings of EI competencies, stereotyping will likely affect peers perceptions of males versus females, even in the same setting (Taylor and Hood, 2010). Social identity theory, along with social comparison theory and self-categorization theory are expected to result in attributions made to females differently than those made to males even if their behavior was the same (Sturm et al., 2014). For example, Taylor and Hood (2010) reports that even though female MBAs appear to be more assertive and self-confident than other female samples, sexist bias in perception results in males being seen as more assertive and confident than females. However they did find that predicted ratings of others showed a gender difference: "women leaders believed that others would rate them lower than the actual ratings they received" (p. 542).

In light of these findings, we propose females may be subject to sexist discrimination in their multi-source assessments, particularly those from raters at work. This suggests there may be an interaction of both gender and rater in the relationship between EI and *g*.

This leads us to the fourth hypothesis for this study:

Hypothesis 4: Gender moderates the relationship of EI and cognitive competencies to g.

MATERIALS AND METHODS

Data were collected on 641 part-time and full-time MBA students from 23 countries, in a leading European business school, between 2006 and 2013. 30% were females, with an average age of 33 years for females and 34 years for males. As part of the MBA, the students took a required course called Leadership Assessment and Development which is based on the Intentional Change Theory (Boyatzis, 2008). In the course, students were asked to complete a self and multi-rater assessment of EI competencies. All data were collected under the informed consent an ethical guidelines of ESADE Business School.

MEASURES

Emotional Intelligence Competencies

We used the Emotional and Social Competency Inventory – University Edition (ESCI-U; Boyatzis and Goleman, 2007), a 70-item survey instrument which measures 14 competencies of two types: cognitive and emotional. The first type is composed of two cognitive competencies: systems thinking and pattern recognition. The other, includes 12 EI competencies: emotional self-awareness, emotional self control, adaptability, achievement orientation, positive outlook, empathy, organizational awareness, influence, inspirational leadership, conflict management, coach and mentor, and teamwork. Because the behavioral manifestations of these competencies are frequently observed in a variety of different situations they have been operationalized with as many as five indicators per competency. Psychometric properties of the test based on samples of 62,000 completions of the ESCI and 21,000 of the ESCI-U both reveals each scale shows model fit and satisfies criteria for discriminant and convergent validity (Boyatzis et al., 2014). A wide variety of validation studies on the test were reviewed earlier in this paper and in Wolff (2008).

Competencies can be considered to be the behavioral approach to emotional, social, and cognitive intelligence (Boyatzis, 2009). As such, the student is asked to solicit others from their work and life to complete the test about their behavior. The students had an average of 4.2 others complete the test for each of the 641 subjects in this analysis (standard deviation equals to 1.6). It is believed that multi-source assessment, such as 360°, provides protection against social desirability because of the distinct sources of responses.

Researchers have traditionally placed more emphasis on testing hypotheses on the relationships among constructs than on bridging the gap between abstract theoretical constructs and their measurements (i.e., epistemic relationships; Bagozzi, 1984). In our case, measurement error is particularly dangerous because it affects ESCI as a GMAT predictor leading to biased estimates of the structural effects (Frost and Thompson, 2000). Therefore,

before estimating these effects, we examined the ESCI construct validity[1].

Since we suspected that the ESCI factorial structure provided by the personal and the professional raters could be different as a function of their different perspectives[2] of the MBA students' behavior, we have modeled the data separately. Two confirmatory factor analysis (CFA) models have shown that both sets of raters were consistent with the hypothesized 13-factor (i.e., the competencies) model[3].

For purposes of exploring our research question, we distinguished three types of sources, or assessments in this study. We used a classification provided by each respondent at the time of completing the test. The responses were grouped as either: self, personal, or professional. One is the assessment provided by the student about himself or herself. Another source was personal, such as a spouse/partner, friends, or family members. Professional sources were bosses, peers, subordinates or clients from work or classmates in the MBA program. There were a few cases in which personal or professional assessments were missing, these cases were dropped resulting in a final sample of 624 individuals with personal and 611 with professional assessments available. All had self-assessment.

MBA participants and their raters were asked to indicate the frequency of the behavior on each item on an eleven point-scale ranging from (0) 'the behavior is never shown' to (10) 'the behavior is consistently shown.' This response set provides higher quality data on this predominantly European MBA population than the usual 5-point scale (Batista-Foguet et al., 2009). The final ESCI-U scores have been mean-centered to ease the interpretation of the parameters in the model. To compute the 360° assessments on the 70 items that constitute the ESCI-U survey, we first obtained for each item, its average score across all professional and personal raters separately, and then averaged across the five items per each competency. This way, our database consisted of 26,264 competency scores from 3 types of raters, on the 12 + 1 emotional, social, and cognitive competencies.

General cognitive ability (g)

We used the Graduate Management Admission Test (GMAT) as a measure of *g*. For this study we chose to collect our GMAT data from the GMAC, the entity that owns and administers the GMAT, and not through the Admissions Office at the University. We collected the students' GMAT scores from the first time they took the test. Using GMAT first time scores as compared to the scores with which students were admitted in the MBA program (usually

obtained after repeatedly taking the test), enabled a wider range of variation in GMAT with higher dispersion and lower means. We, thus, attempted to minimize the issue of range restriction in GMAT (Oh et al., 2008) and the resulting attenuation bias in the model coefficients. In our sample, the GMAT mean is 602.4, which is a little higher than the overall GMAT for all test takers of 545. The sample's standard deviation of the GMAT is 79.3, almost two thirds of the reported GMAT deviation (at 121). Therefore, our sample contains individuals with slightly higher GMAT and less "heterogeneous" scores than the population of GMAT applicants.

The ESCI-U data are configured in two non-nested structures: (1) the rater groups, varying between self, personal or professional raters; and (2) the competencies category with 13 competencies divided into two types of competencies: cognitive and EI. The hierarchal structure of the data model is shown in **Figure 1**.

The relationship between the ESCI-U and the GMAT scores might be affected by whether the ESCI-U scores on each competency are independent or not from the rater group. Therefore, treating each competency and group of raters as independent might mask important information. To adjust for this possibility, we allowed for a possible dependent relationship between the rater source and the competency category to be freely estimated in our model.

In order to be able to accommodate such a complex data structure and the relationships among the competencies (13 in two groups) and three types of raters, we need a specified model with sufficient flexibility to assign the proper systematic and stochastic variations. A multilevel/hierarchical model with non-nested structures in the first level (raters and competencies) and a nested structure in one of the components (competencies in two groups) is needed.

BAYESIAN MODEL SPECIFICATION

We chose to analyze the data and test our hypotheses by specifying a Bayesian hierarchical model. The choice to work with a Bayesian model was due to two main factors: (1) the sample

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[1]We define validity as "the degree to which evidence and theory support the interpretation of test scores entailed by proposed uses of tests" (American Educational Research Association et al., 1999, p. 9).

[2]Since we didn't assume that Personal and Professional raters have the same perception and aggregate them under the usual "other" category of raters, we have tested their measurement or factorial equivalence (Meredith, 1993).

[3]Exploratory Factor Analysis (EFA, Promax rotation) has already shown that systems thinking and pattern recognition competencies correlate on both raters' perceptions above 0.94. The subsequent confirmatory factor analysis (CFA) didn't reject the unidimensionality of the 5 + 5 items corresponding to the two competencies, that had ex-ante been assumed as distinct competencies. As a result, in this analysis, we used thirteen instead of the usual 14 factors underlying the ESCI model on this MBA population by having combined the two cognitive competencies into one scale.
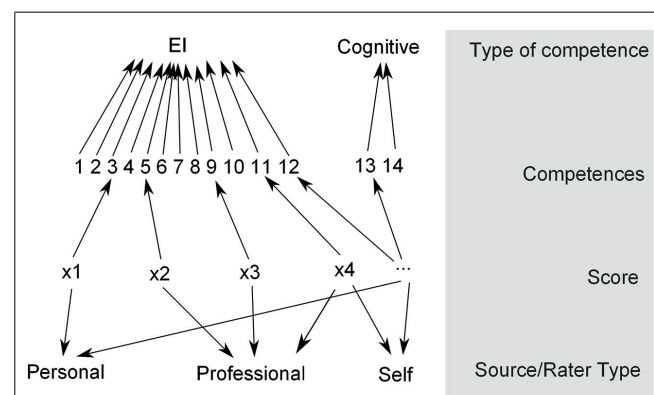

FIGURE 1 | Emotional and Social Competencies Inventory – University Edition (ESCI-U) data configuration. The ESCI-U data is framed within two non-nested structures: (1) the raters group, composed of self, personal and professional raters; and (2) the competencies category, withholding 14 competencies, which in turn are sub grouped into two types of competencies: Emotional and Cognitive.

was an entire population in and by itself; and (2) it was not a random sample. These issues pose problems in many statistical analyses because traditional frequentist methods are based upon the assumption that the data are created by a repeatable stochastic mechanism. While mainstream statistics treat the observable data as random and the unknown parameters of the population are assumed fixed and unchanging, in the Bayesian view, it is the observed variables that are seen as fixed whereas the unknown parameters are assumed to vary randomly according to a probability distribution. Therefore, in Bayesian models, the parameters of the population are no longer treated as fixed and unchanging as a frequentist approach would assume[4].

In sum, the main advantages of the Bayesian approach are twofold: (1) it enables highly flexible model specifications (as the one needed to account for the hierarchical structure of our data); and (2) is more appropriate for settings where the data is not a random sample, but the entire population. In addition, it offers a clear and intuitive way to present results. For example, it appears more intuitive by generating *probability* statements about the findings (for more readings on the advantages of Bayesian inference, check the introductory chapters of Gill, 2002; Gelman et al., 2003; Jackman, 2009).

To best accommodate the structure of our data, we used a multilevel or hierarchical model non–nested structure (by competency and rater group). Equation 1 below represents our model specification, which assumes a linear association between GMAT and ESCI-U scores.

$$GMAT_{i,c,r} \sim N(\mu_i, \sigma)$$

$$\mu_i = \alpha_{c,r} + ESCI\text{-}U\,\theta_{c,r} + Female\,\beta_r + Female^*ESCI\text{-}U\,\delta_{c,r}$$

$$\sigma \sim U(0,100)$$

$$\alpha_{c,r} \sim N(0,1000)$$

$$\theta_{c,r} \sim N(\Theta_{r,t}, \sigma_\theta)$$

$$\Theta_{r,t} \sim N(0,1000)$$

$$\sigma_\theta \sim U(0,10)$$

$$\beta_r \sim N(0, \sigma_\beta)$$

$$\sigma_\beta \sim U(0, 100)$$

$$\delta_{c,r} \sim N(\Delta_{r,t}, \sigma_\delta)$$

$$\Delta_{r,t} \sim N(0,1000)$$

$$\sigma_\delta \sim U(0,10)$$

The *i* subscript refers to the individual, the *c* subscript refers to the competency and the *r* subscript refers to the rater group (self, personal or professional). The intercept, $\alpha_{c,r}$, varies by competency and rater group. The parameters that account for the ESCI-U effect, $\theta_{c,r}$, have a hyper-parameter[5], $\Theta_{r,t}$, that varies by rater group and by type of competency (i.e., cognitive or emotional).

Additionally, the model includes gender as a source of variation, with coefficient β_r varying by group of raters. The moderator effect of gender on the association between ESCI-U and GMAT is also specified, an interaction that is parameterized as $\delta_{c,r}$ – varying by competency category and rater group, with hyper-prior specification that depends on the type of competency.

In total, there are six main parameters of interest to be estimated, which are compared regarding the type of competency (cognitive or emotional) and the rater group. Estimating a model like the one above is not possible using "canned" procedures from mainstream statistical packages. This confounds the other seemingly inappropriate assumptions from frequentist approaches based on maximum likelihood. One technical solution is to use Bayesian simulation techniques, which allow for highly flexible model specifications[6].

RESULTS

To test the structure of the 13 competency scales, we used LISREL 8.80 with the covariance matrix to estimate the factorial composition. The same CFA model was specified for professional and personal raters. The fit indexes of the measurement model were satisfactory, as shown in **Table 1**. Factor loadings of the items per competency were above 0.65. The usual global indexes shown in **Table 1** are below or close the appropriate thresholds (Hu and Bentler, 1999). The relatively high values of chi-square were actually due to some irrelevant misspecifications which were magnified due to the high power situation (large sample size and high reliability). We could have released a few constraints on uncorrelated uniqueness but their estimated values would be negligible.

In addition, it is well known that these global fit indexes may have limitations resulting in erroneous conclusions (Saris et al., 2009). Therefore, we checked whether: (1) all the estimated values were reasonable and of the expected sign; (2) the correlation

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[4]Instead of a frequentist approach, in this approach a parameter is assigned a prior distribution (based on previous research in the field), which is then updated with the actual data by means of a specified likelihood function, so as to produce a posterior distribution of the parameter (Wagner and Gill, 2005). In fact, in our approach we are not entitled to use a *p*-value (as in frequentist statistics) as the probability of obtaining the observed sample results under the null hypothesis. As mentioned the data is not a sample of a larger population but it is a population.

[5]Hyper-parameters provide a clear illustration of the Bayesian view on population parameters. That is, there are no static assumptions made about the mean of a parameter, rather the mean is allowed to fluctuate according to its own probability function. The subscript *r* on the hyper-parameter refers to the gender and the subscript *t* refers to the type of competency, Cognitive or Emotional.

[6]As mentioned earlier, Bayesian inference requires researchers to provide prior distributions for the parameters of the model. Given the lack of previous research on this topic, however, the current prior distributions were weakly informative. Consequently, our model has been estimated using Markov Chain Monte Carlo methods, more specifically, the Gibbs sampler. JAGS (Plummer, 2003) has been used for the estimation, while the chains have been analyzed under R with the coda and ggmcmc libraries (Plummer et al., 2006; Fernández-i-Marín, 2013; R Development Core Team, 2013). A total of 5,000 samples of two chains of simulated posteriors have been acquired under different initial values, with a burn-in period of 1,000 iterations. There is no evidence of non-convergence of the series according to the Geweke (1992) test.

Table 1 | Confirmatory factor analysis (CFA) model fit for different sources of raters (*n* = 641).

Raters CFA model	Satorra-Bentler χ^2 (df)	90% CI RMSEA	*P*-value for test of close fit (RMSEA < 0.05)	CFI	SRMR
Professional	4751 (2261)	(0.0404; 0.0437)	1.000	0.992	0.0525
Personal	5399 (2261)	(0.0456; 0.0488)	0.994	0.988	0.0579

residuals suggested the addition of parameters; and (3) the modification indexes and expected parameter changes led to plausible estimates. This process focuses more attention on the detection of misspecification errors rather than solely on the global fit (Saris et al., 2009). It considers the power of the test in addition to the significance levels. The results did not show any significant misspecifications in our CFA model for each set of raters.

Results from a discriminant validity analysis show that all the competencies are adequately discriminated[7]. Discriminant validity was assessed by comparing the square root of the AVE, as shown in **Table 2**, of each reflective construct with the correlations between the constructs, as shown in **Tables 3** and **4**. Despite the relatively high magnitude of some correlations among competencies as shown in **Tables 3** and **4,** the results suggested that the 13 competencies were adequately discriminated. To be sure, the two cognitive competencies were integrated into one scale for this analysis. Any model that specified a correlation between two competencies constrained to one has been rejected. Therefore, these results suggested the appropriateness of maintaining the 13 competencies rated by others as separate scales.

With this evidence supporting validity of the scales, we addressed reliability. In **Table 2** we used Cronbach's α for assessing the internal consistency of each set of five items within each competency. However, for those competencies in which tau-equivalence (Bollen, 1989) was not fulfilled, we used Heise and Bohrnstedt's (1970) W, which only requires fitting a unidimensional factor analysis model.

Although the two models shown in **Table 2** fulfill the *configural invariance* (same CFA model for personal and professional raters), they showed support for rejecting the condition that the item loadings were the same in both groups of raters (i.e., they had measurement equivalence). Intraclass correlation indexes were not considered because we did not need to aggregate raters into one category of "others." As a result, the two raters' perspectives were considered under a hierarchical model specification.

The outcome of a Bayesian model is not a point estimate of the coefficient with an associated standard error, but a complete density distribution of the parameter, which can then be simply summarized by using its median and standard deviation to resemble the traditional frequentist approach of parameter estimates and standard errors. Moreover, percentiles of the parameter's distribution are used to summarize its credible interval (which is the

Bayesian equivalent to a parameter's confidence interval in classical statistics). In addition, results and substantial interpretations of some of the parameters are presented using graphical figures, in accordance with statisticians' advice of "turning tables into graphs" (Gelman et al., 2002).

COGNITIVE VS. EMOTIONAL COMPETENCIES

As mentioned earlier, the main parameters of interest, $\Theta_{r,t}$, are those that describe the association between GMAT and ESCI-U competencies depending on which type of competency, cognitive or EI, and which of the three groups of raters are considered. A caterpillar plot is shown in **Figure 2** with the median of the posterior distribution of each parameter and the 90 and 95 percent credible intervals. The parameters can be interpreted as follows: (a) if the distribution crosses the zero point, there is no consistent relationship of significance; and (b) if the line is to the right or the left of the zero point, then it tells us about the relative impact. For example, in **Figure 2**, the cognitive competencies assessed by professional sources have a positive relationship to *g*. The distribution can be said to show that an increase of one unit in the cognitive competencies, as scored by professional raters, is expected to produce an on average increase of around 8.5 units in the GMAT scores. EI and cognitive competencies show no relationship to *g* with observations from personal sources. Observations from professional sources show a positive relationship between EI and *g*. Observations from self-assessment show a negative relationship between EI and *g*. In all three groups of raters the association between GMAT scores and the raters' evaluation of the cognitive competencies is considerably higher than with the raters' evaluation of EI competencies. This clearly indicates that GMAT scores are associated in a different way with the ESCI-U scores produced by the three groups of raters. Adding to the main effects mentioned, these results show that the rater group has a moderator effect on the association between ESCI-U and GMAT scores. Therefore we find support for hypothesis 1, strong support for hypothesis 2, and clarity as to the different sources for hypothesis 3.

Figure 2 also shows that others' ratings of behavior agree more with each other than they do with self-perceptions. This is a well-established result (Atwater and Yammarino, 1992; Carless et al., 1998) that brings further support to our claim that clustering self-report with others' ratings or 360° based approaches confuses the relationships of EI to different constructs.

Another way to examine these results is by using probability statements, which is one of the advantages of using Bayesian inference. In this sense, the probability that cognitive competencies are more strongly associated with GMAT scores than the EI competencies ranges between 81.5 percent for professional raters, 92.7 for personal raters and 97.8 for self-evaluations. Therefore, the data offers strong evidence for hypotheses 3.

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[7]In addition, as indexes of discriminant and convergent validity (Bagozzi and Yi, 1988), we first checked the average variance extracted (AVE; i.e., the average communalities per competency). As mentioned, the results showed that all items have loadings above 0.65, with competencies having always an AVE above or close to 0.5. In addition, cross-loadings from a previous EFA showed that all the items have much higher loadings with their respective construct (as suggested by Chin, 1998) than with any other competency.

Table 2 | AVE, Cronbach's α and Omega of the 13 competencies (a) personal and (b) professional (the two cognitive competencies were combined into one factor for this analysis; *n* = 641).

Constructs		AVE		Cronbach's α		Ω	
		Pers (a)	**Prof** (b)	(a)	(b)	(a)	(b)
[AO]	Achievement orientation	0.519	0.587	0.842	0.875	0.860	0.880
[A]	Adaptability	0.558	0.591	0.856	0.875	0.890	0.910
[CFM]	Conflict management	0.497	0.521	0.824	0.854		
[CM]	Coach and mentor	0.610	0.617	0.882	0.888		
[ESA]	Emotional self-awareness	0.589	0.591	0.874	0.847		
[ESC]	Emotional self-control	0.676	0.731	0.905	0.920		
[E]	Empathy	0.610	0.654	0.885	0.896		
[I]	Influence	0.498	0.534	0.828	0.847	0.840	0.870
[IL]	Inspirational leadership	0.693	0.702	0.913	0.920		
[OA]	Organizational awareness	0.555	0.578	0.852	0.869		
[PO]	Positive outlook	0.652	0.572	0.902	0.868		
[T]	Teamwork	0.654	0.695	0.902	0.914		
[C]	Cognitive	0.543	0.561	0.909	0.916	0.920	0.929

Table 3 | Correlation matrix of competencies as scored by personal raters (*n* = 641).

		AO	A	CFM	CM	ESA	ESC	E	I	IL	OA	PO	T
[A]	**Adaptability**	0.817											
[CFM]	**Conflict management**	0.685	0.865										
[CM]	**Coach and mentor**	0.626	0.705	0.853									
[ESA]	**Emotional self-awareness**	0.560	0.597	0.726	0.749								
[ESC]	**Emotional self-control**	0.566	0.720	0.809	0.534	0.460							
[E]	**Empathy**	0.588	0.726	0.905	0.814	0.720	0.721						
[I]	**Influence**	0.582	0.805	0.802	0.666	0.605	0.500	0.587					
[IL]	**Inspirational leadership**	0.724	0.802	0.827	0.786	0.644	0.557	0.596	0.845				
[OA]	**Organizational awareness**	0.651	0.870	0.841	0.693	0.568	0.646	0.746	0.783	0.764			
[PO]	**Positive outlook**	0.619	0.696	0.670	0.575	0.534	0.553	0.517	0.552	0.734	0.566		
[T]	**Teamwork**	0.640	0.780	0.890	0.824	0.594	0.675	0.787	0.653	0.786	0.811	0.674	
[C]	**Cognitive**	0.781	0.900	0.793	0.641	0.629	0.632	0.646	0.797	0.769	0.806	0.601	0.646

To provide deeper insight into the consistency of the distributions, **Figure 3** shows the caterpillar plot of all the 52 $\theta_{c,r}$ parameters, one per each of the 14 ESCI-U competencies, and the three rater groups. As can be seen, the parameters' distributions are quite consistent within the EI and cognitive types of competencies results shown in **Figure 2**. The figure can be read as follows, taking as an example the first element of **Figure 3**: an increase of 1 unit in the competency score of pattern recognition by professional raters is expected to generate an on average increase of about 7.5 in the GMAT score. Yet, regardless of which rater perceptions are considered, cognitive competencies always show higher association with GMAT scores than EI competencies.

THE MODERATOR EFFECT OF GENDER

Regarding the moderator effects of gender, females showed substantially lower associations between EI and *g* than males, as shown in **Figure 4**. In fact, it is negative for observations from each of the self and professional observers and non-significant for personal observers for females. Meanwhile, there is a positive relationship between EI and *g* for males as viewed from professional observers. Although varying in intensity, for all sources for both EI and cognitive competencies, males show a stronger relationship to *g* than females. Regarding cognitive competencies, the relationship to *g* is stronger for males than females from all sources. This provides further support for hypotheses 3 and clarifies why hypothesis 4 is important.

Table 4 | Correlation matrix of competencies as scored by professional raters (*n* = 641).

|		AO	A	CFM	CM	ESA	ESC	E	I	IL	OA	PO	T
[A]	**Adaptability**	0.892											
[CFM]	**Conflict management**	0.770	0.840										
[CM]	**Coach and mentor**	0.740	0.743	0.875									
[ESA]	**Emotional self-awareness**	0.674	0.730	0.799	0.777								
[ESC]	**Emotional self-control**	0.509	0.627	0.799	0.593	0.527							
[E]	**Empathy**	0.637	0.752	0.930	0.854	0.784	0.788						
[I]	**Influence**	0.762	0.853	0.888	0.785	0.803	0.603	0.784					
[IL]	**Inspirational leadership**	0.757	0.786	0.793	0.833	0.682	0.538	0.689	0.867				
[OA]	**Organizational awareness**	0.686	0.854	0.829	0.738	0.729	0.680	0.825	0.858	0.722			
[PO]	**Positive outlook**	0.734	0.742	0.759	0.662	0.603	0.600	0.683	0.705	0.781	0.669		
[T]	**Teamwork**	0.683	0.753	0.877	0.903	0.683	0.698	0.887	0.757	0.741	0.830	0.692	
[C]	**Cognitive**	0.848	0.908	0.832	0.743	0.776	0.589	0.720	0.869	0.769	0.797	0.652	0.696
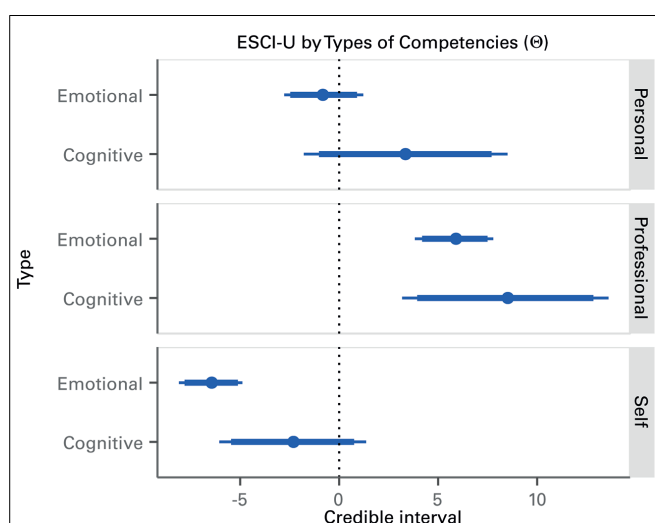
FIGURE 2 | Caterpillar plot of the posterior distribution of the effects of types of competencies on GMAT scores, by rater. Credible intervals (median, 90 -thick line- and 95% -thin line-) of the distribution of the Δ parameters that account for the association between the type of competency and the GMAT score. Hence, for the first element (Emotional-Personal), one unit increase in emotional competencies is expected to decrease the GMAT by around one point. However, since the credible interval overlaps zero, there may be weak evidence of an actual decrease.
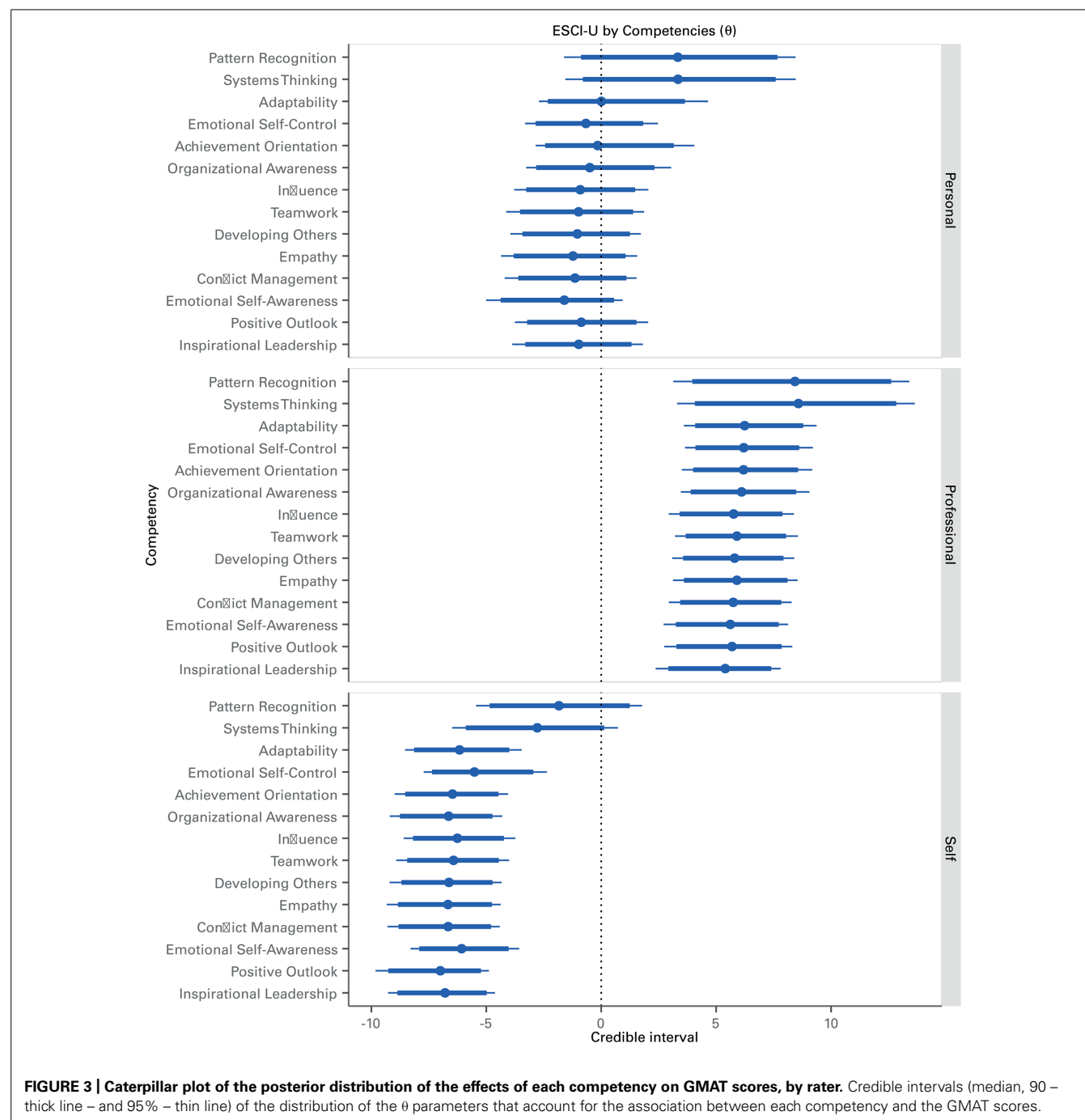
DISCUSSION

The study examined the relationship between behavioral EI and *g*. We found that cognitive competencies are more strongly related to *g* than EI competencies. EI, as seen by others, is slightly related to *g*, in particular for observations from professional raters for males, but there is no relationship from observations of personal raters, and a slightly negative relationship of EI and *g* from self-assessment. When we examined gender moderating effects, there appears to be a relationship between EI and *g* for males with observations from professional

raters. With females, there is no relationship between EI and *g* with observations from personal raters, and a slight negative relationship with observations from professional raters and self-assessment.

In alignment with both Fernández-Berrocal and Extremera (2006) and Boyatzis (2009) frameworks of the research on EI, these results offer further support to distinguish between approaches to EI that are based on self-perception and those that are behavioral. This would add to the literature by supplementing the other approaches and levels of EI with the behavioral approach and helps us develop a more holistic model of the EI. Even with this approach, for males with assessment from professional colleagues, there is a relationship between EI and *g*. It is not as strong as the relationship with cognitive competencies and *g*. But it is there. These findings support the idea reported in other studies that to be effective in management, leadership or professions, we probably need some distribution of EI, cognitive competencies and *g* (Boyatzis, 2006; O'Boyle et al., 2011).

Self-assessment showed a slight negative relationship between EI and *g*. This raises the question as to whether self-perception approaches to EI will be as good in predicting job performance (Taylor and Hood, 2010). But a recent meta-analysis of self-assessment methods did show consistent predictive effects of EI (Joseph et al., 2014). Perhaps for those jobs and professions that involve more analytic activities and tasks which require a higher level of *g* – e.g., a bench scientist, engineering programmer, creative artist or mathematician, self-perceived EI may be relatively less accurate in performance prediction than a behavioral approach.

The gender moderating effects noted may be interpreted as a result of the different expectations and attributions from others to males and females. Whether emerging from stereotyping or social comparison processes, they force what appears to be a more generous attribution of the link between EI and *g* to males than females. One dilemma is that some studies may confound such processes by using a measure of *g* that appears gender biased. For example, the Ravens Progressive Matrices, although considered

FIGURE 3 | Caterpillar plot of the posterior distribution of the effects of each competency on GMAT scores, by rater. Credible intervals (median, 90 – thick line – and 95% – thin line) of the distribution of the θ parameters that account for the association between each competency and the GMAT scores.
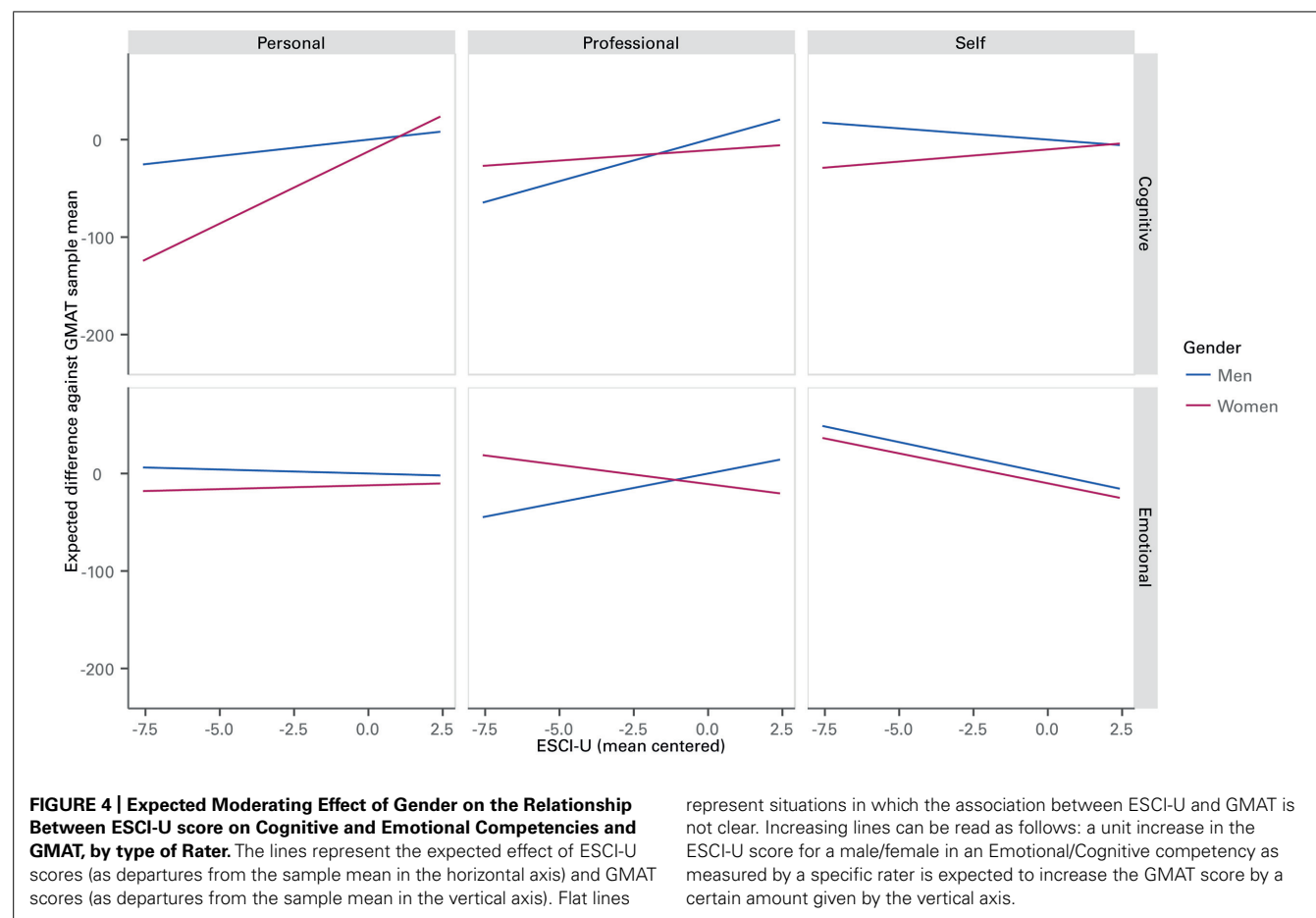
one of the best measures of *g*, is a visual comparison task (i.e., choosing a figure that fits into a sequence more than others). Since males appear to handle such spatial reasoning more quickly, as a result of prior gender based training and socialization, may give males a different distribution on the results than females. It is recommended that these "male normative" intelligence tests (Furnham, 2001), are paired with the Mill Hill Vocabulary or some such similar test that balances a measure of *g* with specific skills in which females do better than males (Boyatzis et al., 2012).

Overall, the different results from different raters is a reminder that the reality of what you see depends on the direction in which you look, and the color of the lenses you wear.

IMPLICATIONS

The results suggest that research on EI should examine at more than one level within studies, the ability, trait, self-perception or behavioral levels. It may help in understanding the relevance of EI to life and work outcomes, as well as other constructs in psychology. They also suggest that research on EI should include measures

FIGURE 4 | Expected Moderating Effect of Gender on the Relationship Between ESCI-U score on Cognitive and Emotional Competencies and GMAT, by type of Rater. The lines represent the expected effect of ESCI-U scores (as departures from the sample mean in the horizontal axis) and GMAT scores (as departures from the sample mean in the vertical axis). Flat lines represent situations in which the association between ESCI-U and GMAT is not clear. Increasing lines can be read as follows: a unit increase in the ESCI-U score for a male/female in an Emotional/Cognitive competency as measured by a specific rater is expected to increase the GMAT score by a certain amount given by the vertical axis.

of *g* to show the unique variance contributed by each concept and show the relative power of each. When collecting behavioral EI data, these results suggest that analyses should examine the sources of the observations as a possible moderator or mediator on the dependent variables. For example in this research, it is likely that the professional environment provides more opportunities for the raters to assess *g*-related competencies than the personal environment. It is also crucial to analyze data for gender effects that may not be apparent in more direct, statistical analysis.

Professionals using 360° assessments to coach or develop EI should be prepared to identify systemic differences across gender and rater types. Otherwise, individuals may leave their coaching session thinking they have an actual "problem" with certain raters, when in reality it is a systematic bias shared across the population.

LIMITATIONS

One of the limitations of this study emerges because the data came from a single school with diverse nationalities. As such, it threatens external validity. The study should be replicated in other schools to insure that a specific school's selection and admissions criteria have not biased results.

By focusing on MBA students, we also threatened construct validity. Social desirability is one of the most common validity threats associated with the use of questionnaires in this postgraduate population. Raters provided by the individual rated might create a halo effect, an overall positive feeling leading to inflate their perception of how often desirable behaviors are present. Specially, self-assessment is often misguided for this overall positive feeling about oneself, or because being competent is desirable, thus increased positive self-assessment tends to occur. Future research should address this issue as well.

CONCLUSION

Emotional intelligence exists at multiple levels. The behavioral level of EI shows a different relationship to *g* than other levels or approaches to EI. Different people around us, at home and at work, will see different facets of our behavior, depending on the kind of relationship and rapport they have established. Some raters are best equipped to assess certain competencies than others because they witness frequently the activities that elicit those behaviors. While our study reveals that raters from a professional sphere are more apt to evaluate cognitive competencies, future research would benefit from looking further into discovering which rater type among professionals (boss, colleagues or subordinates) is best suited to assess which ESCI-U competency. The same can be said of the pervasive impact that gender stereotypes and social comparison processes have on observations of others and their interpretations of it. Regarding EI, to be of most help in discovering insights that will be useful to improving our lives, we should be more comprehensive about the variety in

approaches to EI and more sensitive to their differences at the same time.

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Beyond fluid intelligence and personality traits in social support: the role of ability based emotional intelligence

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Social support represents an important individual resource that has been associated with multiple indices of adaptive functioning and resiliency. Existing research has also identified an association between emotional intelligence (EI) and social support. The present study builds on prior research by investigating the contributions of ability based EI to social support, beyond the effects of fluid intelligence and personality traits. The Advanced Progressive Matrices, the Big Five Questionnaire, the Mayer Salovey Caruso EI test (MSCEIT), and the Multidimensional Scale of Perceived Social Support were administered to 149 Italian high school students. The results showed that ability based EI added significant incremental variance in explaining perceived social support, beyond the variance due to fluid intelligence and personality traits. The results underline the role of ability based EI in relation to perceived social support. Since ability based EI can be increased through specific training, the results of the present study highlight new possibilities for research and intervention in a preventive framework.

Keywords: fluid intelligence, personality traits, ability based emotional intelligence, social support, prevention

Introduction

Social support represents an important human resource that can be understood from multiple theoretical perspectives (Di Fabio and Kenny, 2012b; Blustein and Di Fabio, 2013). Relational theory (Blustein, 2001), for example, highlights the value of social support, noting the natural human aspiration for personal connection, and relationships (Bowlby, 1982; Josselson, 1992; Blustein, 2001, 2006). The aspiration for connection is evident across the life span through friendships, romantic relationships, familial connections, and work relationships (Blustein, 2006). Research has documented the importance of relational experiences and interpersonal relationships both for career development and work success (Blustein et al., 1995; Schultheiss et al., 2001; Kenny et al., 2003; Blustein, 2006; Richardson, 2012). According to the inclusive psychology of working (Blustein, 2011), work is an inherently relational act such that each decision, experience, and interaction with the world of work is understood, influenced and shaped by relationships. Accordingly, career development interventions now highlight the importance of relationships in designing a career or Career project (Savickas, 2011) and as integral to the Life project (Guichard, 2013).

Social support also serves important preventive and protective functions in fostering positive development and buffering stress (Hage et al., 2007; Kenny and Di Fabio, 2009; Kenny and Hage, 2009; Hage and Romano, 2013; Kenny et al., 2014; Di Fabio and Kenny, 2015). Research has found

social support to be related to quality of life (Petito and Cummins, 2000; Helgeson, 2003) and well-being (Rigby, 2000; Ben-Ari and Gil, 2004). Evidence suggests, furthermore, that positive relationships can help to buffer the negative effects of psychosocial stress and job loss (Aquino et al., 1996; Blustein et al., 1997; Greenhaus and Parasuraman, 1999; Blustein, 2006). Relationships thus offer valuable resources for responding to the challenges of the 21st century and in helping people to build their work lives (Hage et al., 2007; Richardson, 2012; Kenny et al., 2014; Di Fabio and Kenny, 2015). The positive youth development (Lerner, 2001; Kenny, 2007, 2014) and developmental–contextual frameworks (Walsh et al., 2002) also emphasize the important role of the social context at the family, school, and community levels in moderating risks and fostering academic success and productive societal participation (Dryfoos, 1994; Paavola et al., 1995; Airasian and Walsh, 1997; Schorr, 1997; Ferry et al., 2000; Kenny et al., 2014; Di Fabio and Kenny, 2015). Building supportive relationships is thus important for prevention efforts in early life and across the life course (Hage et al., 2007; Kenny and Hage, 2009; Blustein, 2011).

Positive Lifelong Self and Relational Management (PLS&RM, Di Fabio, 2014a; Di Fabio et al., in press) is a new theoretical integration that emanates from Positive Psychology (Seligman and Csikszentmihalyi, 2000; Seligman, 2002), brings into consideration the dialectic of self in relationship, and is aligned with developmental-contextualism (Lerner, 2002; Kenny, 2007), career construction (Savickas, 2005), self-construction and life-construction (Guichard, 2005, 2013), and the relational theory of working (Blustein, 2011). PLS&RM refers to the promotion of effective and lifelong self and relational management across numerous personal and professional transitions and complex challenges of 21st century life. PLS&RM is comprised of three constructs: Positive Lifelong Life Management, Positive Lifelong Self Management, and Positive Lifelong Relational Management. The first construct is operationalized by the Pemberton Happiness Index (PHI, Hervás and Vázquez, 2013) and the Authenticity Scale (AS, Wood et al., 2008); the second construct by the Intrapreneurial Self-Capital Scale (ISC, Di Fabio, 2014b), the Career Adapt-Abilities Inventory (Savickas and Porfeli, 2012), and the Life Project Reflexivity Scale (Di Fabio, in press b); the third construct by the Trait Social-Emotional Intelligence Questionnaire (TEIQue, Petrides and Furnham, 2004; the Bar-On EQ-I, Bar-On, 1997), the Multidimensional Scale of Perceived Social Support (MSPSS, Zimet et al., 1988), and the Positive Relational Management Scale (Di Fabio, in press c), encompassing respect for others, respect by others for oneself, respect for oneself; caring for others, caring by others for oneself, caring for oneself; and connection with family, connection with friends, connection with significant others.

Following a preventive orientation, PLS&RM (Di Fabio, 2014a; Di Fabio et al., in press) focuses on building strengths at the person (Di Fabio and Blustein, 2010; Di Fabio and Kenny, 2011, 2012a; Di Fabio and Palazzeschi, 2012; Di Fabio et al., 2012, 2013; Kenny et al., 2014; Di Fabio, in press a) and relational levels (Blustein, 2006, 2011; Di Fabio and Kenny, 2012b). Given prior

research on the value of social support for prevention and positive development, social support is of clear relevance to the PLS&RM model as a strength for promoting positive lifelong management and wellness.

Social support has been widely researched over the years, with attention to its relationship with personality traits. Early research established positive relationships with extraversion and negative relationships with neuroticism (Sarason et al., 1983, 1986). More recent research has documented positive relationships between perceived social support and the personality traits of agreeableness and conscientiousness (Di Fabio and Kenny, 2012b). Recent research has also explored the relationship of perceived social support with emotional intelligence (EI; Austin et al., 2005; Montes-Berges and Augusto, 2007; Di Fabio and Kenny, 2012b). While EI is considered a variable that can be increased through specific training with potential for prevention (Di Fabio and Kenny, 2011), personality traits are considered generally stable and less amenable to modification through intervention (Costa and McCrae, 1992). Given evidence that EI is associated with perceived social support (Di Fabio and Kenny, 2011, 2012b), EI has promise for promoting personal well-being and PLS&RM.

The term EI was introduced by Salovey and Mayer (1990) to describe the individual's ability to monitor his or her own feelings and those of others, discriminating among the various types of emotions and utilizing this information to guide thoughts and actions. Salovey and Mayer (1990) affirm that EI is composed of three categories of adaptive abilities: Appraisal and expression of emotions, Regulation of emotions, Utilization of emotions in solving problems. Subsequently Mayer and Salovey (1997) expanded their definition to include the ability to perceive emotions, to compare emotions and feelings connected to them, to understand information derived from emotions, and to manage these emotions. Saklofske et al. (2003) and Stough et al. (2009) distinguish two principal EI models: ability based models refer to EI abilities (Mayer et al., 2000) and trait EI models refer to self-reported EI (Bar-On, 1997) and EI self-efficacy (Petrides and Furnham, 2000, 2001).

Recent research on EI (Di Fabio and Palazzeschi, 2008a,b, 2009; Di Fabio and Blustein, 2010; Di Fabio and Kenny, 2012a; Di Fabio et al., 2012, 2013; Di Fabio and Saklofske, 2014a,b) has examined the incremental contribution of EI to varied indices of adaptive functioning beyond the contribution of personality traits. Prior research has established relationships between trait EI and perceived social support (Austin et al., 2005; Montes-Berges and Augusto, 2007; Di Fabio and Kenny, 2012b) and between ability based EI and perceived social support (Di Fabio and Kenny, 2012b).

Aim and Hypotheses

Following from the theoretical frameworks and prior research delinated above, social support represents an important individual resource associated with multiple indices of adaptive functioning (Blustein et al., 1997; Petito and Cummins, 2000; Rigby, 2000; Helgeson, 2003; Ben-Ari and Gil, 2004; Blustein and Di Fabio, 2013). Social support also represents an important preventive and protective factor in fostering positive development (Hage et al., 2007; Kenny and Di Fabio, 2009; Kenny and Hage,

2009; Hage and Romano, 2013; Kenny et al., 2014; Di Fabio and Kenny, 2015). Existing research has also identified a specific association between EI and social support (Austin et al., 2005; Montes-Berges and Augusto, 2007; Di Fabio and Kenny, 2012b). The present study builds on prior research by investigating the contribution of ability based EI to social support, beyond the effects of fluid intelligence and personality traits in Italian high school students attending the last year. The decision to examine these aspects in a sample of students attending the last year of an Italian high school was determined by this critical stage in the life of the participants examined, since they had to cope with important choices and transitions at the end of high schoolregarding their development and career. The following two hypotheses were formulated.

H1: Personality traits will explain a significant percentage of incremental variance over variance explained by fluid intelligence in relation to perceived social support (Sarason et al., 1983, 1986; Di Fabio and Kenny, 2012b).

H2: Ability based EI will explain a significant percentage of incremental variance over the variance due to fluid intelligence and personality traits in relation to perceived social support (Di Fabio and Kenny, 2012b).

Materials and Methods

Participants

One hundred and forty-nine students attending the last year of high school in the Tuscan school system participated in the study. All final-year high school students in the school system were invited to participate. With regard to gender, 58 (38.41%) of the participants were boys and 91 (60.26%) were girls. The participants ranged in age from 18 to 20 years ($M = 19.48$, $SD = 0.56$).

Measures
Advanced Progressive Matrices (APM)

The Italian version by Di Fabio and Clarotti (2007) of the Advanced Progressive Matrices (APM) test by Raven (1962) was used to evaluate fluid intelligence. The test is composed of two series of items, with12 items in Series I and 36 items in Series II. Participants select one response for each item among eight possible alternatives. Cronbach's alpha was 0.91.

Big Five Questionnaire (BFQ)

The Big Five Questionnaire (BFQ, Caprara et al., 1993) was used to evaluate personality traits. The questionnaire is composed of 132 items with response options on a 5-point Likert scale format ranging from $1 = Absolutely\ false$ to $5 = Absolutely\ true$. The questionnaire measures five personality dimensions. In the Italian sample, the Cronbach's alpha coefficients were:0.81 for Extraversion, 0.73 for Agreeableness, 0.81 for Conscientiousness, 0.90 for Emotional Stability, and 0.75 for Openness.

Mayer Salovey Caruso Emotional Intelligence Test (MSCEIT)

The Italian version by D'Amico and Curci (2010) of the Mayer Salovey Caruso EI Test (MSCEIT, Mayer et al., 2002) was used to evaluate ability based EI. The measure has 141 items and provides a total score and four branch scores: Perceiving Emotions (PE), Facilitating Thought (FT), Understanding Emotions (UE), Managing Emotions (ME). For the Italian version, split half reliabilities were: 0.90 for PE, 0.77 for FT, 0.75 for UE, 0.72 for ME (D'Amico and Curci, 2010).

Multidimensional Scale of Perceived Social Support (MSPSS)

The Italian version by Di Fabio and Busoni (2008) of the Multidimensional Scale of Perceived Social Support (MSPSS, Zimet et al., 1988) was used to evaluate perceived social support. The scale is composed of 12 items with response options on a 7-point Likert-type scale, ranging from 1 (*absolutely false*) to 7 (*absolutely true*). The instrument measures support from family (Example of item: "My family works very hard to help me"), friends (Example of item: "I can speak about my problems with my friends"), and significant others (Example of item: "When I need someone, there is always a special person who stands by me"). For the Italian version, the Cronbach's alpha coefficient was 0.90.

Procedure and Data Analysis

The measures were administered collectively in the classroom by trained staff. The administration order was counterbalanced to check for potential presentation order effects.

The measures were administered at a time agreed upon with the school and with due adherence to the requirements of privacy and informed consent requested by the Italian law (Law Decree DL-196/2003). Regarding the ethical standards for research, the study referred to the last version of the Declaration of Helsinki (Fortaleza, 2013).

Descriptive statistics, Pearson's r correlation and hierarchical regressions were calculated for the data.

Results

Means, SDs and correlations between APM, BFQ, MSCEIT, and MSPSS are reported in **Table 1**.

With the MSPSS as criterion variable, a hierarchical regression was conducted with fluid intelligence at the first step, personality traits at the second step, and ability based EI at the third step (see **Table 2**).

Fluid intelligence did not account for significant variance at the first step. At the second step, personality traits accounted for 18% of the variance; at the third step, ability based EI accounted for an additional 12%. The overall model explained 30% of variance.

In the regression model the following personality traits are significant: Extraversion ($\beta = 0.28$, $p < 0.01$), Emotional Stability ($\beta = 0.25$, $p < 0.01$), Openness ($\beta = 0.22$, $p < 0.01$), Agreeableness ($\beta = 0.18$, $p < 0.05$). The MSCEIT Total Score is also significant ($\beta = 0.32$, $p < 0.01$).

TABLE 1 | Means, SDs, and correlations relative to APM, BFQ, MSCEIT, MSPSS.

		M	SD	1	2	3	4	5	6	7	8
1	APM	34.94	6.57	–							
2	BFQ Extraversion	76.02	10.63	0.02	–						
3	BFQ Agreeableness	76.26	9.21	0.09	0.34**	–					
4	BFQ Consciousness	78.96	9.63	0.09	0.28**	0.23**	–				
5	BFQ Emotional Stability	61.69	13.81	0.10	0.39**	0.32**	0.31**	–			
6	BFQ Openness	79.25	9.36	0.13	0.42**	0.39**	0.37**	0.40**	–		
7	MSCEIT total score	42.74	7.05	0.19	0.09	0.07	0.08	0.10	0.11	–	
8	MSPSS total score	42.23	8.35	0.05	0.35**	0.24**	0.21**	0.32**	0.29**	0.52**	–

*N = 149, **p < 0.01.*

TABLE 2 | Hierarchical regression.

	MSPSS total score
	β
Step 1	
APM fluid intelligence	0.00
Step 2	
BFQ Extraversion	0.28**
BFQ Agreeableness	0.18*
BFQ Consciousness	0.15
BFQ Emotional Stability	0.25**
BFQ Openness	0.22**
Step 3	
MSCEIT Total Score	0.32**
R^2 *step 1*	0.00
ΔR^2 *step 2*	0.18***
ΔR^2 *step 3*	0.12***
R^2 *total*	0.30***

The contributions of fluid intelligence (APM), personality traits (BFQ), and ability-based emotional intelligence (MSCEIT) to perceived social support (MSPSS).
*N = 149, *p < 0.05, **p < 0.01, ***p < 0.001.*

Discussion

The aim of the present study was to analyze the role of personality traits and ability based EI after controlling for the effects of fluid intelligence in relation to perceived social support in Italian high school students. Given the interest in promoting EI as a preventive resource (Hage et al., 2007; Kenny and Di Fabio, 2009; Di Fabio and Kenny, 2011, 2015; Kenny et al., 2014), we were interested in verifying the contribution of EI to social support beyond the effect of more static personality traits.

The results confirmed the first hypothesis as personality traits explained a significant percentage of variance in relation to perceived social support. As in prior research (Sarason et al., 1983, 1986; Di Fabio and Kenny, 2012b), personality was related to perceived social support. More specifically, the current study suggests that more extraverted, agreeable and emotionally stable people perceive a greater level of available social support.

The second hypothesis was also confirmed as ability based EI added significant incremental variance beyond that accounted for by personality traits in relation to perceived social support. These results are also consistent with existing literature (Di Fabio and

Kenny, 2012b), documenting the relationship of ability based EI with perceived social support. These findings suggest that people who possess greater ability in perceiving, understanding, and managing emotions and in using emotions to facilitate thought also perceive more available social support (Di Fabio and Kenny, 2012b).

Despite the contributions of the present study in affirming existing research on the relationship of ability based EI with perceived social support, it is necessary to highlight some limitations. A first limitation is the exclusive use of a group of Italian high school students (ages of 18–20) attending the last year of school from the region of Tuscany, who are not representative of the overall Italian high school context. Future research should consider a group of participants who are more representative of the Italian population, including high school students from other geographical areas in Italy. Furthermore, future research could also involve other groups such as university students and workers. The results of the present study could also be replicated in other international contexts. Another limitation is relative to the fact that the present research is a cross-sectional study. In future research, longitudinal studies could be useful to assess the directionality of effects.

Notwithstanding the above-mentioned limitations, the results of the present study add to existing reasearch by providing an in-depth look within an Italian context at the role of ability based EI in perceived social support, beyond the effects of cognitive ability and personality. If the results of the present study are further confirmed in future research, this could also suggest the need for more intervention that seeks to build EI through specific training (Di Fabio and Kenny, 2011) and thus foster positive development and enhanced resiliency (Hage et al., 2007; Di Fabio and Kenny, 2011, 2015; Kenny et al., 2014).

Such training would be aligned with the growing interest in developing effective relational skill-building interventions for promoting positive development and functioning (Blustein and Di Fabio, 2013). Consistent with the PLS&RM framework and a prevention and positive development agenda (Hage et al., 2007; Di Fabio, 2014a; Kenny et al., 2014; Di Fabio and Kenny, 2015), group-level and systemic programs could serve to prevent relational conflict and enhance relational support (Blustein and Di Fabio, 2013). Furthermore, training specifically developed to increase EI represents an example of a relational skill-building approach that is evidenced-based.

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The associations among the dopamine D2 receptor Taq1, emotional intelligence, creative potential measured by divergent thinking, and motivational state and these associations' sex differences

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Previous neuroscientific studies have shown that the dopaminergic system plays an important role in creative potential measured by divergent thinking (CPMDT), emotional control, and motivational state. However, although associations between two of these four components have been previously established (e.g., the association between CPMDT and emotional control, the association between CPMDT and motivational state, etc.), the interactions between these four remain unknown. The purpose of this study was to reveal these interactions using path analyses. The Taq1A polymorphism of the dopamine D2 receptor (DRD2) gene was used for this purpose. For measuring emotional intelligence (EI), we used the Japanese version of the Emotional Intelligence Scale. CPMDT was measured using the S-A creativity test. Motivational state was measured using the Vigor subscale of the Japanese version of the Profile of Mood Scale (POMS). Data from 766 healthy, right-handed individuals (426 men and 340 women; 20.7 ± 1.9 years of age) were used in this study. There were significant and robust positive relationships among measures of CPMDT, EI, and motivational state across sex. In addition, the polymorphism of the DRD2 gene was significantly associated with EI, specifically in females. Path analysis in females indicates that the model in which (a) the DRD2 polymorphism primarily facilitates EI, (b) EI in turn facilitates CPMDT and leads to

a better motivational state, and (c) a better motivational state also directly facilitates CPMDT explains the data in the most accurate manner. This study suggested a comprehensive picture of the cascade of the associations among dopamine, EI, motivational state, and CPMDT at least in females.

Keywords: emotional intelligence, mood, dopamine, creativity, divergent thinking, motivation, creative potential

Introduction

The broadly accepted standard definition of creativity is the ability to produce work that is both novel and useful within a certain social context (Stein, 1953; Runco and Jaeger, 2012). Creative production has been the key to the development of our culture and civilization (Takeuchi et al., 2013a). In the laboratory setting, divergent thinking measures are widely used to measure individual differences in abilities of creative cognition (Takeuchi et al., 2011a), and they have been shown to be reliable and valid indicators of a person's creative potential (Runco and Acar, 2012; Benedek et al., 2014). Divergent thinking is defined as the generation and application of several different ideas to solve a given problem (Runco, 1990). A meta-analysis has shown that divergent thinking can strongly predict individual creativity achievement (Kim, 2008).

Psychological studies have shown that creative potential measured by divergent thinking (CPMDT) is associated with individual differences in perspectives of emotion, mood, and motivation. Creativity has been traditionally and essentially linked to motivation; specifically, it is predicted that brain motivational systems are critically relevant to creativity (for review, see Flaherty, 2005). In addition, it is assumed that motivation increases the number of ideas produced and that the number of novel and useful ideas increases proportionately (for review, see Flaherty, 2005). Furthermore, motivation increases CPMDT (Halpin and Halpin, 1973). Although a wide range of mood and emotional states is thought to be important for CPMDT (Baas et al., 2008); among mood states, motivational state (state with full vigor and vitality) is shown to be particularly important for CPMDT. And there is a rather distinct positive association between CPMDT and higher motivational state (Takeuchi and Kawashima, 2013). On the other hand, emotional intelligence (EI) is defined as "*the subset of social intelligence that involves the ability to monitor one's own and others' feelings and emotions, to discriminate among them and to use this information to guide one's thinking and actions*" (Salovey and Mayer, 1990, p. 189). In addition, EI is known to promote better mood and emotional states (Uchiyama et al., 2001) including motivational state (Extremera and Fernández-Berrocal, 2005). In addition, the theoretical models of EI assume that motivation or the ability to motivate oneself is an essential part of EI (Goleman, 1998; Uchiyama et al., 2001). On the contrary, some theories suggest that higher EI leads to higher creativity (Mayer et al., 1999). Theoretically, it was also assumed that EI facilitates positive mood, which in turn facilitates creative thinking (Ivcevic et al., 2007). CPMDT has been shown to be positively associated with EI (Guastello et al., 2004). Given the aforementioned distinct association between CPMDT and motivational

state, motivational state may be the link between CPMDT and EI.

Previous neuroscientific studies have shown that the dopaminergic system plays an important role in CPMDT, emotional control, and motivational state. A wide range of evidence has established the role of dopamine in motivation (Carlson, 2001). With regard to creativity or creative potential, recent neuroimaging studies have shown an association between CPMDT and dopamine receptor binding potential (De Manzano et al., 2010). Furthermore, mean diffusivity (MD) in the areas of the dopaminergic system, which is associated with dopamine synthesis capacity (Kawaguchi et al., 2014), displays an association with CPMDT (Takeuchi et al., 2015). These findings are congruent with the theory based on a wide range of evidence stating that the dopaminergic neural system may facilitate creativity through motivation as well as other dopamine-dependent cognitive processes, such as goal-directed thoughts and seeking behaviors (Flaherty, 2005). Finally, given the aforementioned essential link between motivation and EI, the dopamine neural system may also be theoretically linked to EI. Finally, the polymorphism of the dopamine D2 receptor (DRD2) gene is shown to be associated with emotional control (Blasi et al., 2009). Dopamine D2 function has been shown to be important for regulatory self-control (Pattij et al., 2007). While deficit EI has been shown to underlie disorders involving addiction or substance abuse, such as alcohol dependence (Schutte et al., 2011), so is the dopamine D2 function (Volkow et al., 2006).

One way to look at dopamine D2 function is to consider the polymorphism of the DRD2 gene. Among these, the Taq1A polymorphism (rs1800497) of the DRD2 gene is a substitution located in a noncoding region of the DRD2 locus. The A1 allele (as opposed to the A2 allele) of this polymorphism was shown to be robustly associated with alcohol dependence through a meta-analysis (Munafo et al., 2007). A previous meta-analysis of the association between this DRD2 polymorphism and substance dependence (Munafò et al., 2009). Furthermore, a physiological study (Thompson et al., 1997) revealed that the effect of this polymorphism has sex differences on dopamine physiology; therefore, the interaction effects between the DRD2 polymorphism and sex on phenotypes may exist. Moreover, for processing emotion and motivation as well as emotional and motivational responses to stimuli, sex differences are known to exist (e.g., Willner et al., 1998; Bradley et al., 2001). Additionally, there are sex differences in mood disorders (Kessler et al., 1993). Furthermore, concerning dopamine release and dopamine binding potential, sex differences are known to exist (Andersen and Teicher, 2000; Munro et al., 2006). Moreover, sex differences are also known to exist concerning the effects of

polymorphisms that are related to emotions (Walderhaug et al., 2007).

From these lines of evidence, we hypothesized that dopamine D2 functional difference measured by DRD2 Taq1A polymorphism, EI, CPMDT and motivational states are associated with one another and each component mediates the others' associations. And we also assumed possible interaction effects between the DRD2 polymorphism and sex on other variables. As described previously, the associations among EI, CPMDT, and motivational state have been well established, and other polymorphisms of DRD2 known to be linked to emotion control have been previously established. However, the following remain unknown: (a) the associations of the DRD2 Taq1 polymorphism with EI, CPMDT, and motivational state, (b) these associations' possible sex differences, and (c) the mechanism by which the DRD2 Taq1 polymorphism, EI, CPMDT, and motivational state affect one another in the causal pathway. The purpose of this study was to reveal these mechanisms.

Materials and Methods

Subjects

Data from 766 healthy, right-handed individuals (426 men and 340 women; 20.7 ± 1.9 years of age) were used in this study as a part of an ongoing project, consisting of various types of MRI scanning and psychological test batteries besides the ones analyzed in this manuscript, to investigate associations among brain imaging, cognitive functions, aging, genetics, and daily habits (Takeuchi et al., 2012a, 2013b,c, 2014a,b). The description of the basic information of subjects in this study, was reproduced from our previous study (Takeuchi et al., 2013d, p. 320). All subjects were university, college, or post-graduate students or subjects who had graduated from these institutions within 1 year before the experiment and had normal vision. None had a history of neurological or psychiatric illness. Handedness was evaluated using the Edinburgh Handedness Inventory (Oldfield, 1971). This study was approved by the Ethics Committee of Tohoku University. Written informed consent was obtained from each subject and for nonadult subjects, written informed consent was obtained from the parent (guardian) of each subject by signing a form and in accordance with the World Medical Association (1991).

Divergent Thinking Assessment

The methods outlined here are reproduced from our previous studies (Takeuchi et al., 2010a, pp. 12–13; 2010b, pp. 579–580; 2011a, p. 682; 2011b, p. 2; 2012b, pp. 2923–2924).

The S-A creativity test (Society_for_Creative_Minds, 1969) was used to assess CPMDT. J.P. Guilford generated the draft plan of this test. He also supervised the development of the test (Society_for_Creative_Minds, 1969). The test was standardized for Japanese speakers (Society_for_Creative_Minds, 1969).

The test is used to evaluate verbal CPMDT (Society_for_Creative_Minds, 1969), and it involves three types of tasks. The practice (and real) tasks are administered in the following order: (1) practice of the first task (2 min), (2) the

first task (5 min), (3) practice of the second task (2 min), (4) the second task (5 min), (5) practice of the third task (2 min), and (6) the third task (5 min). Each task involves two questions. In total, the test takes 30 min. This test was administered in a group setting. The first task requires subjects to generate unique ways of using typical objects (e.g., "Other than reading, how can we use newspapers?" An example answer is "We can use them to wrap things."). The second task requires subjects to imagine desirable functions of ordinary objects (e.g., "What are the characteristics of a good TV? Write down as many characteristics as possible." An example answer is "A TV can receive broadcasts from all over the world."). The third task requires subjects to imagine the consequences of "unimaginable things" happening (e.g., "What would happen if all the mice in the world disappeared?" An example answer is "The world would become more hygienic."). Each task requires subjects to generate as many answers as possible. The S-A creativity test provides a total score, which was used in this study, as well as scores for the following dimensions of the creative process: (a) Fluency: Fluency is measured by the number of relevant responses to questions and is related to the ability to produce and consider several alternatives. Fluency scores are determined by the total number of questions answered after excluding inappropriate responses or responses that are difficult to understand. (b) Flexibility: Flexibility is the ability to produce responses from a wide perspective. Flexibility scores are determined by the sum of the (total) number of category types to which the responses are assigned based on a criteria table or an almost equivalent judgment. (c) Originality: Originality is the ability to produce ideas that differ from those of others. Originality scoring is based on the sum of idea categories that are weighted based on a criteria table or an almost equivalent judgment. (d) Elaboration: Elaboration is the ability to produce detailed ideas (Society_for_Creative_Minds, 1969). Elaboration scores are determined by the sum of responses that are weighted based on a criteria table or an almost equivalent judgment. These four dimensions correspond to the same concepts as those of the Torrance tests of creative thinking (TTCT; Torrance, 1966).

The total score is the sum of the originality score and that of elaboration in the version of the S-A creativity test (Society_for_Creative_Minds, 1969) used here. This is because the Fluency and Flexibility scores are highly correlated with those of Elaboration (Society_for_Creative_Minds, 1969). Scoring of the tests was performed by the Tokyo Shinri Corporation.

The analysis was limited to the total score, and it did not include the score for each dimension. This is because in this test, the score of each dimension is highly correlated with the total score and with those of other dimensions (Takeuchi et al., 2010a). This phenomenon is consistent with another similar divergent thinking test (Heausler and Thompson, 1988), namely TTCT (Torrance, 1966). Heausler and Thompson (1988) concluded that the correlations among the subscales in TTCT are so high that each subscale could not meaningfully provide dissociated information. Treffinger (1985) also warned that separate interpretations of TTCT subscores should be avoided. Consistent with this notion, a previous study (Chávez-Eakle et al., 2007) that investigated the association between regional

cerebral flow (rCBF) and each dimension revealed that different dimensions were correlated with rCBF in similar regions. Thus, we believe that using only the total score serves the purpose of this study. However, another study using different approaches found two-factor structures in the subscales of figural TTCT, which contains six subscales (Kim, 2006). Furthermore, a previous study of the association of polymorphisms of dopamine-related genes and CPMDT found significant associaitons in some subscales but not in others, although whether the patterns of the results are statistically significantly different between different subscales is not clear from the report (Runco et al., 2011). In light of these findings, we assessed whether the correlations between the DRD2 polymorphism (for details, see the subsection below) and the four subscale scores were different in this study. The zero-order correlation coefficients of these correlations ranged from 0.086 to 0.10 in females and from −0.01 to 0.02 in males. Thus, apparently, there were no statistically distinguishable differences among the results of the correlation analyses between the four subscales of this test and the DRD2 polymorphism in this study.

Please refer to the Appendix for a sample and the manner in which the tests were scored.

For the information of the external validity of this scale, we quote our previous study (Takeuchi et al., 2010b, p. 579). S-A creativity test scores are significantly correlated with various other external measures, such as various personality factors and problem-solving abilities in daily life, suggesting its ability to predict performance in everyday situations (Shimonaka and Nakazato, 2007). Furthermore, S-A creativity test scores are significantly correlated with the frequency of visual hypnagogic experiences, which in turn are correlated with the vividness of mental imagery and neuroticism (Watanabe, 1998).

Emotional Intelligence Scale

The methods outlined here are reproduced from our previous studies (Takeuchi et al., 2011c, p. 1499; 2013d, p. 320; 2013e, pp. 1026–1027).

The Japanese version of the EI scale (EIS) (Fukunishi et al., 2001b; Uchiyama et al., 2001) was used to assess EI as it was in our previous studies (Takeuchi et al., 2011c, 2013d,e). The Emotional Intelligence Scale is a self-reported measurement that provides an estimate of emotional and social intelligence. The scale was developed and standardized for use with Japanese subjects. The Emotional Intelligence Scale comprises 65 items and a five-point Likert scale with a response format ranging from "not true of me" to "very often true of me." The subjects' responses were categorized into the following three composite scale scores (factors): (a) intrapersonal factor (comprised of self-insight, self-motivation, and self-control), (b) interpersonal factor (comprised of empathy, altruism, and interpersonal control), and (c) situation management factor (comprised of insight into and control over a situation). Each composite scale score is composed of three subscale scores.

The intrapersonal factor evaluates (1) self-awareness, (2) the ability to sustain one's behavior, and (3) the ability to act appropriately. The interpersonal factor evaluates the ability

to maintain appropriate personal relationships based on the understanding and empathy toward another person's emotions. The situation management factor evaluates (1) the ability of an individual to endure and adapt to a change, (2) provide leadership, and (3) exhibit flexibility in the control and use of their abilities in dynamic situations.

The following are examples of items on the Emotional Intelligence Scale.

"I know when my emotions change" (self-insight subscale in the Intrapersonal factor).

"I do not want to say something that offends someone else" (altruism subscale in the Interpersonal factor).

"I can respond to situational changes effectively" (control toward situation subscale in the Situation Management factor).

Other than this three-component model of EI, there are a four-component model of EI (Salovey and Mayer, 1990) and a five-component model of EI (Bar-On, 1997). The Bar-On model of EI (Bar-On, 1997) consists of two major factors, an intrapersonal and an interpersonal factor, as well as other minor factors, such as stress coping, adaptability, and general mood. On the contrary, based on a literature review, Otake et al. (2001) proposed a third major factor (situation management), which is equal to the minor factors of the Bar-On model. Basically, they proposed that EI is not limited to the self-related abilities and other-related abilities which previous models consistently included, and they proposed a factor to manage the situation. Moreover, based on these models, items were gathered and described. Then, based on the factor analyses, these three factor models were supported (Uchiyama et al., 2001).

The Emotional Intelligence Scale is an established test based on normative data with a large sample size ($n = 703$) (Uchiyama et al., 2001). The scoring of each factor is based on a test manual. Confirmatory factor analyses validate the model of this test (Otake et al., 2001; Uchiyama et al., 2001). According to the test manual (Uchiyama et al., 2001), the internal consistencies of the three factors (intrapersonal, interpersonal, and situation management factors) are 0.894, 0.915, 0.915 respectively (Cronbach's coefficient alpha).

In this study, we used the total score (sum of the three factors) of EIS, as in the case of the previous study (Takeuchi et al., 2013d). The previous study suggested that the polymorphism of EI is associated with not only aspects of self control (Blasi et al., 2009) but also social and situational aspects (Ponce et al., 2003). We therefore focused on the total EI score in this study. The associations of each factor with motivational state, CPMDT, and the DRD2 Taq1 polymorphism were highly similar and could not be statistically differentiated.

Scores on the Emotional Intelligence Scale are associated with EI related measurements such as the Toronto Alexithymia Scale (Fukunishi et al., 2001a). This indicates the external validity of the Emotional Intelligence Scale. All three factors of the Emotional Intelligence Scale are associated with improved mental health as determined by a general health questionnaire as well as increased optimism as determined by the LOT Optimism scale (Uchiyama et al., 2001). Specifically, the situation management factor was strongly associated with better mental health (Uchiyama et al., 2001). These results are consistent with

the idea that higher TEI leads to better mental health (Salovey et al., 2000).

Profile of Mood States

Vigor subscale of the shortened Japanese version (Yokoyama, 2005) of the Profile of Mood States (POMS) (McNair et al., 1992), which measures participants' motivation, was used. In this study, we used the score of each participant's experience of mood during the week preceding the experiment (Takeuchi et al., 2011b) (which means the experience of the mood on the day of the experiment as well as that during the past week before the experiment). Cronbach's alpha of this subscale is 0.869 (Yokoyama, 2005). The score of this subscale is decreased in a number of diseases and after exhausting work (Yokoyama, 2005).

Genotyping of DRD2/ANKK1 Taq1A Polymorphism

High-molecular-weight DNA was isolated from the saliva of subjects using Oragene containers (DNA Genotek Inc., Canada), according to the manufacturer's protocol. DRD2/ANKK1 Taq1A polymorphism (rs1800497) was genotyped utilizing the Taqman Allelic Discrimination Assay System (assay ID: C_7486676_10) obtained from Applied Biosystems (Foster City, CA, USA). Each genomic DNA (20 ng) was mixed with 0.25 ml of primer/TaqMan Probe mixture and 5 ml of TaqMan Universal PCR Master Mix (Applied Biosystems) within 10 ml of the total volume. Thermal cycling conditions were 95°C for 10 min, followed by 50 cycles of 92°C for 15 s and 59°C for 1 min in the CFX96 Real-Time System (BioRad, Hercules, CA, USA). Alleles were determined on the basis of allelic discrimination features of the CFX Manager software (BioRad). qRT-PCR-based genotyping data was validated on the basis of sequencing of PCR products (635 bp) of representative subjects, utilizing the following primers: forward: ccctgcatctagcagcctac, reverse: gagacagggttttgccatgt, spanning the polymorphic site.

DRD2 was coded A1/A1, A1/A2, and A2/A2. Among the 778 participants whose psychological and genetic data were obtained in this study, data for the polymorphism were successfully obtained from 766 subjects (426 men and 340 women; 20.7 ± 1.9 years of age); genotyping data of 12 subjects were not available because of failures either in proper extraction of a DNA sample from the saliva or in amplification in the PCR procedure or failure to provide a (proper) saliva sample. The genotypic distributions of the 766 subjects were as follows: DRD2 Taq1A A1/A1 (men, $n = 57$, 7.4%; women, $n = 37$, 4.8%), DRD2 Taq1A A1/A2 (men, $n = 197$, 25.7%; women, $n = 153$, 20.0%), and DRD2 Taq1A A2/A2 (men, $n = 172$, 22.5%; women, $n = 150$, 19.6%). Allele frequencies of A1 and A2 alleles were 35.1% and 64.9%, respectively, which were concordant with previous findings (Tsuchimine et al., 2012). Tests for the Hardy–Weinberg equilibrium exhibited no deviations from the expected genotype distribution ($p > 0.05$).

As described in the previous study (Stice et al., 2010), the DRD2 Taq1A site exists in exon 8 of the ANKK1 gene on the opposite strand. This SNP results in a glutamate-to-lysine (E713K) substitution within the eleventh ankyrin repeat of ANKK1. This suggests that changes in the function of ANKK1

may be relevant to some associations that are attributed to DRD2 (Neville et al., 2004). Keeping this in mind, we refer to the polymorphism as DRD2 Taq 1A in this study.

Statistical Analyses of the Effects of the DRD2 Taq1A Polymorphism

Behavioral data were analyzed using SPSS 22.0 (SPSS Inc., Chicago, IL). First, the associations between the DRD2 Taq1A polymorphism (DRD2 Taq1A A1/A1 = 1, DRD2 Taq1A A1/A2 = 2; DRD2 Taq1A A2/A2 = 3) and the scores for the cognitive measures that were common to both sexes were analyzed using multiple regression analyses. Additional covariates for each analysis were age and sex. Second, the interaction effects between sex and the DRD2 Taq1A polymorphism on cognitive measures were analyzed using analyses of covariance (ANCOVAs). Sex was a fixed factor, and additional covariates were the DRD2 Taq1A polymorphism and age. These three variances and the interaction between sex and the DRD2 Taq1A polymorphism were included in the model. Finally, associations between the DRD2 Taq1A polymorphism (DRD2 Taq1A A1/A1 = 1, DRD2 Taq1A A1/A2 = 2; DRD2 Taq1A A2/A2 = 3) and the scores for the cognitive measures in each sex were analyzed using multiple regression analyses with age as a covariate.

In psychological analyses, results with a threshold of $p < 0.05$, corrected for false discovery rate (FDR) using the two-stage sharpened method (Benjamini et al., 2006), were considered statistically significant. The correction for multiple comparisons using this method were applied to the results of abovementioned three ANCOVAs (analyses for interactions between sex and DRD2 Taq1A polymorphism on Vigor subscale of POMS, the total score of EIS, and the score of S-A creativity test) and 18 multiple regression analyses (analyses for associations between two of the polymorphism of DRD, Vigor subscale of POMS, the total score of EIS, and the score of S-A creativity test for both sexes, men, women).

Path Analysis of the Associations between the DRD2 Taq1A Polymorphism, EI, CPMDT, and Motivational State

The results of analyses described above suggested that there were sex differences in the associations between the polymorphism of DRD2 and psychological variables. There were also associations among the DRD2 Taq1A polymorphism on the Vigor subscale of POMS, the total score of EIS, and the score of the S-A creativity test in females.

We then proceeded to path analyses for identifying the association among these variables, particularly in females. As described in a previous study (Charlton et al., 2008), structural equation modeling (SEM) was used to simultaneously estimate the relationships among the abovementioned four variables. Intercepts were allowed in the structural equations, and models were fitted using maximum likelihood methods. SEM was performed using the Amos software (version 22.0, IBM, SPSS). We included the abovementioned four variables.

In constructing the initial models, we assumed that the polymorphism affected the psychological variables and not the
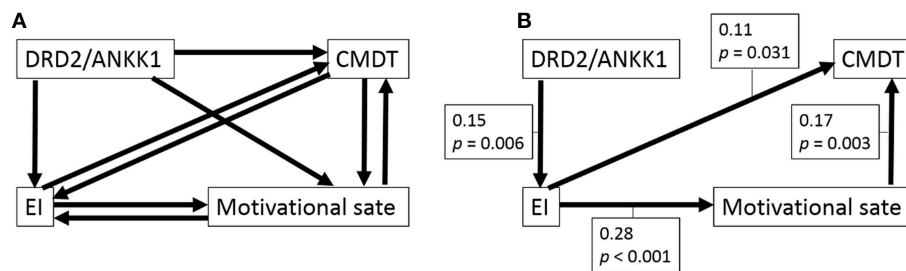
FIGURE 1 | Path analysis of the associations among the polymorphism, CPMDT, motivational state, and emotional intelligence in females. (A) The initial model is shown. Depending on the directionality of the paths among four variables, there were eight initial models. From each initial model, the paths with the highest *P*-value were deleted recursively one by one, the analyses were rerun after each path was removed, until the model fit stopped improving. **(B)** The final model is shown. Standardized regression weights for the significant paths and *P*-values are shown next to each path arrow.
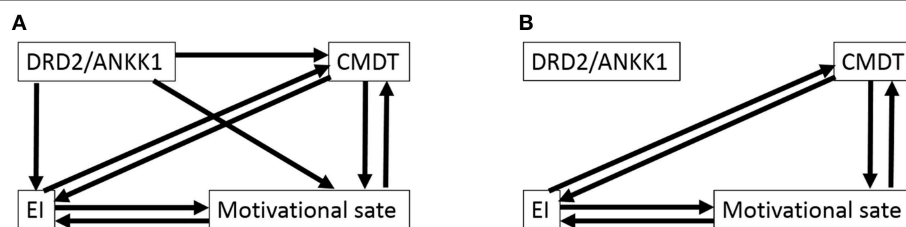

FIGURE 2 | Path analysis of the association among the polymorphism, CPMDT, motivational state, and emotional intelligence in males. (A) The initial model is shown. Depending on the directionality of the paths among four variables, there were eight initial models. From each initial model, the paths with the highest *P*-value were deleted recursively one by one, and analyses were rerun after each path was removed, until the model fit stopped improving. **(B)** The final model is shown. Depending on the directionality of the paths among personalities, there were eight final models with equal statistical values.

other way around. We did not make any further assumptions in this study. Thus, there were eight initial models for each sex because we could not presume the direction of paths between psychological variables (**Figures 1A**, **2A**). Subsequently, as described in the previous study (Charlton et al., 2008), we considered whether the paths of relatively complex literature-derived models shown in **Figures 1A**, **2A** could be reduced by removing pathways that lacked statistically significant associations and the models could be improved. To obtain a better model, we employed stepwise removal or alternation procedure that fitted the model, as described in the previous studies (Charlton et al., 2008; Fjell et al., 2012). The models were evaluated by comparing the fit of nested models that included and excluded a path in question and by using Akaike information criterion (AIC) and statistics of fitness. Once a final model was obtained, regression coefficients were estimated for all the remaining paths. To check that the final model fitted the data adequately, two verifications were performed: (a) a test to check for the lack of fit was performed using chi-squared statistics, and (b) the following fit indices were calculated: AIC, the comparative fit index (CFI), and the root mean square error of approximation (RMSEA).

Based on the initial models, the paths with the highest *P*-value were deleted recursively one-by-one, and the analyses were rerun after each path was removed until the model fit stopped improving.

Results

The Basic Demographic and Psychological Characteristics of Each Genotype

The basic demographic variables and psychological variables of each genotype and each sex are presented in **Table 1**.

The Associations among Psychological Variables and the Polymorphism of DRD2 Across Sexes

The associations among the EIS score, Vigor subscale score of POMS, score of the S-A creativity test, and DRD2 Taq1 polymorphism were tested using multiple regression analyses correcting for age and sex. The statistical values are presented in **Table 2**. The correlations between (a) the EIS score and S-A creativity test score, (b) the EIS score and the score of the Vigor subscale of POMS, and (c) the S-A creativity test score and Vigor subscale of POMS were significant, and were all positive correlations. However, the correlations of the DRD2 polymorphism with other psychological scores were not significant. Note that this result (c) is reported using the smaller sample in this project (Takeuchi et al., 2013a).

The Effects of the Interaction between Sex and the Polymorphism on Psychological Variables

ANCOVA with age as a covariate revealed the significant effect of the interaction between sex and the polymorphism of the DRD2

TABLE 1 | The descriptive data for each genotype of the DRD2 Taq1 polymorphism in each sex.

	Men			Women		
	DRD2-Taq1 A1/A1 ($n = 57$)	DRD2-Taq1 A1/A2 ($n = 197$)	DRD2-Taq1 A2/A2 ($n = 172$)	DRD2-Taq1 A1/A1 ($n = 37$)	DRD2-Taq1 A1/A2 ($n = 153$)	DRD2-Taq1 A2/A2 ($n = 150$)
Age	20.68 ± 2.14	20.71 ± 1.86	20.91 ± 2.01	20.16 ± 1.48	20.51 ± 1.61	20.68 ± 1.71
S-A creativity test	36.88 ± 10.94	35.96 ± 9.61	36.19 ± 10.97	35.51 ± 7.54	38.00 ± 9.72	39.09 ± 10.02
Vigor subscale of POMS	8.37 ± 3.8	8.51 ± 3.86	8.12 ± 3.97	7.14 ± 3.59	7.86 ± 3.83	8.40 ± 4.18
Total score of EIS	133.39 ± 31.17	127.22 ± 33.82	126.61 ± 37.38	123.03 ± 30.13	124.56 ± 36.84	134.83 ± 28.77

gene on the total score of EIS ($F = 7.114$, uncorrected $P = 0.008$, P-value corrected for FDR in a studywise manner $= 0.009$) but not on the score of the Vigor subscale of POMS ($F = 3.269$, uncorrected $P = 0.071$, P-value corrected for FDR in a studywise manner $= 0.057$) and the score of the S-A creativity test ($F = 2.460$, uncorrected $P = 0.117$, P-value corrected for FDR in a studywise manner $= 0.082$). For the descriptive data, see **Table 1**.

The Association among Psychological Variables and the Polymorphism of DRD2 in Each Sex

Post-hoc multiple regression analyses using data from either one of two sexes revealed that there was a significant relationship between the polymorphism and the total score of EIS only in females in that the number of A2 alleles was significantly and positively correlated with the total score of EIS. In addition, for both sexes, significant associations were found between any two of the total score of EIS, the score of the Vigor subscale of POMS, and the score of the S-A creativity test. For statistical values, see **Table 2**.

Path Analysis Involving CPMDT, Motivational State, EI, and the DRD2 polymorphism

The eight initial models created to generate the model involving CPMDT, motivational state, EI, and the DRD2 polymorphism were presented in **Figure 1A** (males) and **Figure 2A** (females).

For females, from each initial model (AIC = 28, CFI = 1.0, RMSEA = 0.111), the paths with the highest P-values were deleted recursively one by one, and analyses were rerun after each path was removed, until the model fit stopped improving. One of the final models showed the best statistic for the fit of the models (**Figure 1B**, chi-squared statistic = 3.284, $df = 2$, $P = 0.194$, AIC = 27.284, CFI = 0.973, RMSEA = 0.041). In this final model, all the paths reached significance. In this final model, (a) the DRD2 polymorphism primarily facilitated EI (the total score of EIS), (b) EI in turn facilitated CPMDT (the score of the S-A creativity test) and led to a better motivational state (the score of the Vigor subscale of POMS), and (c) the better motivational state also directly facilitated CPMDT.

For males, from each initial model (AIC = 28, CFI = 1.0, RMSEA = 0.142), the paths with the highest P-values were deleted recursively one by one, and analyses were rerun after each path was removed, until the model fit stopped improving. The three paths from the DRD2 polymorphism were removed. However, the directions of the paths among the three

psychological variables could not be determined and there were eight final models that showed the same statistics for the fit of the models (**Figure 2B**, chi-squared statistic = 1.303, $df = 3$, $P = 0.728$, AIC = 23.303, CFI = 1.0, RMSEA < 0.001).

Discussion

In this study, we demonstrated that there were significant positive relationships among CPMDT, EI, and motivational state across sex. In addition, the polymorphism of the DRD2 gene was significantly associated with EI, specifically in females. Path analysis in females indicated that the model in which (a) the DRD2 polymorphism primarily facilitates EI, (b) EI in turn facilitates CPMDT and leads to a better motivational state, and (c) the better motivational state also directly facilitates CPMDT explained the data in the most accurate manner. Thus, our hypothesis was at least partially confirmed in females. However, it should be noted that the results of path analysis do not prove that the finalized model is statistically significantly better than the other models and that it does not account for the variables that are not in the models. For males, the associations among EI, CPMDT, and a better motivational state were confirmed and the polymorphisms of DRD2 did not show an association with any of these factors.

This study depicted a comprehensive picture of the association among dopamine, EI, motivational state, and CPMDT at least in females. As described in the Introduction, the associations between two of these factors have been previously reported. These include the association between emotional regulation and the polymorphism of the DRD2 gene (Blasi et al., 2009), the association between EI and CPMDT (Guastello et al., 2004), the association between EI and better mood (Uchiyama et al., 2001), and the association between motivational state and CPMDT (Takeuchi et al., 2013a). In addition, we previously analyzed the iron mineral which is critical to dopamine processing and suggested that dopaminergic physiology is indirectly associated with CPMDT (Takeuchi et al., 2013a). We also showed that microstructural properties of the areas of the dopaminergic system are indirectly associated with CPMDT through personalities that are related to motivation (Takeuchi et al., 2015). The results of the present study are congruent with those of these previous studies and have advanced our understanding of the interactions among dopamine, EI, motivational state, and CPMDT. In particular,

TABLE 2 | Statistical values (beta-value, t-value, uncorrected P-value, P-value corrected using FDR) of the multiple regression analyses in men, women (controlling for age), and the entire sample (controlling for age and sex).

Dependent variables	Independent variables	Male				Female				All			
		β	t	P (unc)	P (FDR)	β	t	P (unc)	P (FDR)	β	t	P (unc)	P (FDR)
S-ACT[a]	Vigor[b]	0.198	4.149	4.030×10^{-5}	6.045×10^{-5}	0.173	3.203	0.001	0.001	0.187	5.232	2.169×10^{-7}	4.554×10^{-7}
S-ACT	EIS[c]	0.301	−6.573	1.454×10^{-10}	$−5.089 \times 10^{-10}$	0.133	2.446	0.015	0.014	0.231	6.571	9.283×10^{-11}	4.874×10^{-10}
S-ACT	DRD2[d]	−0.013	−0.277	0.782	0.391	0.097	1.777	0.076	0.057	0.034	0.932	0.351	0.217
Vigor	EIS	0.295	6.278	8.518×10^{-10}	2.236×10^{-9}	0.261	4.927	1.311×10^{-6}	2.294×10^{-6}	0.280	7.972	5.713×10^{-15}	5.999×10^{-14}
Vigor	DRD2	−0.034	−0.696	0.487	0.269	0.097	1.785	0.075	0.057	0.024	0.654	0.513	0.269
EIS	DRD2	−0.059	−1.229	0.220	0.144	0.140	2.587	0.010	0.011	0.025	0.672	0.502	0.269

[a]S-A creativity test score.
[b]Vigor subscale score of POMS.
[c]Total score of EIS.
[d]DRD2 Taq1 polymorphism (number of A2 allele).

it has been theoretically assumed that motivation increases divergent thinking and creativity and not vice versa (for review, see Flaherty, 2005), and at least some theories suggest that EI facilitates positive mood, which in turn facilitates creative thinking (and not vice versa) (Ivcevic et al., 2007). In addition, it has been theoretically assumed that dopamine systems underlie these cognitive processes. The results in females are congruent with the theoretical views and empirically support these views. In addition, the twin study already demonstrated the role of the substantial contribution of genetics to EI (Vernon et al., 2008). In addition, our results extended this previous finding from the twin study, indicating that polymorphisms of dopamine-related genes may at least partly contribute to the genetics of EI.

One interesting speculation arising from this study is that in females, because the physiology of dopamine receptor D2 is associated with EI, by modulating this physiology through agonist and antagonist, we may be able to modulate EI. On the other hand, it has been shown that EI can be trained and consequently improve well-being (Slaski and Cartwright, 2003). Thus, through such training, we may be able to enhance CPMDT as well.

The studies of polymorphism suffer from low effect sizes of the polymorphism (Murphy et al., 2012), and this study may suffer from the same limitation. Although we focused on the polymorphism that is shown to have robust effects on the phenotypes through meta-analyses (Munafo et al., 2007; Munafò et al., 2009), the effect in females was not very marked and the effect in males was negative. To show the association between dopamine physiology and EI more robustly and in a brain region-specific manner, neuroimaging techniques such as dopamine receptor binding potential measures of positron emission tomography (PET) can be utilized (Hirvonen et al., 2004).

The possible mechanism of how the A1 allele of the DRD2 Taq1 polymorphism is associated with behaviors that are apparently related to less EI is summarized in a previous study (Bowirrat and Oscar-Berman, 2005). Basically, in this model, the A1 allele of this polymorphism is associated with less density of the DRD2 receptor. Substances of abuse such as alcohol and tobacco and other most positive reinforcers cause dopamine release in the brain, which can decrease negative feelings and satisfy cravings. The deficiency of the DRD2 receptor in people with the A1 allele reduces their capacity for enjoying this reward naturally and their requirement of positive reinforcers is greater and less controllable. These conditions lead to their addictive, impulsive, and compulsive behaviors. These descriptions correspond well with at least conditions of parts of less EI (Uchiyama et al., 2001) and explain well the negative impact of the A1 allele of the DRD2 Taq1 polymorphism on EI.

One possible speculation about why there was a female-specific effect of the DRD2 Taq1 polymorphism in the present sample is related to environmental and cultural backgrounds. As hypothesized in the Introduction, a previous meta-analytic study showed sex differences in the effects of the DRD2 Taq1 polymorphism on substance dependence (Munafò et al., 2009). However, in this case, the A1 allele was associated with the phenotype more strongly in males. On the other hand, other

studies showed that the A1 allele was associated with phenotypes more strongly in females. For example, Lee et al. (2003) showed that in an Asian sample of their study (Korea), the A1 allele was associated with a higher reward dependency only in females. Related to this, one recent study using a huge sample showed that the effects of the DRD2 Taq1 polymorphism on the harshness of mothers' parenting are modulated by the economic situation; when the macroeconomic conditions are deteriorating, the A1 allele is associated with mothers' harsh parenting, but when it is not, the allele does not necessarily have such impact (Lee et al., 2013). These results suggest that the effects of the DRD2 polymorphism appear only under certain conditions such as stress. On the other hand, it has been said that in Japan, women are oppressed in many aspects and women from universities tend to feel more stressed than males (Suzuki et al., 1997). These cultural backgrounds may explain the present female-specific effects of the DRD2 Taq1 polymorphism. However, certainly, these are speculative possibilities that we propose to explain the present results. Future study is required to investigate this issue. In addition, it is generally known that sex differences in cognition are small when they exist (Zell et al., 2015). Furthermore, the measures we used hold true to such patterns (see **Table 1**). However, apparently, men and women are culturally exposed to different environments during development. Moreover, the environment and genes are assumed to interact and affect phenotype (Caspi and Moffitt, 2006). The aforementioned view may hold true to this pattern.

It should be noted that perhaps, the present finding of the positive associations among EI, CPMDT, and better motivational state does not apply to the group in the field of art. While a previous study has identified the positive relationship between EI and verbal divergent thinking using a large sample (Guastello et al., 2004), another previous study using the figurative divergent thinking test and a small sample revealed a negative relationship between divergent thinking performance and measures of EI in the field of art (but there was an opposite insignificant pattern in the groups of science) (Sánchez-Ruiz et al., 2011). In addition, a meta-analysis (Feist, 1998) revealed that personalities that lead to higher creativity in science and those of artists are at least partially different. For example, with regard to personalities related to EI, artists are characterized as personalities displaying less tolerance and less sociability, whereas creative scientists are the opposite. Our sample did not include the students belonging to the faculty of typical art. Thus, the model of the associations among the polymorphism, EI, motivational state, and CPMDT can be different in the group of arts.

This study had at least a few limitations. One was common to our previous studies and other studies that used college cohorts (Song et al., 2008; Jung et al., 2010; Takeuchi et al., 2010a,b) and since this problem is common across relevant studies. We quote our study (Takeuchi et al., 2011a, p. 686) for this matter. "*Limited sampling of the full range of intellectual abilities is a common hazard when sampling from college cohorts. However, given the correlation between intelligence and creativity among subjects with normal and inferior intelligence (but not subjects with higher intelligence, Sternberg, 1999), focusing on highly intelligent subjects (or subjects with higher education) was certainly warranted for the purpose of this study.*" Another limitation is common to our previous studies using the S-A creativity test. To measure creativity, we only used the S-A creativity test, which is a measure of verbal CPMDT, and we did not use tests for figural divergent thinking. However, as summarized by Jung et al. (2010), and as we quoted previously (Takeuchi et al., 2015, p. 1823), "*several cognitive processes are important for creativity or creative measures, such as flow (Csikszentmihalyi, 1997), insight (Jung-Beeman et al., 2004), perseverance in the face of social acceptance or resistance, such as that of personality variables, creative achievements, and remote association of ideas.*" Divergent thinking tests are by far the most used measure in the field to measure creative potential (Dietrich, 2007), and their validity to predict creative achievement has been established (Kim, 2008). However, different creative processes and measures may exhibit different patterns of associations with variables used in the study. Future studies need to investigate this issue.

Acknowledgments

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Appendix

We quote the manner by which the S-A creativity test is scored from our previous study (Takeuchi et al., 2010b, pp. 583–584) as follows:

"This appendix presents sample answers to a problem in the S-A creativity test, and the manner in which they were scored."

Sample question: Other than for storing milk, how can we use milk bottles?

Sample answers:

1. *Make a hole in it and use it as a coin bank.*
2. *Use it as a weight.*
3. *Use it as an instrument.*
4. *Use it as an object for shooting.*
5. *Beat on it and make a sound.*
6. *Eat it.*

The manner in which they were scored is as follows.

(1) *Inappropriate answers were excluded. In this case, the sixth answer (Eat it) was excluded.*

(2) *If the answer is included in categories on the criteria table, the answer is categorized and elaborate scoring is performed based on the table. Each category has an originality score. In the criteria table, the score is determined on the basis of how rare the category of certain answers is (If the category of a certain answer appears in more than 5% of the answers, the category has 0 originality points. If the category of a certain answer appears in less than 5%, but more than 1% of the answers, the category has 1 originality point. If the category of a certain answer appears in less than 1% of the answers, the category has 2 originality points.).*

(3) *If the answer is not included in the categories on the criteria table, and if it cannot be considered to belong to the same category as any of the other answers that are not included in the categories on the criteria table, then it is categorized as a new category and scoring of Elaboration*

score is performed in a similar manner to that of the criteria table.

Scores of each answer are as follows.

1. *Make a hole in it and use it as a coin bank."*
   Category: To use it as a vessels
   Originality of the category = 0, Category number = 1, Elaboration = 2
2. *Use it as a weight.*
   Category: To use it as a measure or to use its shape or weight
   Originality of the category = 1, Category number = 2, Elaboration = 1
3. *Use it as an instrument.*
   Category: To use it as an instruments
   Originality of the category = 1, Category number = 3, Elaboration = 0
4. *Use it as an object of shooting.*
   Category: Others 1
   Originality of the category = 2, Category number = 4, Elaboration = 2
5. *Beat on it and make a sound.*
   Category: To use it as an instruments
   Originality of the category = 1, Category number = 3, Elaboration = 1
6. *Eat it.*
   Inappropriate answer
   The total score of the sample answers are as follows.
   Fluency = Number of appropriate answers = 5.
   Flexibility = Number of different categories = 4.
   Originality = The sum of the originality scores of the different categories = 4. (In this case, category number 1 = 0 points, category number 2 = 1 point, category number 3 = 1 point, category number 4 = 2 points).
   Elaboration = The sum of the elaboration scores of all the answers = 6.
   Total score = Originality + Elaboration = 10."

Emotional intelligence and the Occupational Personality Questionnaire (OPQ)

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This study explores the relationship between the Bar-on EQ-I and the Occupational Personality Questionnaire OPQ32i to determine if there is a link between self- and other-reported Emotional Intelligence and personality traits. Data was obtained from 329 managers working in the IT and Finance sectors and included multi-source (360°) measures of Emotional Intelligence. Results indicated construct overlap and correlations between some elements of Emotional Intelligence and the OPQ32i with a stronger relationship between 360 measures of Emotional Intelligence and personality. On both the self-report measure of EQ-I and the 360 measure the mood scale showed a strongest link with personality factors. Measures of Emotional Intelligence which include a 360 component may thus provide a more useful indicator of an individual's ability to manage their own feelings and those of others.

Keywords: Emotional Intelligence, self concept, other person perception, personality inventory, mood

INTRODUCTION

There is a rapidly growing literature on Emotional Intelligence: definition, measurement, origin, and consequences (Matthews et al., 2002; Murphy, 2006). The idea of emotional intelligence is discussed and debated widely within the mainstream business world with a growing claim that it can be a better predictor of high performance than the traditional measure of general intelligence (Furnham, 2008a; Weinberger, 2009).

Measures of emotional intelligence vary widely in both content and method of assessment and tend to fall into two broad camps; those that focus on *ability* and are derived from the original EI conceptualization (with a focus on being able to reason validly about emotions) and measures of *self-report* (trait) (which focus on the behavioral dispositions and self perceptions of one's ability to recognize and understand emotions (Petrides and Furnham, 2001, 2003). Empirical work in this field would suggest that trait EI is more robustly related to, but distinct from, personality as measured by the Big Five (Petrides and Furnham, 2001) and is quite different from ability EI (Petrides et al., 2007). There are, however, personality correlates of ability measures of EQ, particularly Agreeableness (Fiori and Antonakis, 2011).

Critics of ability measures of EI highlight the misconception that EI or competencies can be measured through self-report (Cooper and Petrides, 2010) and the potential for faking on self-report EI measures. Similar criticisms of the measure used in this study have been made (Petrides et al., 2007).

Other views position EI, and in particular trait EI, as an individual difference construct and therefore argue that EI exists within the same space as personality accounting for very little criterion variance above and beyond that of basic personality dimensions (Matthews et al., 2002). Petrides et al. (2007) explore this in more detail and, in their study found evidence to suggest

that EI is a distinct construct, partially because it is determined by a number of personality factors and "exists at the lower levels of personality hierarchies" (p.48) thus somewhat dispelling the myth that EI is simply personality "rebranded."

This study focuses on the relationship between two popular measures of emotional intelligence and personality in business settings though neither are used in mainstream psychological research on individual differences (Furnham, 2008a). Both are embedded in a separate theoretical framework but appear to have considerable conceptual overlap. The central question in this study is the empirical relationship between these two measures.

THE Bar-On MEASURE

The measure used in this study is the Bar-On Emotional Quotient Inventory (EQ-i), which is designed to measure competencies including awareness, stress tolerance, problem solving, and happiness (Bar-On, 1997). Doubts have been expressed about the Bar-On model in the literature especially the factorial structure of the test and the selection of facets (Petrides et al., 2007). Matthews et al. (2002) noted that the theory behind the measure is vague and others have found the model to be highly susceptible to faking (Grubb and McDaniel, 2007; Day and Carroll, 2008). However, despite these criticisms the model continues to be applied in a variety of academic and real world settings (Lievens et al., 2011). Furthermore, the measure has been shown to have acceptable psychometric properties like internal consistency, convergent validity, and resistance to response style and bias (Dawda and Hart, 2000). Various attempts have been made to assess various different versions and translations of the measure with different degrees of support for such issues as factor structure (Kun et al., 2012) and concurrent validity (Al Said et al., 2013).

THE OPQ PERSONALITY MEASURE

Measurement of personality has equally attracted vast amounts of attention and many commercial organizations, rather than academic institutions, have developed measures which are now commonplace in the HR professional's toolkit. One such measure that has expanded greatly over the past 20 years all around the world is Saville et al. (1984) who claim several advantages for their "Occupational Personality Questionnaire" (OPQ) derived in part from the 16PF. The most comprehensive versions of the OPQ measure 30 scales which are grouped into three categories, associated with *Relationships with People*, *Thinking Style*, and *Feelings and Emotions*, respectively. Robertson and Kinder (1993) carried out a meta-analysis of some 21 different populations who had all completed the OPQ. They showed that, if specific hypotheses were tested, there was strong evidence of the criterion-related validity of the OPQ. It continues to attract attention with a recent study yielding a six factor solution interpretable within the Five Factor Model space (Woods and Hardy, 2012).

Early evaluations of the OPQ were critical (Barrett et al., 1996) however the measure has undergone significant development and an extensive report by the British Psychological Society concluded that there was good evidence of the tests norms, reliability as well as construct and criterion-related validity (British Psychological Society, 2007).

PERSONALITY AND EMOTIONAL INTELLIGENCE

This study is concerned with the degree of association between a popular model of personality and the Bar-on model of emotional intelligence. In the current study we used two EQ measures: the original self-report measure and the 360 measure where different raters—typically a manager (boss), peers, direct reports, and others rate a specific person. It has been suggested that observer data is less prone to dissimilation and hence more accurate (Furnham, 2008a,b).

Van der Zee et al. (2002) present a summary of early findings which point to a stronger relationship between emotional intelligence and personality than the relationship between emotional intelligence and general intelligence. In a study to determine the relationship between emotional intelligence, cognitive ability, and personality with academic achievement Newsome et al. (2000) found that many of the factors in the Bar-on measure of emotional intelligence were closely related to traditional personality traits. Similarly Bar-On (1997) reported significant correlations between many sub-scales of the EQ-i and the 16 Personality Factor Questionnaire (16PF 5th edition; Cattell et al., 1999). Research by Ciarrochi et al. (2000) found that emotional intelligence, as assessed by the MEIS, correlates with empathy, but shares little overlap with extraversion and neuroticism. This would suggest that the link between emotional intelligence and personality is largely determined by the measure used. This study is partly exploratory, but three tentative hypotheses will be made.

SELF vs. OBSERVER RATINGS

There is an extensive literature in psychology concerned with self vs. other/observer difference in ratings of various behaviors (Conway and Huffcutt, 1997; Pronin et al., 2004; Connolly et al., 2007; Bollich et al., 2011). This is variously called multi-source feedback, 360° feedback or inter-rater reliability (Stolarova et al., 2014). A wide variety of issues have been considered such as the duration of acquaintance, observer type (peers, boss, subordinate), personality of the raters etc. and how these influence the ratings of observers and which may account for the difference between self and other. There are also a list of cognitive biases that may also account for the differences. Finally, there is also an academic literature going back well over 20 years which suggests a positive-self bias which indicates that managers tend to rate themselves overall more positively than those they work with. There appear few studies on self-other differences in emotional intelligence.

There are however various papers measured vs. self-estimated emotional intelligence which showed evidence of estimation bias (Petrides and Furnham, 2000; Siegling et al., 2014).

HYPOTHESES

In line with the idea that 360 measures of EI (i.e., reports by others) are better predictors of actual performance than self report measures because of less dissimulation and other biases (poor self-insight) it is hypothesized that:

H1. 360 measures of emotional intelligence as assessed by the EQ-I show a stronger link with personality traits than self report measures of emotional intelligence.

To test the thinking that emotional competence is directly related to one's ability to manage feelings and relationships it is proposed that elements of personality measures that focus on interpersonal skills and ability to build relationships will show more overlap with emotional intelligence and as such:

H2. The OPQ "Feelings" factors will show a significant correlation with self report measures of Emotional Intelligence.
H3. The OPQ "Relationships" factors will show a significant correlation with the 360 measure of Emotional Intelligence.

METHODS

PARTICIPANTS

In all 329 people took part of which 301 were males. They were all British, ranged in age from 30 to 50 years old and were senior middle managers and executives taking part on leadership development programmes working in the financial or IT sector.

MEASURES

Bar-on emotional quotient inventory (Bar-On, 2004)

The Emotional Quotient Inventory (EQ-i), EQ-360 and EQ-i: YV were developed to assess the Bar-On model of emotional-social intelligence. The EQ-I is a self-report measure designed to measure a number of constructs related to EI. The EQ-I consists of 133 items and takes approximately 30 min to complete. It gives an overall EQ score as well as scores for the five composite scales and 15 subscales (Bar-On, 2004, 2006). In addition to the self report measure a 360 version of the tool was also administered with data collected from participants' peers. This has similar psychometric properties as the self-report table.

Occupational personality questionnaire

In order to assess personality, respondents completed the 230 item Occupational Personality Questionnaire (OPQ). The OPQ measures personality at three levels. First are six factors, five of which describe the "Big Five" factors plus an achievement factor. At the next level is a 16-factor solution. Third is the deductively-rather than factor analytically-derived "Concept Model" consisting of 30 scales. Subjects register their level of agreement with each statement on a five point Likert scale.

PROCEDURE

Participants were tested during a management training programme. They had ethical committee permission to proceed. All were told to be as honest as possible, and given feedback on their results at a later date. Furthermore, those who worked with the target person also evaluated them on the EQi. Efforts were made to get full 360 data such that the target person (who completed all the measures) was evaluated by the boss (superior), peers, reports (subordinates), and clients. Inevitably these varied greatly between individuals both in terms of the number of people who completed the observer version of the questionnaire but their specific role with respect to the target person. For the purposes of this study the observer ratings were combined to get an other/observer score. On average each person had more than two observer reports combined.

RESULTS

First, the data was inspected for outliers, and highly skewed distributions however, none appeared. Given the imbalance between males and females in this sample a MANOVA was run comparing the sexes on the 30 OPQ scores and the five EQi scores. Neither was statistically significant.

The total EQi score for self was 105.22 ($SD = 16.77$) while the total score for others was 100.59 ($SD = 8.9$). This was significant: [$t_{(212)} = 3.45$, $p < 0.001$].

The next step involved subjecting the 32 OPQ scales to a Promax and then Varimax rotated factor analysis. The scales failed to load onto three factors in line with the conceptual model underpinning the OPQ and therefore further analysis was carried out on all of the OPQ scale scores. Interestingly the result of this analysis indicated a five factor solution suggesting a factor model aligned with the Big 5 model of personality (Costa and McCrae, 1992). The results were similar to those of Woods and Hardy (2012) who factor analyzed the results of a similar number of British participants. The fact that the OPQ scales failed to load on the three factors does challenge the conceptual model of the test.

Next, the five factors of the EQi measure were subjected to similar factor analysis, using both orthogonal and oblique rotations. In both cases a single factor emerged with all scales loading on the single factor. Again factor analysis of this scale fails to meet theoretical expectations.

However, for comparison with other studies further analysis will be performed on the total score, and the various subscale scores.

All three hypotheses received partial support. The three OPQ facet scales (Relationships, Thinking, Feelings) were then correlated with both the self and 360 measures of the five EI scales. **Tables 1–3** below presents these correlations. Given their numbers and the possibility of Type 1 errors, Bonferroni corrections were made though tables show un-corrected correlations. **Table 1** shows that the relationships element of personality correlates more significantly with the 360 measures of emotional intelligence than the self report measure although overall the correlations are low.

Table 2 shows there are more significant correlations between the OPQ Thinking scale facets and EQi than with the Relationships scale. Conventional, Rational and Forward thinking all correlate negatively with both self measures of EQi. In **Table 3** the Worrying and Emotionally Controlled measures of "Feelings" correlate most significantly with both self and 360 measures of EQi although there is little other evidence to suggest a link between the OPQ Feelings scale and Emotional Intelligence. Across all 3 OPQ scales (Relationships, Thinking, Feelings) there was some evidence of a relationship with Emotional Intelligence and this was more evident with the 360 measures of EQi.

Table 4 shows the self and other scores as well as *t*-test results for each analysis. Three things are noticeable from these data. *First*, nearly all (16 out of 21) analyses showed a significant difference all in the same direction. Overall participants thought that they were more emotionally intelligent than did observers. The only exception was the interpersonal total scale and sub-scale scores where the lack of significant difference seems mainly attributable to the participants giving slightly below average scores. *Second*, participants tended to give themselves scores between a third and a half of a standard deviation above the mean while observers gave scores one of two points above or below the mean of 100. *Third*, in nearly all instances the SD of the observers were lower than that of the estimates of the participants.

Significant correlations on each of the three OPQ scales were regressed against EQi. Six, step-wise multiple regressions were computed with the Self 360 EI score and the five subscales as the criterion variable and the 9 significant OPQ scales as the predictor variables.

Following this a series of regression were performed with the total and five EI scales as the criterion variable and all nine OPQ scores as the predictor variables. The aim was to examine which OPQ facets were most strongly linked to the EI facets.

Four regressions were significant: the Independent Minded scale on the OPQ was a significant predictor of the total self-report EI score and accounted for 4% of the variance. The regression which accounted for most of the variance (17%) was the Mood factor and it showed that higher scores on Independent Minded and Outgoing and low scores on Conventional were associated with high scores on Mood Intelligence as. Higher scores on Outgoing were associated with higher scores on Mood Intelligence. The Stress subscale did not show any significant relationships with personality. On the Intrapersonal subscale, there was a significant negative relationship with Independent Minded but this accounted for a very small amount of variance (less than 1%).

A series of regressions were then computed similar to those reported in **Table 5** however this time the criteria variable was the observer rather than the self-reported scores on the EQ1. These are shown in **Table 6**.

Table 1 | Pearson product-moment correlation between measures of Emotional Intelligence and OPQ Relationships Scale.

		Mean	SD	(SIR)	(SIA)	(SS)	(SA)	(SM)	(OIR)	(OIA)	(OS)	(OA)	(OM)	(P)	(CN)	(ON)	(IM)	(OG)	(A)	(SC)	(M)	(D)	(CR)
1	Self inter (SIR)	98.22	11.82	–																			
2	Self intra (SIA)	103.58	17.37	0.08	–																		
3	Self stress (SS)	105.56	11.23	–0.03	–0.00	–																	
4	Self adapt (SA)	107.58	13.81	0.14*	0.09	0.06	–																
5	Self mood (SM)	104.54	10.16	0.11	0.11	0.15*	0.03	–															
6	Other inter (OIR)	97.96	10.48	0.12	0.10	0.10	0.12	0.48**	–														
7	Other intra (OIA)	99.79	8.64	0.10	0.10	0.08	0.05	0.40**	0.24**	–													
8	Other stress (OS)	102.67	6.99	0.01	0.07	0.41**	0.09	0.49**	0.45**	0.24**	–												
9	Other adapt (OA)	102.29	7.42	0.08	0.07	0.17*	0.08	0.47**	0.50**	0.33**	0.67**	–											
10	Other mood (OM)	98.55	10.53	0.11	0.12	0.15*	0.03	0.41**	0.49**	0.40**	0.49**	0.47**	–										
11	Persuasive (P)	5.13	2.09	0.00	–0.03	0.00	–0.00	0.20	0.10	0.16	–0.09	–0.03	0.10	–									
12	Controlling (CN)	6.42	1.69	0.05	0.10	–0.05	0.04	0.07	0.02	0.16*	–0.00	0.01	0.14**	0.35	–								
13	Outspoken (ON)	5.79	2.13	–0.05	0.06	–0.02	0.12	0.04	–0.03	0.16*	–0.05	0.06	0.07	0.09	0.21	–							
14	Independent minded (IM)	5.93	2.03	–0.19	–0.12	0.08	0.06	–0.18*	–0.12	–0.09	–0.13	–0.06	–0.04	–0.02	0.02	0.21	–						
15	Outgoing (OG)	5.28	2.22	0.06	–0.01	–0.10	0.06	0.29**	0.26**	0.11	–0.06	–0.04	0.05	0.28	0.25	0.29	–0.02	–					
16	Affiliative (A)	5.36	2.02	0.04	–0.03	–0.02	0.06	0.14*	0.15*	0.04	–0.02	–0.09	0.14*	0.17	0.07	0.01	–0.09	0.41	–				
17	Socially confident (SC)	5.16	2.00	0.10	0.02	–0.04	0.05	0.29**	0.24**	0.11	0.16*	0.03	0.16**	0.29	0.17	0.03	–0.14	0.38	0.30	–			
18	Modest (M)	5.80	4.16	–0.04	–0.02	–0.01	–0.01	–0.18**	–0.03	–0.10	–0.00	–0.05	–0.11	–0.22	–0.17	–0.11	0.09	–0.20	–0.09	–0.08	–		
19	Democratic (D)	5.49	2.01	0.10	–0.09	–0.03	0.05	0.02	0.06	0.05	0.09	0.00	0.03	0.05	–0.04	–0.07	–0.29	0.03	0.17	0.10	0.03	–	
20	Caring (CR)	5.51	1.97	0.17**	–0.01	–0.12	0.00	0.06	0.23**	–0.05	0.15*	0.12	0.12	–0.06	–0.07	–0.17	–0.28	–0.03	0.18	0.05	0.07	0.30	–

$**p < 0.01$; $*p < 0.05$.

Table 2 | Pearson product-moment correlation between measures of Emotional Intelligence and OPQ Thinking Scale.

		Mean	SD	(Sir)	(SIA)	(SS)	(SA)	(SM)	(OIR)	(OIA)	(OS)	(OA)	(OM)	(R)	(E)	(B)	(CV)	(CP)	(I)	(VS)	(A)	(F)	(DC)	(CS)	(RF)
1	Rational (R)	5.22	1.90	–0.07	0.03	0.11	–0.04	–0.16	–0.19**	–0.07	0.01	0.01	–0.03	–											
2	Evaluative (E)	5.59	2.45	0.01	–0.02	–0.04	–0.10	–0.07	–0.01	0.06	0.01	0.06	–0.02	0.14	–										
3	Behavioral (B)	5.53	1.83	0.07	–0.02	–0.01	0.03	0.13	0.13	0.10	0.12	0.11	0.07	–0.09	0.04	–									
4	Conventional (CV)	5.83	2.15	–0.09	–0.09	0.09	–0.19**	–0.26**	–0.17*	–0.10	–0.16*	–0.17	–0.07	0.16	0.03	–0.26	–								
5	Conceptual (CP)	5.58	2.06	0.04	0.01	0.01	0.03	–0.05	0.00	–0.04	–0.05	–0.03	–0.07	0.01	0.12	0.22	–0.19	–							
6	Innovative (I)	5.52	2.08	0.08	0.03	0.00	0.08	0.09	0.01	0.13	–0.04	–0.02	–0.11	–0.11	0.05	0.01	–0.36	0.31	–						
7	Variety sk (VS)	5.78	1.92	–0.04	–0.07	0.00	0.01	0.06	–0.09	–0.02	–0.03	–0.06	0.05	–0.25	–0.02	–0.05	–0.23	0.12	0.21	–					
8	Adaptable (A)	5.38	1.73	0.03	0.04	–0.05	–0.05	0.09	–0.02	–0.02	0.04	–0.03	0.07	–0.12	–0.06	0.14	–0.12	0.03	–0.11	0.02	–				
9	Forward thk (F)	6.49	2.00	–0.00	0.01	0.03	0.07	0.09	0.18**	–0.02	–0.08	–0.05	–0.03	0.02	0.05	0.07	–0.09	0.16	0.18	–0.11	0.15	–			
10	Detail Cons (DC)	4.77	1.99	–0.09	0.05	0.04	–0.08	–0.18**	–0.20**	–0.14*	0.03	–0.01	–0.05	0.33	0.13	–0.20	0.37	–0.13	–0.34	0.03	0.10	–0.22	–		
11	Conscientious (CS)	4.61	2.16	–0.01	0.04	0.08	–0.00	–0.14*	–0.04	–0.07	0.07	0.12	–0.11	0.27	0.12	–0.11	0.30	–0.18	–0.20	–0.25	0.09	–0.25	0.58	–	
12	Rule follow (RF)	5.39	1.92	–0.06	0.07	0.06	–0.06	–0.09	–0.02	–0.06	0.00	–0.02	–0.05	0.19	0.02	–0.16	0.50	–0.08	–0.30	–0.31	0.05	0.04	0.45	0.40	–

$**p < 0.01$; $*p < 0.05$.

Table 3 | Pearson product-moment correlation between measures of Emotional Intelligence and OPQ Feelings Scale.

		Mean	SD	(SIR)	(SIA)	(SS)	(SA)	(SM)	(OIR)	(OIA)	(OS)	(OA)	(OM)	RX	WR	TM	OP	TR	EC	VG	CV	A	DC
1	Relaxed (RX)	5.38	2.05	0.01	0.01	0.08	−0.02	0.10	0.08	0.01	0.17*	0.07	0.02	–									
2	Worrying (WR)	5.11	2.21	−0.15**	−0.06	−0.08	−0.12	−0.24**	−0.11	−0.14*	−0.18**	−0.15*	−0.02	−0.33	–								
3	Tough mind (TM)	5.21	1.88	−0.01	0.06	0.00	0.13	0.16	0.18	0.02	0.28	0.13	−10	0.27	−0.31	–							
4	Optimistic (OP)	6.12	3.75	0.03	−0.01	0.02	−0.01	0.01	−0.10	−0.06	−0.12	−0.09	0.02	0.09	0.01	−0.04	–						
5	Trusting (TR)	6.45	4.67	0.04	0.01	0.00	−0.03	−0.01	0.03	−0.01	−0.06	−0.02	−0.04	0.07	0.02	0.00	0.08	–					
6	Emotionally controlled (EC)	5.63	2.06	−0.16*	−0.07	−0.05	−0.17**	−0.18**	−0.10	−0.22**	0.02	−0.06	−0.15*	0.03	0.28	0.04	−0.05	0.03	–				
7	Vigorous (VG)	5.13	1.98	0.06	0.08	−0.13*	0.01	0.01	0.03	−0.05	−0.04	−0.08	0.01	0.00	0.09	−0.06	−0.07	−0.01	−0.08	–			
8	Competitive (CV)	5.91	2.3	−0.06	−0.13*	0.05	0.01	−0.04	−0.21**	−0.03	−0.08	−0.06	−0.07	0.03	−0.06	−0.21	0.03	−0.12	−0.21	0.08	–		
9	Achieving (A)	5.13	2.13	0.05	0.02	−0.01	0.06	0.06	−0.04	0.04	0.03	0.02	0.03	−0.01	−0.17	0.00	−0.08	−0.09	−0.21	0.29	0.43	–	
10	Decisive (DC)	5.98	2.02	0.07	0.03	0.04	0.08	−0.01	−0.04	0.04	−0.09	−0.02	−0.01	−0.01	−0.15	−0.13	0.05	−0.02	−0.15	0.07	0.07	0.04	–

**p < 0.01; *p < 0.05.

Table 4 | Self and other rated EQi scores.

	Self		Other		Difference	t
	X	SD	X	SD		
Intrapersonal total	103.58	17.37	99.79	8.64	5.80	4.79***
IA1. Self-regard	106.43	9.20	100.63	7.83	5.79	9.14***
IA2. Self-awareness	102.18	11.91	96.92	8.74	5.26	4.29***
IA3. Assertiveness	106.39	12.78	101.92	8.73	4.47	5.36***
IA4. Independence	105.77	12.73	99.81	8.76	5.96	6.83***
IA5. Self-actual	104.39	10.51	98.62	8.68	5.77	6.67**
Interpersonal total	98.22	11.82	97.96	10.48	0.26	0.29
IE1. Empathy	98.46	12.71	97.91	8.48	0.56	0.67
IE2. Social responsibility	99.45	11.91	97.99	11.73	1.48	1.69
IE3. Interpersonal relations	97.65	12.53	98.79	9.12	−1.13	1.49
Stress management total	105.56	11.23	102.67	6.99	3.29	4.58**
S1. Stress tolerance	108.55	10.38	102.67	6.99	5.58	7.69***
S2. Impulse control	101.80	12.41	101.53	7.91	0.27	0.39
Adaptability	107.58	13.81	102.29	7.42	5.29	7.36***
A1. Reality testing	105.67	10.87	102.87	10.87	2.82	3.90***
A2. Flexibility	107.80	11.64	101.32	11.42	6.48	8.07***
A3. Problem solving	105.32	10.35	101.68	6.73	3.03	5.19**
General mood	104.54	10.16	98.55	10.53	5.57	7.98***
GM1. Optimism	104.84	9.90	99.40	7.53	5.44	7.91***
GM2. Happiness	103.89	10.84	98.92	8.80	4.96	7.03***
Total	104.54	17.23	100.48	7.74	4.06	3.45***

***p < 0.001; **p < 0.01.

Four regressions were significant: the conventional scale on the OPQ was a significant predictor of the total 360 EI score and accounted for 17% of the variance. Similarly with the Interpersonal factor, Outgoing, Tough minded and Caring accounted for 15% of the variance and for the Mood factor, Independent Minded, Outgoing and Conventional accounted for 17% of the variance. The regression which accounted for most of the variance (17%) was the Mood factor and it showed that higher scores on Independent Minded and Conventional were associated with lower scores on Mood Intelligence as assessed. Higher scores on Outgoing were associated with higher scores on Mood Intelligence. Two factors predicted the Stress subscale; Tough Minded was associated with a higher ability to Manage Stress and Conventional was associated with a lower ability to manage stress. The intrapersonal scale did not report any significant relationships with personality.

DISCUSSION

Factor analyses of both scales failed to confirm theoretical expectations. This could be a function of this particular modest-sized and relatively homogeneous sample. Yet previous studies have shown the same thing: namely failure to confirm the theoretical structure of the two models and psychometric tests used in this study. Next, the data do suggest modest overlap between these two measures but clearly more some scales more than others. Few, if any correlations exceeded $r = 0.30$ and fewer than half were significant.

Table 5 | Results of the Regression with EI self total and subscale scores as the criterion (independent) variables and the significant OPQ (dependent) variables as the predictor.

		Total		Intrapersonal		Interpersonal		Stress manag		Adapt		Mood	
		Beta	t	Beta	t	Beta	t	Beta	t	Beta	t	Beta	t
1	Independent minded	−0.13	2.01*	−0.14	2.06*	−0.158	2.40*	0.07	1.03	0.05	0.70	−1.77	2.66**
2	Outgoing	0.04	0.50	−0.04	0.54	0.00	0.02	−0.11	1.46	−0.01	0.13	0.19	2.65**
3	Socially confident	0.04	0.56	−0.03	0.36	0.02	0.23	−0.02	0.22	−0.02	0.31	0.11	1.46
4	Caring	0.06	0.84	−0.02	0.30	0.13	1.90	−0.11	1.61	0.02	0.26	0.01	0.14
5	Behavioral	−0.06	0.82	−0.06	0.87	−0.02	0.32	0.02	0.23	−0.06	0.95	0.02	0.32
6	Conventional	−0.11	1.61	−0.12	1.70	−0.07	1.07	0.13	1.82	−0.17	2.45	−0.19	−2.70**
7	Tough minded	0.00	0.01	0.05	0.72	−0.05	0.78	−0.02	0.24	0.13	2.01	0.09	1.39
8	Worrying	−0.14	1.82	−0.01	0.14	−0.11	1.41	−0.11	1.50	−0.00	0.03	−0.08	1.11
9	Emotionally controlled	−0.03	0.45	−0.07	1.00	−0.12	1.54	−0.08	1.20	−0.17	2.50	−0.04	−0.50
$F_{(9, 238)}$		2.20*		0.99		2.61**		1.54		2.31*		6.10***	
Adjusted R Square		0.04		0.00		0.06		0.02		0.05		0.17	

***$p < 0.001$; **$p < 0.01$; *$p < 0.05$.

Table 6 | Results of the Regression with EI 360 total and subscale scores as the criterion (independent) variables and the significant OPQ (dependent) variables as the predictor.

		Total		Intrapersonal		Interpersonal		Stress manag		Adapt		Mood	
		Beta	t	Beta	t	Beta	t	Beta	t	Beta	t	Beta	t
1	Independent minded	−0.13	1.89	−0.11	1.51	−0.05	0.76	−0.09	1.31	−0.06	0.76	−0.18	2.66**
2	Outgoing	0.10	1.41	0.02	0.22	0.22	2.93**	−0.12	1.62	−0.06	0.81	0.19	2.65**
3	Socially confident	0.10	1.39	0.04	0.54	0.09	1.14	0.12	1.53	−0.04	0.51	0.12	1.46
4	Caring	0.10	1.48	−0.11	1.46	0.22	3.23***	0.12	1.67	0.10	1.35	0.01	0.14
5	Behavioral	0.07	0.10	0.06	0.80	0.03	0.40	0.03	0.45	0.03	0.43	0.02	0.32
6	Conventional	−0.19	2.76**	−0.05	0.67	−0.10	1.47	−0.15	2.10*	−0.15	1.98	−0.19	2.70**
7	Tough minded	0.09	1.34	−0.00	0.01	0.15	2.20*	0.22	3.10**	0.09	1.28	0.09	1.40
8	Worrying	−0.06	0.78	−0.02	0.18	−0.01	0.17	−0.04	0.56	−0.08	0.96	−0.08	1.11
9	Emotionally controlled	−0.11	1.60	−0.18	2.40	0.02	0.21	0.05	0.63	−0.03	−0.37	−0.04	0.50
$F_{(9, 202)}$		5.81***		1.62		5.01***		4.04***		1.71		6.11***	
Adjusted R Square		0.17		0.03		0.15		0.11		0.03		0.17	

***$p < 0.001$; **$p < 0.01$; *$p < 0.05$.

One of the most interesting issues was self-other differences in the EQ scores. **Table 4** shows that of the 21 self-other differences participants rated themselves significantly higher on all but five. The biggest differences were on Flexibility, Independence and Self-regard. Participants gave themselves highest rating for stress tolerance. There are numerous possible explanations for these findings. It is possible that the participants gave inflated scores either because they were dissimulating to try to create a good impression in a work setting or else because they lacked self-awareness into their actual abilities and behavior. Equally it is possible but unlikely that observer ratings were lower either because they did not feel the pressure to do impression management or else that they did not have sufficient data on the person they rated. Indeed, there is a large literature on self-serving bias which suggests that compared to both objective and observer data, people tend to over-estimate their abilities (Furnham, 2008a).

There are two further interesting features of this part of the study. The first is the exception of the interpersonal EQi total and subscale scores where there was no difference between self- and other-reports possibly because of the fact that the participants scored themselves below average on this scale. This component and subscale scores indicate Social Adeptness, the Ability to Understand Others, and to interact and relate well to people. It is interesting, but unclear, why this sample scored themselves consistently lower on this component and scales, particularly on Interpersonal Relations. The second is the size of the difference which is, on average, around a third of a standard deviation.

The 360 scores on Emotional Intelligence also reported a stronger link with personality than the self report measure. In **Table 5** only 4% of the variance in Total Self scores on Emotional Intelligence was accounted for by personality vs. Seventeen percent of the variance in Total Other scores. This suggests that measures of emotional intelligence which include a 360 component may provide a more useful indicator of an individual's ability to manage own feelings and those of others.

The second aspect of the study was exploring the link between personality and Emotional Intelligence. The Relationship scale on the OPQ produced a greater number of significant relationships than the Feelings and Thinking scale. This indicates that those individuals with a natural ability to manage relationships are perceived by others to be more emotionally intelligent. In particular it would appear that those who are Socially Confident and exhibit a caring nature are regarded more highly in terms of emotional intelligence by their colleagues. On the other hand there was little relationship between an individual's score on the "Feelings" component of the OPQ and emotional intelligence suggesting that those elements of personality related to the management of feelings may not be linked to ability measures of emotional intelligence such as the Bar-on. This would support the argument that emotional intelligence offers little more than a measure of personality: that is, the incremental benefits of using *this* EQ measure over *this* personality test is poor.

The component of emotional intelligence which showed the greatest linked with personality on both self and 360 data was the Mood Scale accounting for 17% of the variance in both instances. The link between mood and personality has been studied extensively with most studies assuming that personality influences mood (Harris and Lucia, 2003; Brown et al., 2011). Some researchers including Zajenkowski et al. (2012) challenge this view and suggest that the correlations could in fact be interpreted in the opposite direction whereby self-report personality measures are influenced by an individual's mood in particular situations. In the current study though the fact that both the 360 and self-report measure correlated highly with personality would give weight to the more common view that mood is significantly affected by personality.

Like all studies this one has limitations. We were unable to obtain data on the participant's age and job experience which may have been relevant to their individual scores. More importantly we were unable to examine the internal reliability of the 360 "other" reports which may mean that that data is potentially unstable. Furthermore, despite that both measures are used extensively in business settings (Furnham, 2008b) it would be most desirable to relate both tests to objective work outcome measures attempting to establish which test and which scales have strongest predictive validity, and indeed the incremental validity of the one test over the other. Another limitation of this study is the external validity, i.e., whether the conclusion could be generalized to the general population since all the sample subjects came from a business setting.

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Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Dimensions of emotional intelligence related to physical and mental health and to health behaviors

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In this paper the relationship between emotional intelligence (EI) and health is examined. The current work investigated the dimensions of EI are sufficient to explain various components of physical and mental health, and various categories of health-related behaviors. A sample of 855 participants completed two measures of EI, the Trait Meta-Mood Scale and trait emotional intelligence questionnaire, a measure of health, the Health Survey SF-36 Questionnaire (SF-36); and a measure of health-related behaviors, the health behavior checklist. The results show that the EI dimensions analyzed are better predictors of mental health than of physical health. The EI dimensions that positively explain the Mental Health Component are Well-Being, Self-Control and Sociability, and negatively, Attention. Well-Being, Self-Control and Sociability positively explain the Physical Health Component. EI dimensions predict a lower percentage of health-related behaviors than they do health components. Emotionality and Repair predict the Preventive Health Behavior category, and only one dimension, Self-Control, predicts the Risk Taking Behavior category. Older people carry out more preventive behaviors for health.

Keywords: trait emotional intelligence, mental health, physical health, health protective behavior, ager differences, gender differences

Introduction

Current studies suggest that higher emotional intelligence (EI) is linked to improved psychological and physical health, and a meta-analysis further emphasizes that the link between trait EI and mental health is important (Martins et al., 2010).

Emotional intelligence can be broadly defined as the ability to perceive, control, and evaluate emotions (Johnson et al., 2009). This set of characteristics, which deal with the perception, expression, and regulation of moods and emotions, suggests that there must be a direct link between EI and physical as well as psychological health (Tsaousis and Nikolaou, 2005).

There are different conceptualizations of EI in the research literature including: ability approaches, which examine relatively discrete mental abilities that process emotional information (Mayer et al., 2008); and trait approaches where trait EI is postulated to be a personality trait occupying the lower levels of the personality hierarchies (Petrides et al., 2007c). Peña-Sarrionandia et al. (2015) in a recent meta-analysis suggest that EI is a useful construct to capture individual differences in emotion regulation.

Emotional intelligence has been operationalized in different ways that can be divided into two general tendencies: maximum performance tests, which assess actual levels of EI performance

(known as ability EI), and self-report questionnaires, which reflect typical EI functioning (known as trait EI or emotional self-efficacy; Pérez et al., 2005; Siegling et al., 2014).

Within the measures to assess trait EI, as indicated by Martins et al. (2010) in their comprehensive meta-analysis, two of the most frequently used are the Trait Meta-Mood Scale (TMMS; Salovey et al., 1995) and the trait emotional intelligence questionnaire (TEIQue; Petrides and Furnham, 2003a).

The TMMS is based on Salovey and Mayer's (1990) EI model. This self-report measure evaluates three facets of the reflective processes that accompany mood states, termed the meta-mood experience (Salovey et al., 1995). The TMMS evaluates a "reasonable operationalization of aspects of EI" (Salovey et al., 1995, p. 147). This scale does not directly tap people's emotional abilities but rather their perceived beliefs about their emotional abilities. Given its subjective nature, this instrument provides an index of what researchers have called a proxy for perceived EI (PEI; Salovey et al., 2002; Extremera and Fernández-Berrocal, 2005; Paek, 2006).

The TEIQue is based on Petrides's model (Petrides and Furnham, 2001; Petrides et al., 2007c). Basically, this model, whose initial sampling domain was identified through content analysis of early EI and related models, aims at organizing in a single framework all affect-related aspects of personality. The construct seems to encompass variance of two kinds: a portion that is scattered across the higher-order dimensions of established personality taxonomies and a portion of variance that lies outside these dimensions (Petrides et al., 2007c). Trait EI is defined as a constellation of emotion-related self-perceptions and dispositions located at the lower levels of personality hierarchies (Petrides et al., 2007a).

Various works have studied the relation between EI and physical and mental health, emotional adjustment, psychological well-being, and life satisfaction (e.g., Goldman et al., 1996; Extremera and Fernández-Berrocal, 2002; Salovey et al., 2002; Saklofske et al., 2003; Petrides et al., 2007b; Johnson et al., 2009; Mavroveli et al., 2009; Andrei and Petrides, 2013; Costa et al., 2014; Laborde et al., 2014). However, as reported by Martins et al. (2010) in their meta-analysis, once the relation between EI and health is established, we need to focus on incremental validity issues. Another area of interest they point out is the relation between EI and specific types of health conditions. Some studies have also examined the relation between EI and consumption of substances such as alcohol and tobacco (e.g., Austin et al., 2005; Tsaousis and Nikolaou, 2005; Saklofske et al., 2007; Hill and Maggi, 2011), but the relation between EI, health behaviors, and addictions is still unclear (Kun and Demetrovics, 2010; Martins et al., 2010).

Health behaviors can be broadly defined as actions undertaken to maintain or improve health (Vickers et al., 1990). Research indicates that, rather than being independent, health behaviors occur in clusters or dimensions (Harris and Guten, 1979; Vickers et al., 1990). Summarizing the empirical patterns of association between behaviors, it has been shown that health behaviors tend to occur in combinations requiring between two and six dimensions or clusters (Harris and Guten, 1979; Tapp and Goldenthal, 1982; Krick and Sobal, 1990). When developing a measure to

assess health behaviors, the health behavior checklist (HBC), Vickers et al. (1990), found that individual differences in health behavior can be conceptualized in terms of a hierarchical model. At the most general level, health behaviors formed two broad categories or dimensions, Preventive Health Behavior and Risk Taking Behavior.

Present Study

The purpose of this investigation is to provide more evidence about the relationship of EI with physical and mental health, and with health behaviors.

The main objective of the work is to delimit the specific dimensions of EI that best predict various components of physical and mental health, and various categories of health-related behaviors.

For this purpose, we applied the two most frequently used measures of EI, which appraise different EI dimensions, thus including the greatest possible number of EI dimensions.

The investigations carried out have usually applied a single EI measure to verify the relation between this construct and health. In this paper we apply two measures of EI that assess different dimensions to obtain all possible dimensions of EI to determine the best physical and mental health.

Another objective is to determine if the dimensions of EI that predict better physical and mental health are the same for both types of health. We also intend to find out if the dimensions of EI are better predictors of physical or mental health.

As dependent variables, we assessed physical and mental health with a generic measure of health, and health behaviors with a measure of health-related behaviors.

Materials and Methods

Participants and Procedure

Participants were 855 undergraduate students, 188 male and 668 female, with a mean age of 34.27 years (SD = 9.61), and an age range between 18 and 64 years, volunteered to take part in this study.

There were 188 (22%) men in the sample, mean age 36.29 years (SD = 9.96), age range between 18 and 61 years; and 668 (78%) women, mean age 33.7 years (SD = 9.43), age range between 18 and 64 years. These people were recruited in the National Open University (UNED). The participants were not compensated for taking part in the study.

Measures
Trait EI Measures
Trait Meta-Mood Scale (Salovey et al., 1995)
The TMMS was designed to assess the way people reflect on their moods, and thus, it was conceived as an index of PEI (Salovey et al., 2002). The scale has three factors that provide three sub-scale scores: Attention or Attention to Feelings, which evaluates the extent to which people attend to and value their emotions and moods; Clarity or Clarity of Feelings, relating to the ability to discriminate between emotions and moods, to feel clear rather than confused about one's feelings; and Repair or Mood Repair, relating to the ability to regulate unpleasant moods or maintain

pleasant modos and to using positive thinking to repair negative moods.

We used the well-validated Spanish shorter version of the TMMS (Fernández-Berrocal et al., 2004), which includes 24 items from the original version (eight for each subscale). The original 48 items were subjected to a principal components analysis with a varimax rotation. The analysis showed a three-factor solution with Attention, Clarity and Repair as dimensions, consistent with the findings of Salovey et al. (1995) for the English version. This Spanish version has shown acceptable internal consistency and satisfactory test–retest reliability. Further details on the scoring, reliability, and validity of the Spanish version of TMMS can be found in Fernández-Berrocal et al. (2004).

The final Spanish version consists of three subscales, as in the original version, each measuring different aspects of PEI: Attention (eight items corresponding to Items 7, 8, 13, 14, 35, 38, 41, and 46 of the English version), Clarity (eight items corresponding to Items 9, 12, 19, 26, 37, 42, 45, and 48 of the English version), and Repair (eight items corresponding to Items 2, 3, 6, 10, 16, 17, 40, and 43 of the English version; Fernández-Berrocal

et al., 2004). In the final version of the TMMS, participants rate the extent to which they agreed with each item on a 5-point Likert-type scale ranging from 1 (Strongly disagree) to 5 (Strongly agree).

Table 1 shows the results of internal consistency and the descriptive statistics of the three factors of this scale in the population of our study.

Trait emotional intelligence questionnaire (Petrides and Furnham, 2003a; Petrides, 2009a,b)

The TEIQue operationalizes the model of Petrides (Petrides and Furnham, 2001; Petrides et al., 2007c).

We used the most recent versión of this questionnaire, the TEIQue v 1.50 (Petrides, 2009a). This versión consists of 153 items (rated on a 7-point Likert scale) and 13 facets, organized in four factors: Well-being, Self-control, Emotionality, and Sociability. Two additional facets (Adaptability, Self-motivation) contribute directly to the Global Trait EI score.

The Well-Being factor refers to a generalized sense of well-being extending from past achievements to future expectations,

TABLE 1 | Cronbach's alphas, means, SDs of the variables examined.

Scale (number of ítems)	Total sample N = 855			Male N = 188		Female N = 667	
	Cronbach Alpha	M	SD	M	SD	M	SD
Trait Meta-Mood Scale (TMMS)							
Attention (8)	0.89	27.32	6.29	25.45	6.20	27.85	6.21
Clarity (8)	0.90	28.27	6.10	29.00	6.50	28.07	5.97
Repair (8)	0.87	28.29	6.15	29.21	5.87	28.03	6.20
Trait emotional intelligence questionnaire (TEIQue)							
Well-Being (3)	0.86	5.27	0.94	5.33	0.89	5.25	0.95
Emotionality (4)	0.73	5.28	0.70	5.10	0.74	5.33	0.69
Sociability (3)	0.77	4.76	0.75	4.89	0.80	4.72	0.73
Self-Control (3)	0.82	4.66	0.84	4.96	0.84	4.58	0.82
Global Trait EI	0.90	5.01	0.63	5.06	0.67	4.99	0.62
Health survey SF-36 questionnaire (SF-36)							
Physical Functioning (10)	0.83	28.74	2.26	29.29	1.83	28.58	2.34
Role Physical (4)	0.92	17.84	3.15	18.43	2.69	17.67	3.25
Bodily Pain (2)	0.76	8.73	2.05	9.28	1.77	8.57	2.10
General Health (5)	0.81	19.98	3.52	20.63	3.16	19.79	3.60
Vitality (4)	0.83	14.20	3.07	15.20	2.72	13.92	3.10
Social Functioning (2)	0.83	8.64	1.75	9.03	1.48	8.53	1.81
Role Emotional (3)	0.91	13.03	2.55	13.32	2.38	12.94	2.59
Mental Health (5)	0.84	19.45	3.55	20.22	3.40	19.23	3.56
Physical Health Component (21)[a]	0.88	75.33	8.55	77.63	6.96	74.66	8.85
Mental Health Component (14)[b]	0.92	55.37	9.20	57.96	8.22	54.63	9.34
Health behavior checklist (HBC)							
Wellness Maintenance and Enhancement Behaviors (10)	0.70	28.54	6.90	27.78	7.13	28.76	6.82
Accident Control Behaviors (6)	0.64	16.87	4.99	16.75	5.15	16.90	4.94
Preventive Health Behavior (16)[c]	0.77	45.41	10.22	44.53	10.53	45.66	10.13
Traffic Risk Taking (7)	0.65	17.09	4.68	18.14	5.20	16.80	4.48
Substance Risk Taking (3)	0.55	6.77	3.12	7.19	3.34	6.65	3.05
Risk Taking Behavior (10)[d]	0.62	23.85	6.02	25.33	6.68	23.43	5.76

[a]Physical Health Component is the sum of Physical Functioning, Role Physical, Bodily Pain, and General Health. [b]Mental Health Component is the sum of Vitality, Social Functioning, Role Emotional and Mental Health. [c]Preventive Health Behavior is the sum of Wellness Maintenance and Enhancement Behaviors and Accident Control Behaviors. [d]Risk Taking Behavior is the sum of Traffic Risk Taking and Substance Risk Taking.

accompanied by high self-esteem, and includes the facets of self-esteem, trait happiness, and trait optimism.

The Emotionality factor reflects the ability to identify and express feelings, and to use these faculties to maintain close relationships with significant others, and it includes the facets of emotion perception, emotion expression, trait empathy, and relationships.

The Sociability factor, regarding the capacity to assert oneself as well as to influence others' emotions and decisions, includes the facets of social awareness, emotion management, and assertiveness.

The Self-Control factor, concerning the ability to regulate one's impulses and emotions, as well as managing external pressures and stress, includes the facets of emotion regulation, stress management and impulsiveness.

In the 1.50 version of the TEIQue, participants rate their degreee of agreement with each ítem on a 7-point Likert-type scale ranging from 1 (Completely disagree) to 7 (Completely agree).

Regarding the validation of trait EI, Petrides and colleagues (Petrides and Furnham, 2001, 2003b; Petrides et al., 2007c) found an oblique trait EI factor both in Eysenckian and the Big Five factor space. Trait EI therefore provides evidence of its discriminant validity versus well-established personality dimensions.

The instrument has shown excellent psychometric properties in a series of studies (for detailed psychometric analyses of the TEIQue, see Mikolajczak et al., 2007; Freudenthaler et al., 2008; Jolic-Marjanovic and Altaras-Dimitrijevic, 2014).

Table 1 presents the results of internal consistency and descriptive statistics of the four factors that make up this questionnaire in the population of our study.

Health Measures

Health survey SF-36 questionnaire (SF-36; Ware and Sherbourne, 1992)

This instrument was developed from the Medical Outcome Study (MOS; Ware and Sherbourne, 1992), and measures concepts that represent excellent basic human values for health. It is applicable to the general population as well as to clinical groups (McHorney et al., 1992, 1994). The SF-36 is a generic measure of health status as opposed to one that targets a specific age, disease, or treatment group (Ware and Gandek, 1998).

It is comprised of 36 items that report positive and negative states of physical health and emotional well-being. It identifies eight dimensions of health: Physical Functioning, Role Physical, Bodily Pain, General Health, Vitality, Social Functioning, Role Emotional, and Mental Health. Subsequently, a new dimension has been included, called Health Transition, which refers to the changes in the perception of the present state of health compared to how it was a year ago. Higher scores indicate a better state of health and/or a better quality of life in different areas (e.g., Physical Functioning, Mental Health, Vitality). Summary scores for a Physical Health Component (Physical Functioning, Role Physical, Bodily Pain, and General Health) and a Mental Health Component (Vitality, Social

Functioning, Role Emotional, and Mental Health) can also be derived.

The reliability and validity of the SF-36 have been well documented by the developers of the instrument (Ware and Sherbourne, 1992; Ware et al., 1995).

We applied the versión that asks participants about all the health dimensions of the past 4 weeks, except for those of physical functioning and general health.

We used a Spanish version, which has shown good internal consistency, reliability, and validity in clinical samples (Alonso et al., 1995, 1998).

Table 1 shows the results of internal consistency and the descriptive statistics of the eight scales of this questionnaire and the two general health components in the population of this study.

Health behavior checklist (Vickers et al., 1990)

This is a 40-item scale designed to assess health behaviors. Twenty-six of the items assess four factor-analytically derived health behaviors (see Vickers et al., 1990, for instrument content). The HBC measures four replicable factors: Wellness Maintenance and Enhancement Behaviors, consisting of 10 items (e.g., "I exercise to stay healthy"); Accident Control Behaviors, with six items (e.g., "I fix broken things around my house right away"); Traffic Risk Taking, with seven items (e.g., "I speed while driving"); and Substance Risk Taking, which consists of three the ítems (e.g., "I do not drink alcohol"). Participants indicate how well each item describes their typical behavior on a 5-point Likert scale ranging from 1 (Disagree strongly) to 5 (Agree strongly).

Health behaviors form two broader categories or dimensions: Preventive Health Behavior and Risk Taking Behavior. Preventive Health Behavior is the sum of the scores of Wellness Maintenance and Enhancement Behaviors and Accident Control Behaviors. Risk Taking Behavior is the sum of the scores of Traffic Risk Taking and Substance Risk Taking. In the categories of Traffic Risk Taking, Substance Risk Taking, and the broad category Risk Taking Behavior, a higher score indicates greater risk.

The procedures used to develop the HBC are described in Vickers et al. (1990), as well as the reliability and validity of the scale. There is also evidence of criterion-referenced validity in comparison with relevant measures (Vickers et al., 1990; Booth-Kewley and Vickers, 1994).

Table 1 presents the results of internal consistency and the descriptive statistics of the four factors of this scale, and of the two broad categories from the population of this study.

Statistical Analysis

We used SPSS (version 20) for all data analyses. Correlations were reported as Pearson product moment correlations (two-tailed) for all continuous variables. To explore the predictive value of the EI dimensions as the independent variables, stepwise multiple regression analysis were performed, with the components of physical and mental health and

the categories of health-related behaviors as the dependent variables.

Results

Internal Consistencies and Descriptive Statistics

Cronbach alphas, means, and SDs were calculated for each scale. **Table 1** present the results for the total sample of participants, and by gender. All the internal consistency values are within aceptable levels.

Correlations Between the EI Dimensions and the Physical and Mental Health Components

To test the relationship between the EI dimensions and the health components, Pearson product moment correlations were computed between the dimensions of the EI measures (TMMS, TEIQue) and the physical and mental health components (SF-36). We also examined the relation between participants' age and the health components.

As shown in **Table 2**, in general, almost all the EI dimensions had a significant and positive correlation with the two broad Physical and Mental Health Components, and also with the specific components, except for the Attention dimension of TMMS, which had significant but negative correlations with these components.

The only dimensions with no significant relations were: Attention, Clarity, and Emotionality did not correlate with Physical Functioning; Clarity, Repair, and Sociability did not correlate with Role Physical.

Age presented significant and positive relationship with General Health, Vitality, Social Functioning, Role Emotional, Mental Health, and with the broad Mental Health Component; but its relation with Physical Functioning was negative and it did not correlate with Role Physical, Bodily Pain, or with the broad Physical Health Component.

Correlations Between the EI Dimensions and the Categories of Health-Related Behaviors

To test the relationship between the EI dimensions and health-related behaviors, Pearson product moment correlations were computed between the EI dimensions (TMMS, TEIQue) and these categories (HBC). We also examined the relation between participants' age and the health-related behaviors.

As shown in **Table 2**, almost all the EI dimensions had significant and positive relations with the specific categories of Wellness Maintenance and Enhancement Behaviors, and Accident Control Behaviors, and with the broad category Preventive Health Behavior. The EI dimensions also had significant and negative correlations with the specific categories of Traffic Risk Taking, and Substance Risk Taking, and with the broad category Risk Taking Behavior, except for the Attention dimension, which had a positive relation with the broad category of Risk Taking Behavior. Attention had no significant correlations with any of the specific health-related behaviors.

Clarity did not correlate with Traffic Risk Taking. Repair, Well-Being, and Sociability had no significant relation with Traffic Risk Taking, Substance Risk Taking, or with the broad category Risk Taking Behavior.

Age had significant relationships with all the health-related behaviors, which were positive in the case of Wellness Maintenance and Enhancement Behaviors, Accident Control Behaviors, and with the broad category Preventive Health Behavior, and negative in the case of Traffic Risk Taking, Substance Risk Taking, and the broad category Risk Taking Behavior.

Stepwise Multiple Regression with EI Dimensions as Predictor Variables, and Criterial Variables Each One of the Physical and Mental Health Components

Prior to the stepwise multiple regression analysis, the relationships between independent variables (TMMS, TEIQue) and the dependent variables (SF-36) were examined. Independent variables significantly associated with the physical and mental health components were considered candidate predictors and were entered into the stepwise multiple regression analysis.

In order to avoid the collinearity problem with the TEIQue factors, and also because our focus was on the study of the EI dimensions and not on general EI, we did not enter the general EI measure from this questionnaire in any analysis.

We followed the same procedure as with the EI dimensions with the independent variable age, considering it an independent variable in the situations in which it had a significant relation with some health component.

In all the analyses, gender was entered as an independent variable to determine whether it predicted health. The assigned code for the analyses was 1 = men and 2 = women.

In this type of regression analysis, the sign of the partial regression coefficient (ß) of a variable should not be the same as the sign of the simple correlation coefficient between that variable and the dependent variable because of the adjustments made to obtain the best possible equation.

The results are presented in **Table 3**. In general, the EI dimensions predicted mental health more strongly than physical health. Starting with the two broad health components, the EI dimensions explained the Mental Health Component better than they explained the Physical Health Component.

Regarding the broad health component, Physical Health Component, the prediction model contained five predictors and was reached in five steps, $F(5,849) = 30.047$, $p < 0.001$, accounting for 15.6% of the variance of the Physical Health Component ($R^2 = 0.156$). The significant predictors of this model were Well-Being ($R^2 = 0.114$), Gender ($R^2 = 0.016$), Sefl-Control ($R^2 = 0.01$), Sociability ($R^2 = 0.01$), and Age ($R^2 = 0.007$), with the men obtaining higher scores than the women in this component (see the mean score of men and women in **Table 1**).

Regarding the Mental Health Component, the model contained five predictors and include five steps, $F(5,849) = 153.342$, $p < 0.001$, accounting for 48.4% of the variance of this component ($R^2 = 0.484$). The significant predictors of this model were

TABLE 2 | Pearson correlations between the emotional intelligence (EI) dimensions and the Health Components.

				Health survey SF-36 questionnaire (SF-36)						
	Physical Functioning	Role Physical	Bodily Pain	General Health	Vitality	Social Functioning	Role Emotional	Mental Health	Physical Health Component[a]	Mental Health Component[b]
Trait Meta-Mood Scale (TMMS)										
Attention	−0.023 (p = 0.510)	−0.130*** (p = 0.000)	−0.111*** (p = 0.001)	−0.161*** (p = 0.000)	−0.213*** (p = 0.000)	−0.277*** (p = 0.000)	−0.318*** (p = 0.000)	−0.311*** (p = 0.000)	−0.153*** (p = 0.000)	−0.331*** (p = 0.000)
Clarity	0.062 (p = 0.069)	0.041 (p = 0.231)	0.075* (p = 0.029)	0.146*** (p = 0.000)	0.206*** (p = 0.000)	0.152*** (p = 0.000)	0.086* (p = 0.012)	0.208*** (p = 0.000)	0.104** (p = 0.003)	0.194*** (p = 0.000)
Repair	0.086* (p = 0.012)	0.052 (p = 0.130)	0.082* (p = 0.017)	0.238*** (p = 0.000)	0.314*** (p = 0.000)	0.230*** (p = 0.000)	0.226*** (p = 0.000)	0.348*** (p = 0.000)	0.160*** (p = 0.000)	0.344*** (p = 0.000)
Trait emotional intelligence questionnaire (TEIQue)										
Well-Being	0.179*** (p = 0.000)	0.182*** (p = 0.000)	0.189*** (p = 0.000)	0.438*** (p = 0.000)	0.544*** (p = 0.000)	0.418*** (p = 0.000)	0.425*** (p = 0.000)	0.647*** (p = 0.000)	0.345*** (p = 0.000)	0.623*** (p = 0.000)
Emotionality	0.035 (p = 0.314)	0.088** (p = 0.010)	0.082* (p = 0.017)	0.224*** (p = 0.000)	0.310*** (p = 0.000)	0.255*** (p = 0.000)	0.232*** (p = 0.000)	0.356*** (p = 0.000)	0.153*** (p = 0.000)	0.344*** (p = 0.000)
Sociability	0.072* (p = 0.035)	0.054 (p = 0.114)	0.069* (p = 0.046)	0.191*** (p = 0.000)	0.303*** (p = 0.000)	0.205*** (p = 0.000)	0.144*** (p = 0.000)	0.306*** (p = 0.000)	0.127*** (p = 0.000)	0.294*** (p = 0.000)
Self-Control	0.128*** (p = 0.000)	0.198*** (p = 0.000)	0.159*** (p = 0.000)	0.332*** (p = 0.000)	0.427*** (p = 0.000)	0.380*** (p = 0.000)	0.411*** (p = 0.000)	0.585*** (p = 0.000)	0.288*** (p = 0.000)	0.549*** (p = 0.000)
Age	−0.145*** (p = 0.000)	0.008 (p = 0.823)	−0.001 (p = 0.979)	0.090** (p = 0.010)	0.168*** (p = 0.000)	0.112*** (p = 0.001)	0.223*** (p = 0.000)	0.173*** (p = 0.000)	0.002 (p = 0.952)	0.204*** (p = 0.000)

(Continued)

TABLE 2 | Continued

	Health behavior checklist (HBC)					
	Wellness Maintenance and Enhancement Behaviors	Accident Control Behaviors	Preventive Health Behavior[c]	Traffic Risk Taking	Substance Risk Taking	Risk Taking Behavior[d]
Trait Meta-Mood Scale (TMMS)						
Attention	0.013 (p = 0.701)	−0.056 (p = 0.100)	−0.019 (p = 0.589)	0.066 (p = 0.056)	0.045 (p = 0.195)	0.074* (p = 0.031)
Clarity	0.124*** (p = 0.000)	0.206*** (p = 0.000)	0.184*** (p = 0.000)	−0.051 (p = 0.137)	−0.068* (p = 0.047)	−0.074* (p = 0.030)
Repair	0.156*** (p = 0.000)	0.176*** (p = 0.000)	0.191*** (p = 0.000)	−0.057 (p = 0.100)	−0.015 (p = 0.668)	−0.051 (p = 0.137)
Trait emotional intelligence questionnaire (TEIQue)						
Well-Being	0.210*** (p = 0.000)	0.162*** (p = 0.000)	0.221*** (p = 0.000)	−0.032 (p = 0.348)	−0.060 (p = 0.079)	−0.056 (p = 0.104)
Emotionality	0.183*** (p = 0.000)	0.224*** (p = 0.000)	0.233*** (p = 0.000)	−0.145*** (p = 0.000)	−0.096** (p = 0.005)	−0.162*** (p = 0.000)
Sociability	0.125*** (p = 0.000)	0.158*** (p = 0.000)	0.161*** (p = 0.000)	0.045 (p = 0.186)	0.003 (p = 0.937)	0.037 (p = 0.286)
Self-Control	0.101** (p = 0.003)	0.190*** (p = 0.000)	0.161*** (p = 0.000)	−0.143*** (p = 0.000)	−0.142*** (p = 0.000)	−0.184*** (p = 0.000)
Age	0.152*** (p = 0.000)	0.175*** (p = 0.000)	0.188*** (p = 0.000)	−0.192*** (p = 0.000)	−0.107** (p = 0.002)	−0.207*** (p = 0.000)

Total sample N = 855, ***p ≤ 0.001 (two-tailed); **p ≤ 0.01 (two-tailed); *p ≤ 0.05 (two-tailed). [a]Physical Health Component is the sum of Physical Functioning, Role Physical, Bodily Pain and General Health. [b]Mental Health Component is the sum of Vitality, Social Functioning, Role Emotional and Mental Health. [c]Preventive Health Behavior is the sum of Wellness Maintenance and Enhancement Behaviors and Accident Control Behaviors. [d]Risk Taking Behavior is the sum of Traffic Risk Taking and Substance Risk Taking.

Well-Being ($R^2 = 0.381$), Self-Control ($R^2 = 0.068$), Attention ($R^2 = 0.027$; the relation is negative, see **Table 2**), Sociability ($R^2 = 0.003$), and Gender ($R^2 = 0.003$). The men presented higher scores than the women in the Mental Health Component (see the mean score of men and women in **Table 1**). The results are similar to those of the Physical Health Component, except that in the Mental Health Component Age was not a predictor, but Attention was.

Regarding the specific health components, Mental Health, the model $F(4,850) = 221.801$, $p < 0.001$, accounted for approximately 52% of the variance of the Mental Health ($R^2 = 0.516$). Significant predictors were Well-Being ($R^2 = 0.410$), Self-Control ($R^2 = 0.084$), Attention ($R^2 = 0.018$; the relation was negative, see **Table 2**), and Sociability ($R^2 = 0.005$).

The EI dimensions also predicted a considerable percentage of the variance of Vitality 33.8% ($R^2 = 0.338$), Role Emotional 28.7% ($R^2 = 0.287$), Social Functioning 22.8% ($R^2 = 0.228$), and General Health 20.3% ($R^2 = 0.203$).

As seen in **Table 3**, the EI dimensions that do not emerge as predictors of health components are Clarity, Repair, and Emotionality. The EI dimension that most strongly predicts health behaviors is Well-Being, followed by Attention and Self-Control, but predicting a much lower percentage.

Stepwise Multiple Regression with EI Dimensions as Predictor Variables, and Criterial Variables Each One of the Categories of Health-Related Behaviors

The same procedure as in the former stepwise multiple regression analyses was followed to select the possible predictors. In these analyses, the dependent variables were each one of the categories of the HBC scale. The same procedure was followed to enter age into the analyses. Gender was entered in all the analyses; the assigned code was 1 = men and 2 = women.

As in the analyses with the health components, we did not enter general the measure of EI from the TEIQue questionnaire in the analyses to avoid the colinearity problem with the TEIQue factors, and also because our focus was on the study of the EI dimensions and not on general EI.

The results can be seen in **Table 3**. EI dimensions predict almost equally the two broad categories of health-related behaviors, Preventive Health Behavior and Risk Taking Behavior.

In the broad category of Risk Taking Behavior, the prediction model contained three predictors and was reached in three steps, $F(3,851) = 29.659$, $p < 0.001$, accounted for 9.6% of the variance ($R^2 = 0.096$). Significant predictors of this model were Age ($R^2 = 0.043$; the relation was negative, see **Table 2**), Gender ($R^2 = 0.023$), with men assuming more risk behaviors related to traffic safety, and in consumption of substances such as alcohol and tobacco (see mean scores of men and women in **Table 1**). The only EI predictor was Self-Control ($R^2 = 0.030$; the relation was negative, see **Table 2**).

In the other broad category, Preventive Health Behavior, the prediction model also contained three predictors, $F(3,851) = 26.205$, $p < 0.001$, accounting for 8.6% of the variance ($R^2 = 0.086$). Significant predictors of this model

were Emotionality ($R^2 = 0.052$), Age ($R^2 = 0.025$), and Repair ($R^2 = 0.009$).

The EI dimensions of Attention and Sociability did not emerge as predictors of health-related behaviors. The EI dimensions of Emotionality and Well-Being, followed by Self-Control, were the ones that best predicted this type of behaviors.

Conclusion

The current research investigated the EI dimensions that can explain various general, physical, and mental health components, and various categories of health-related behaviors.

Most of the studies carried out to verify the relation between EI and health have observed a relation with general EI. Nevertheless, some studies have used EI measures that provide scores in specific dimensions that predict health (Extremera and Fernández-Berrocal, 2002; Salovey et al., 2002; Tsaousis and Nikolaou, 2005; Johnson et al., 2009). In our study, we extended the number of EI dimensions by using two measures that assess different dimensions, and the results obtained provide sets of EI dimensions that predict health.

One of our goals was to obtain outcomes with the greatest possible number of EI dimensions in order to delimit those that best predict health and health-related behaviors. Hence, in our investigation, we extended the assessment of EI, applying the two most used measures, the TMMS and the TEIQue (Martins et al., 2010), which appraise different EI dimensions. Similarly, to expand the study to the greatest possible number of health components, we applied a general health questionnaire, the SF-36, which provides two general measures of physical and mental health, and various more specific health components.

In addition to this measure of general health, due to the scarcity of studies carried out to establish an association between EI and health-related behaviors, and between EI and addiction-related behaviors (Kun and Demetrovics, 2010; Martins et al., 2010), we also wished to appraise this relation in our study, applying the HBC, a scale specifically designed to assess healthy behaviors, which provides two broad categories, Preventive Health Behavior and Risk Taking Behavior, and four more specific factors.

From the regression analyses, it can be concluded that the EI dimensions analyzed are better predictors of mental health (48.4%) than of physical health (15.6%). The data obtained provide significant results to be able to delimit the specific EI dimensions most closely related to health.

Regarding the broad Mental Health Component, where a higher score predicts better mental health, the group of EI dimensions that explain it positively are Well-Being, Self-Control and Sociability, and negatively in the case of Attention.

The EI dimensions that positively explain the Physical Health Component, where a higher score predicts better physical health, are Well-Being, Self-Control and Sociability of the TEIQue.

With regard to TMMS, Extremera and Fernández-Berrocal (2002) also applied regression analysis to obtain the dimensions that best predict the health components, but we cannot compare our results with theirs because, in our study, we entered more

TABLE 3 | Stepwise multiple regression analysis.

Model	R	R²	R² adjusted	R² change	F(df)	ß	ß standardized	t
Dependent variables: components of the health survey SF-36 questionnaire (SF-36)								
Independent variables: dimensions of the Trait Meta-Mood Scale (TMMS) and Trait Emotional Intelligence Questionnaire (TEIQue)								
Dependent variable: Physical Functioning								
Model 1: Well-Being	0.178	0.032	0.031	0.032	27.317 (1,853)***	0.436	0.178	5.232***
Model 2: Well-Being						0.518	0.212	6.218***
Age	0.254	0.064	0.062	0.033	28.814 (2,852)***	−0.044	−0.184	−5.416***
Model 3: Well-Being						0.512	0.209	6.206***
Age						−0.047	−0.199	−5.889***
Gender	0.291	0.085	0.082	0.020	25.820 (3,851)***	−0.787	−0.144	−4.315***
Dependent variable: Role Physical								
Model 1: Self-Control	0.200	0.040	0.039	0.040	34.901 (1,853)***	0.748	0.200	5.908***
Model 2: Self-Control						0.534	0.143	3.591***
Well-Being	0.220	0.049	0.046	0.008	21.263 (2,852)***	0.367	0.108	2.713**
Model 3: Self-Control						0.446	0.120	2.913**
Well-Being						−0.041	−0.081	−2.286*
Attention	0.233	0.054	0.051	0.006	15.990 (3,851)***	0.365	0.107	2.705**
Dependent variable: Bodily Pain								
Model 1: Well-Being	0.180	0.033	0.031	0.033	28.095 (1,853)***	0.400	0.180	5.300***
Model 2: Well-Being						0.388	0.175	5.178***
Gender	0.224	0.050	0.048	0.018	22.109 (2,852)***	−0.662	−0.134	−3.954***
Dependent variable: General Health								
Model 1: Well-Being	0.424	0.180	0.179	0.180	179.839 (1,853)***	1.595	0.424	13.410***
Model 2: Well-Being						1.322	0.352	9.470***
Self-Control	0.439	0.193	0.191	0.013	97.960 (2,852)***	0.566	0.136	3.656***
Model 3: Well-Being						1.488	0.396	9.632***
Self-Control						0.609	0.146	3.925***
Sociability	0.446	0.199	0.196	0.006	67.749 (3,851)***	−0.434	−0.092	−2.471*
Model 4: Well-Being						1.519	0.404	9.809***
Self-Control						5.48	0.132	3.475***
Sociability						−0.459	−0.098	−2.612**
Gender	0.451	0.203	0.199	0.004	52.101 (4,850)***	−0.557	−0.066	−2.081*
Dependent variable: Vitality								
Model 1: Well-Being	0.540	0.291	0.290	0.291	342.622 (1,853)***	1.788	0.540	18.510***
Model 2: Well-Being						1.450	0.437	12.925***
Self-Control	0.563	0.317	0.316	0.026	193.728 (2,852)***	0.696	0.192	5.663***
Model 3: Well-Being						1.488	0.449	13.360***
Self-Control						0.587	0.162	4.718***
Gender	0.576	0.332	0.330	0.014	137.811 (3,851)***	−0.910	−0.123	−4.248***
Model 4: Well-Being						1.485	0.448	13.374***
Self-Control						0.509	0.140	3.997***
Gender						−0.851	−0.115	−3.967***
Attention	0.581	0.338	0.334	0.006	105.877 (4,850)***	−0.039	−0.079	−2.658**
Dependent variable: Social Functioning								
Model 1: Well-Being	0.406	0.165	0.164	0.165	164.231 (1,853)***	0.764	0.406	12.815***
Model 2: Well-Being						0.700	0.372	11.886***
Attention	0.456	0.208	0.206	0.043	108.715 (2,852)***	−0.058	−0.209	−6.677***
Model 3: Well-Being						0.540	0.287	7.978***
Attention						−0.048	−0.172	−5.379***
Self-Control	0.477	0.228	0.225	0.020	81.509 (3,851)***	0.358	0.173	4.655***
Dependent variable: Role Emotional								
Model 1: Well-Being	0.421	0.177	0.176	0.177	180.389 (1,853)***	1.152	0.421	13.431***

(Continued)

TABLE 3 | Continued

Model	R	R^2	R^2 adjusted	R^2 change	F(df)	ß	ß standarized	t
Model 2: Well-Being						1.040	0.380	12.439***
Attention	0.489	0.239	0.237	0.062	131.350 (2,852)***	−0.102	−0.252	−8.239***
Model 3: Well-Being						0.762	0.279	7.975***
Attention						−0.084	−0.208	−6.698***
Self-Control	0.517	0.268	0.265	0.028	101.608 (3,851)***	0.617	0.205	5.682***
Model 4: Well-Being						0.920	0.336	8.699***
Attention						−0.078	−0.194	−6.225***
Self-Control						0.670	0.223	6.145***
Sociability	0.527	0.278	0.274	0.010	80.044 (4,850)***	−0.411	−0.120	−3.393***
Model 5: Well-Being						0.895	0.327	8.486***
Attention						−0.073	−0.181	−5.815***
Self-Control						0.632	0.210	5.804***
Sociability						−0.412	−0.121	−3.427***
Age	0.536	0.287	0.283	0.009	66.962 (5,849)***	0.026	0.100	3.294***
Dependent variable: Mental Health								
Model 1: Well-Being	0.640	0.410	0.409	0.410	578.526 (1,853)***	2.432	0.640	24.053***
Model 2: Well-Being						1.745	0.459	15.800***
Self-Control	0.703	0.494	0.492	0.084	406.000 (2,852)***	1.429	0.342	11.758***
Model 3: Well-Being						1.741	0.458	16.039***
Self-Control						1.256	0.300	10.172***
Attention	0.715	0.512	0.510	0.018	290.434 (3,851)***	−0.079	−0.140	−5.525***
Model 4: Well-Being						1.892	0.498	15.739***
Self-Control						1.307	0.313	10.523***
Attention						−0.073	−0.130	−5.112***
Sociability	0.719	0.516	0.514	0.005	221.801 (4,850)***	−0.396	−0.084	−2.877**
Dependent variable: Physical Health Component[a]								
Model 1: Well-Being	0.337	0.114	0.113	0.114	104.464 (1,853)***	3.097	0.337	10.221***
Model 2: Well-Being						3.049	0.332	10.143***
Gender	0.361	0.130	0.128	0.016	60.770 (2,852)***	−2.618	−0.128	−3.905***
Model 3: Well-Being						2.473	0.269	6.976***
Gender						−2.219	−0.108	−3.263***
Self-Control	0.374	0.140	0.137	0.010	43.968 (3,851)***	1.206	0.119	3.024**
Model 4: Well-Being						3.005	0.327	7.634***
Gender						−2.348	−.115	−3.464***
Self-Control						1.322	0.130	3.317***
Sociability	0.387	0.149	0.145	0.010	35.628 (4,850)***	−1.360	−0.118	−3.044**
Model 5: Well-Being						3.088	0.336	7.848***
Gender						−2.487	−0.121	−3.670***
Self-Control						1.443	0.142	3.608***
Sociability						−1.374	−0.120	−3.086**
Age	0.396	0.156	0.151	0.007	30.047 (5,849)***	−0.077	−0.086	−2.592**
Dependent variable: Mental Health Component[b]								
Model 1: Well-Being	0.617	0.381	0.380	0.381	506.709 (1,853)***	6.084	0.617	22.510***
Model 2: Well-Being						4.472	0.454	14.863***
Self-Control	0.670	0.449	0.448	0.068	335.442 (2,852)***	3.341	0.308	10.099***
Model 3: Well-Being						4.459	0.452	15.193***
Self-Control						2.781	0.257	8.334***
Attention	0.690	0.477	0.475	0.027	249.324 (3,851)***	−0.253	−0.173	−6.549***
Model 4: Well-Being						4.790	0.486	14.742***
Self-Control						2.901	0.268	8.615***
Attention						−0.241	−0.165	−6.177***
Sociability	0.693	0.480	0.478	0.003	189.387 (4,850)***	−0.871	−0.071	−2.343*
Model 5: Well-Being						4.871	0.494	14.942***
Self-Control						2.767	0.255	8.120***
Attention						−0.231	−0.158	−5.901***
Sociability						−0.939	−0.076	−2.524*
Gender	0.695	0.484	0.480	0.003	153.342 (5,849)***	−1.307	−0.059	−2.290*

(Continued)

TABLE 3 | Continued

Model	R	R²	R² adjusted	R² change	F(df)	ß	ß standarized	t
Dependent variables: categories of the health behavior checklist (HBC)								
Independent variables: dimensions of the Trait Meta-Mood Scale (TMMS) and Trait Emotional Intelligence Questionnaire (TEIQue)								
Dependent variable: Wellness Maintenance and Enhancement Behaviors								
Model 1: Well-Being	0.206	0.042	0.041	0.042	37.124 (1,853)***	1.535	0.206	6.093***
Model 2: Well-Being						1.372	0.184	5.392***
Age	0.238	0.057	0.054	0.014	25.071 (2,852)***	0.087	0.121	3.537***
Model 3: Well-Being						1.382	0.185	5.444***
Age						0.093	0.129	3.767***
Gender	0.251	0.063	0.059	0.006	18.660 (3,851)***	1.325	0.079	2.359*
Model 4: Well-Being						1.233	0.166	4.678***
Age						0.091	0.127	3.709***
Gender						1.381	0.083	2.458*
Clarity	0.260	0.067	0.063	0.005	15.078 (4,850)***	0.081	0.071	2.031*
Dependent variable: Accident Control Behaviors								
Model 1: Emotionality	0.221	0.049	0.048	0.049	42.945 (1,853)***	1.566	0.221	6.553***
Model 2: Emotionality						1.418	0.200	5.936***
Age	0.264	0.070	0.068	0.021	31.362 (2,852)***	0.076	0.146	4.343***
Model 3: Emotionality						0.975	0.137	3.498***
Age						0.075	0.145	4.323***
Clarity	0.283	0.080	0.077	0.010	24.224 (3,851)***	0.098	0.119	3.054**
Model 4: Emotionality						0.771	0.109	2.615**
Age						0.069	0.133	3.917***
Clarity						0.091	0.111	2.827*
Self-Control	0.291	0.085	0.080	0.005	19.327 (4,850)***	0.465	0.079	2.084*
Dependent variable: Preventive Health Behavior[c]								
Model 1: Emotionality	0.228	0.052	0.051	0.052	46.071 (1,853)***	3.327	0.228	6.788***
Model 2: Emotionality						2.996	0.206	6.127***
Age	0.278	0.077	0.075	0.025	34.948 (2,852)***	0.170	0.160	4.757***
Model 3: Emotionality						2.427	0.167	4.612***
Age						0.159	0.149	4.441***
Repair	0.293	0.086	0.083	0.009	26.205 (3,851)***	0.174	0.103	2.850**
Dependent variable: Traffic Risk Taking								
Model 1: Age	0.190	0.036	0.035	0.036	31.597 (1,853)***	−0.093	−0.190	−5.621***
Model 2: Age						−0.100	−0.206	−6.101***
Gender	0.237	0.056	0.054	0.020	24.896 (2,852)***	−1.599	−0.141	−4.192***
Model 3: Age						−0.088	−0.180	−5.262***
Gender						−1.856	−0.164	−4.835***
Self-Control	0.270	0.073	0.070	0.017	22.028 (3,851)***	−0.754	−0.136	−3.929***
Dependent variable: Substance Risk Taking								
Model 1: Self-Control	0.146	0.021	0.020	0.021	18.141 (1,853)***	−.540	−0.146	−4.259***
Model 2: Self-Control						−0.612	−0.165	−4.759***
Gender	0.177	0.031	0.029	0.010	13.442 (2,852)***	−0.767	−0.102	−2.929**
Model 3: Self-Control						−0.546	−0.147	−4.180***
Gender						−0.812	−0.108	−3.103**
Age	0.196	0.038	0.035	0.007	11.133 (3,851)***	−0.029	−0.088	−2.518*
Dependent variable: Risk Taking Behavior[d]								
Model 1: Age	0.208	0.043	0.042	0.043	37.775 (1,853)***	−0.130	−0.208	−6.146***
Model 2: Age						−0.140	−0.224	−6.661***
Gender	0.257	0.066	0.064	0.023	29.539 (2,852)***	−2.207	−0.152	−4.519***
Model 3: Age						−0.118	−0.189	−5.585***
Gender						−2.654	−0.183	−5.438***
Self-Control	0.310	0.096	0.093	0.030	29.659 (3,851)***	−1.290	−0.181	−5.291***

*Total sample N = 855, ***p ≤ 0.001; **p ≤ 0.01; *p ≤ 0.05. [a]Physical Health Component is the sum of Physical Functioning, Role Physical, Bodily Pain and General Health. [b]Mental Health Component is the sum of Vitality, Social Functioning, Role Emotional and Mental Health. [c]Preventive Health Behavior is the sum of Wellness Maintenance and Enhancement Behaviors and Accident Control Behaviors. [d]Risk Taking Behavior is the sum of Traffic Risk Taking and Substance Risk Taking.*

EI dimensions as predictor variables. Nevertheless, some of the results are common: in both studies, the dimension of Attention coincides as a negative predictor of Role Physical, Vitality, Social Functioning, Role Emotional, and Mental Health.

Regarding the health-related behaviors, the results of the regression analyses, show that the EI dimensions predict a lower percentage of health-related behaviors than of health components. In the broad category, Risk Taking Behavior, the only EI dimension that predicts assuming health risks is Self-Control (TEIQue), a high score in this EI dimension predicts taking fewer risks. In the category of Preventive Health Behavior, two EI dimensions emerge that predict preventive behaviors, Emotionality and Repair.

As with the relation between EI and health, a single measure of EI is usually employed to examine the relation between EI and health-related behaviors, and only one or two unhealthy behaviors, such as alcohol and tobacco consumption, are tested (Austin et al., 2005; Tsaousis and Nikolaou, 2005; Limonero et al., 2006; Hill and Maggi, 2011). In this work, in addition to the results for the risk behaviors of alcohol and tobacco consumption, we also obtained results concerning traffic risk taking and preventive health-related behaviors.

Lastly, we note that gender emerges as a predictor of health, with the men obtaining higher values than the women both in the Mental Health and the Physical Health Component. Men also seem to display more health risk behaviors.

Age predicts fewer health risk behaviors, and it is a protector element, older people carry out more preventive behaviors for health.

These results can help future research to continue delimiting the specific EI dimensions that contribute to better health and to promoting the mechanisms through which emotional management can influence physical and mental health.

Regarding the data obtained from the correlations between the EI dimensions and the physical and mental health components, the results show that almost all the EI dimensions assessed are positively related to the Physical and Mental Health Components, except for Attention, which has a negative relation.

When examining the same relation between EI (TMMS) and health (SF-36), Extremera and Fernández-Berrocal (2002) only found a positive relation of the dimension of Attention with Role Emotional, but no relation was found with the remaining health components. Regarding the Clarity dimension, our results are similar to those obtained by these authors, although in our study, positive and significant relations were established with a larger number of health components. Lastly, these authors found a significant but negative relation between the Repair and Bodily Pain dimensions, and in our study, the relation between these dimensions was positive; that is, EI dimension of Repair is related to having fewer symptoms of bodily pain. This EI dimension has significant and positive relations with other health components, and our results are fairly similar to those obtained by these authors.

Salovey et al. (2002), found no relation between the Attention dimension and physical symptoms, but they did find a relation between the dimensions of Clarity and Repair with physical symptoms, both these EI dimensions were associated with lower levels of symptom reporting, social anxiety, and depression.

Freudenthaler et al. (2008), applying the TEIQue questionnaire, found a negative relation between somatic complaints, referring to various physical symptoms and bodily sensations scale, and the dimensions of Well-Being, Self-Control, and Sociability. Also with the TEIQue questionnaire, Mikolajczak et al. (2006) found a positive relation between physical and mental health and the four EI dimensions, Well-being, Self-Control, Emotionality, and Sociability. The results of these studies are similar to those obtained in this work, in which we verified that the dimensions of the TEIQue questionnaire present significant and positive relationships with the physical and mental health components.

In the results of this work, age had positive relations with almost all the components of physical and mental health, because these components—except for Physical Functioning and General Health—reflect information referring to the past 4 weeks before completing the questionnaire. Physical Functioning, which had a negative relation with age, appraises limitations to perform all kinds of physical activity, such as swimming, dressing, walking, squatting, going upstairs, lifting weights, and moderate and intense efforts. All these activities may be affected by age.

Regarding health-related behaviors, not all the EI dimensions are related to these behaviors. Attending to the two broad categories, all the EI dimensions except for Attention have a positive relation with Preventive Health Behavior, such that higher values in these dimensions imply preventive health behaviors. In the other broad category, Risk Taking Behavior, where a high score implies performing health risk behaviors, such as traffic risk taking, alcohol consumption, and smoking, not all the EI dimensions have a relation. Specifically, those that do not are Repair, Well-Being, and Sociability. The Attention dimension is positively related to this category, such that a high score in Attention is related to health risk behaviors, although the relation is not very high. The negatively related EI dimensions, in which a high score implies assuming fewer health risks, are Clarity, Emotionality, and Self-Control.

Tsaousis and Nikolaou (2005), examined the relation between EI and health behaviors, finding a negative relation between total EI and smoking and drinking, and a positive relation with exercising.

Limonero et al. (2006), applied the TMMS to determine the relation between EI and tobacco and cannabis use among university students, finding that the students who consumed tobacco or cannabis and who presented lower levels of the Repair dimension had started consuming tobacco or cannabis at an earlier age. The dimension of Clarity appears to be related to the occasional consumption of cannabis, such that the students obtaining high scores consumed less, whereas the dimension of Attention was not involved in the consumption of these substances. In our study, the dimension of Repair did not have a significant relation with health risk behaviors. Clarity presented a negative relation, and Attention was related to tobacco consumption in addition to other health risk behaviors.

Several limitations of the present study must be mentioned. This study was conducted with self-report measures, so it is likely that social desirability may have influenced the responses. Due to the cross-sectional design of our study, the assumption of

causality should be considered with caution, and a follow-up longitudinal study would be valuable to address this limitation, so that future research using prospective designs is needed to confirm our findings.

Despite these limitations, this study provides preliminary evidence of some of the EI dimensions that could explain each one of the general components of physical and mental health, as well as some representative categories of health-related behaviors.

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Emotional intelligence and recovering from induced negative emotional state

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The aim of the present study was to examine the relationship between emotional intelligence (EI) and recovering from negative emotions induction, using a performance test to measure EI. Sixty seven undergraduates participated in the procedure, which lasted 75 min and was divided into three stages. At Time 1, subjects answered the State-Trait Anxiety Inventory (STAI)-S, Profile of Mood States (POMS)-A, and EI was assessed by Mayer–Salovey–Caruso Emotional Intelligence Test (MSCEIT). At Time 2, negative emotions were induced by nine pictures taken from the International Affective Picture System and participants were asked to complete a second STAI-S and POMS-B questionnaires. At Time 3 participants were allowed to rest doing a distracting task and participants were asked to complete a third STAI-S and POMS-A questionnaires. Results showed that the branches of the MSCEIT emotional facilitation and emotional understanding are related to previous mood states and mood recovery, but not to mood reactivity. This finding contrasts nicely with studies on which emotional recovery was assessed in relation to EI self-reported measures, highlighting the perception and emotional regulation.

Keywords: emotional intelligence, emotional induction, IAPS, recovery, MSCEIT

Introduction

Over the last decades a substantial body of research has showed a positive association between emotional intelligence (EI) and adaptive use of emotions (Martins et al., 2010). EI has been defined as the ability of individuals to recognize, understand and regulate emotions, to discriminate among them, to use this information and to guide the thoughts and actions (Salovey and Mayer, 1990; Mayer and Salovey, 1997; Mayer et al., 2004). Mayer and Salovey (1997) model of emotional intelligence involves four branches, each of which represents a class of ability: (1) Perception of Emotions (2) Emotions to Facilitate Thinking; (3) Understanding and Analyzing Emotional Information and (4) Regulation of Emotion (Mayer and Salovey, 1997; Salovey et al., 2008).

Prior EI works were based in assessing this construct from self-reports (as e.g., Salovey et al., 1995, 2002; Fernández-Berrocal et al., 2004; Limonero et al., 2006b) or more extensive self-reported measures, including social processes and personality (i.e., Bar-On, 1997, 2000; Petrides et al., 2007; Siegling et al., 2015). Currently, most research measures EI through ability tests similar to those used in the measure of intelligence or cognitive performance. Out of these tests, one of the most used is the Mayer–Salovey–Caruso Emotional Intelligence Test (MSCEI; Mayer et al., 2002, 2003),

developed by those who are considered the pioners of EI, term first used by Salovey and Mayer (1990). EI is one of the best predictors of adaptive coping strategies to stressful situations (Extremera and Fernández-Berrocal, 2002; Limonero et al., 2004, 2006a,b, 2012; Cabello et al., 2014). Limonero et al. (2006a) proposed that EI is a mediating variable between life events and their consequences on well-being. EI would facilitate appropriate responses to different events that a person would has to face daily and would decreases maladaptive emotional reactions by enhancing positive moods and reducing negative ones (Mayer and Salovey, 1997; MacCann et al., 2011). In other words, this set of abilities included in EI explains important personal life outcomes, and how a person differs from another one to face life events.

Furthermore, EI could be related to a simple emotional recovery, since a quick recovery from negative emotions would be very useful to cope faster in an adaptive way. Emotional recovery is the process of restoring equilibrium to the organism in terms of returning psychological and physiological activation to prior levels of an emotional reaction, especially if the emotional reaction comes from a negative external situation. Linden et al. (1997) observed that an impaired capacity of recovery from negative emotional states is more harmful to health than an acute rise of activation. Fredrickson (1998, 2001) and Fredrickson and Levenson (1998) have shown that recovery process from negative emotional states is not a passive change in terms of activation, but it is an active process that is promoted by positive emotions. Moreover, resilient individuals use positive emotions in order to recover from negative emotional states (Tugade and Fredrickson, 2004).

Only a handful of researches have related EI to emotional recovery (Salovey et al., 1995, 2002; Ciarrochi et al., 2001; Schutte et al., 2002; Petrides and Furnham, 2003; Fernández-Berrocal and Extremera, 2006; Arora et al., 2011). Overall, these studies indicate that individuals with high EI show lower negative mood states before and during emotion induction and in recovery, than lower EI individuals. In addition, Arora et al. (2011) concluded that individuals with high EI not only show a lower level of negative mood state in the recovery phase, but also a sharper recovery. However, it is worthy to note that in these studies the EI were based on self-reported measures resulting an important limitation because they did not really evaluate the EI of people since they are based on their self-perception. Given that, according to Brackett et al. (2006) and Joseph and Newman (2010) self-rated measures of EI may not be an accurate indicator of performance measures, and it may be valuable to check if relationship between emotional induction and recovery emotional and self-reported measures of EI, also occurs when the EI is measured by performance tests.

Aim

The purpose of the present study was to examine the relationship between EI and recovering from negative emotions induction, measuring EI by a performance test. The first hypothesis was that individuals with higher EI will show lower negative states and higher positive states along a negative emotion induction

process, including measurement at three time-points: previous to induction, during induction, and recovery after induction. The second hypothesis was that an interaction between EI and the process induction-recovery will arise; this means that people with high EI may react less on the induction phase and recover more in the third phase that people with low EI.

Materials and Methods

Participants

Undergraduate psychology students of the Autonomous University of Barcelona were asked to participate in a study on cognition and emotion; attendance was voluntary and participants received course credits to do so. Subjects signed also a consent form.

At first, 67 participants agreed, out of which three were excluded for not finishing any of the questionnaires administered. The final sample consisted of 64 participants. The average age was 22.32 (SD = 4.3). Most were female (78%).

Assessment Instruments

Mayer–Salovey–Caruso Emotional Intelligence Test (MSCEIT version 2.0; Mayer et al., 2002). EI was measured by using a Spanish translation of the MSCEIT that shows similar psychometric properties to the original instrument (Extremera et al., 2006). The MSCEIT is a 141-item, ability-based measure with four branches of EI (perceiving, facilitating, understanding, and managing emotions) according to the theoretical model of Mayer and Salovey (1997). The instrument provides separate scores for each branch as well as an overall score for total EI. The scale had adequate reliability in this study (Cronbach's alpha, 0.73). MSCEIT was scored using consensus criteria where each respondent's answer is scored against the proportion of the sample that endorsed the same MSCEIT answer.

State-Trait Anxiety Inventory (STAI-S; Spielberger et al., 1970). The STAI is a 40-item questionnaire which provides separate measures of state and trait anxiety with 20 questions each. The Spanish validated form of STAI State was used (Buela-Casal et al., 2011) to measure subjective level of state anxiety experienced at the time of assessment. This 20-item questionnaire captures cognitive, emotional, and physical responses of anxiety. Participants rated each item on a 4-point scale (1: "not at all" to 4: "very much"), resulting in a minimum score of 0 and a maximum score of 60. Higher scores indicate greater levels of anxiety. The scales had adequate reliability (Cronbach's alphas in the different time-points ranged between 0.92 to 0.94).

Profile of Mood States (POMS; McNair et al., 1971). The reduced Spanish validated form of POMS was used (Balaguer et al., 1993; Fuentes et al., 1995). This reduced version presents two equivalent forms: A and B. Each form has a 5-point scale (from 0: "not at all" to 4: "extremely") of 15 items created to assess the following five affective mood states: Anger, Depression, Tension, Fatigue, and Vigor. The total mood disturbance score (TMDS) is obtained from scores of the other subscales. In this

study the POMS presents an adequate reliability for all factors with Cronbach's alphas ranging between 0.65 and 0.92, similar to the original scales (McNair et al., 1971). Participants completed three times the Spanish reduced version (A two times, and B one time).

Procedure
Induction of Negative Emotional State
Participants individually arrived at the laboratory and were told that the study was designed to examine people' emotional state and reactions to different situations. All participants voluntarily signed the written consent form after receiving a summary of the study. The procedure lasted 75 min and was divided into three stages (**Figure 1**). *Time1*. The subjects answered the different scales: STAI-S, POMS-A, MSCEIT, and also completed demographics variables (gender and age).

Time 2
For emotion induction, participants were individually shown nine pictures taken from the International Affective Picture

System (IAPS; Lang et al., 1988, 2001). The 21-inch monitor was located at 1 m away from the participants, who were seated in a comfortable chair. The images were presented in the same sequence with an inter-trial interval of 18 s for all the participants. Images were chosen for negative valence and high activation (**Table 1**) in accordance with the Spanish validation norms of the IAPS (Moltó et al., 1999; Vila et al., 2001). Before passing out these pictures, three images were used as examples to explain subjects how to assess throughout the *Self-Assessment Manikin* (SAM; Lang, 1980). SAM is a non-verbal pictorial affective rating system that uses graphic figures to depict values along the dimensions of activation and valence in a 9-point rating scale ranging from 1 (the lowest rating) to 9 (the highest rating). These images were different from those used in emotional induction. The images chosen in the present study present medium high activation ($M = 7.32$, SD $= 1.96$) and negative valence ($M = 1.69$, SD $= 1.13$) measured by SAM and their reference identifications are indicated in **Table 1**. After participants viewed the pictures from IAPS they completed a second STAI-S and POMS in form B. Then participants were allowed to rest in the same laboratory room for 15 min doing a distracting task, which involved answering the following five questions: "*What are your favorite colors?*" "*What are your favorite songs?*" "*What are your favorite movies?*" "*Describe three important memories of your life,*" and "*What are your favorite flavors*?

Time 3
After the 15 min break, participants were asked to complete a third STAI-S and POMS-A form. Finally, the researchers debriefed participants.

Statistical Analysis
Data were analyzed using the Statistical Package for Social Sciences (Version 20.0; IBM, USA). The internal consistency reliability of the different scales was evaluated by Cronbach's alpha coefficient. Comparison of means and repeated measures General Linear Models (GLM) with two between-subject factors were used to test the hypotheses. The extreme groups in the
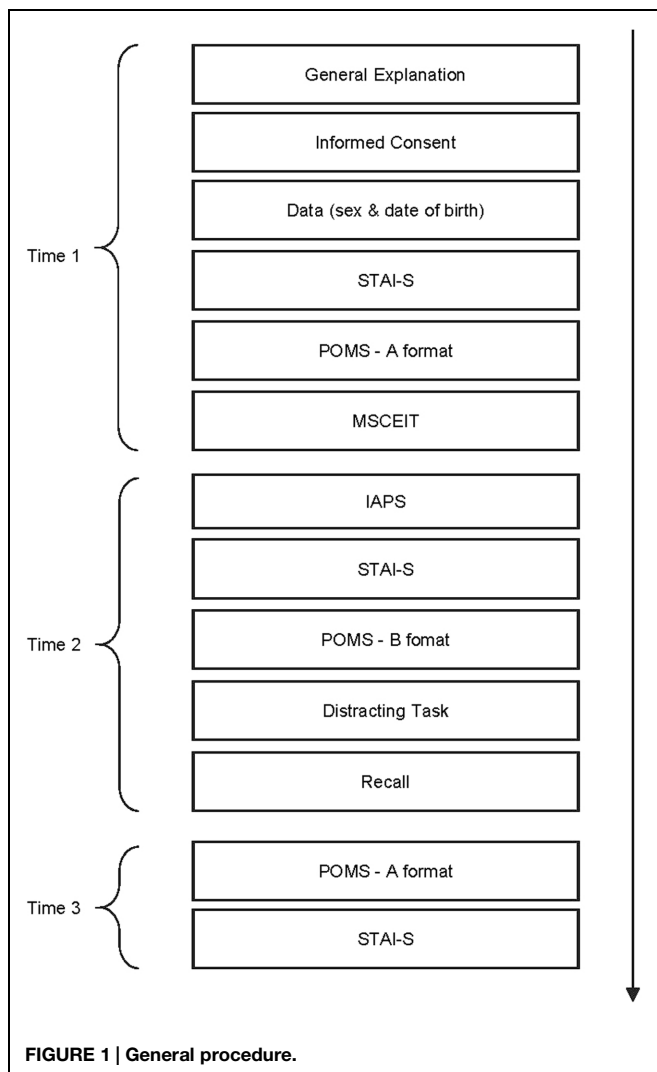

FIGURE 1 | General procedure.

TABLE 1 | Valence and Arousal Values of the IAPS for the selected images of the study.

Presentation order		Valence		Arousal	
Reference	Description	M	SD	M	SD
2683	War	1.68	1.14	7.55	1.74
1525	Attack dog	2.72	1.64	7.79	1.61
6315	Beaten fem	1.81	1.23	7.55	1.77
9635.1	Man on fire	1.77	1.28	7.45	1.84
9433	Dead man	1.55	1.29	6.88	2.45
3015	Accident	1.46	1.14	7.48	1.9
2095	Toddler	1.23	0.67	7.19	2.13
3301	Injured child	1.54	0.94	7.05	2.04
9265	Hung man	1.45	0.85	6.94	2.19
	Mean (SD)	**1.69**	(1.13)	**7.32**	(1.96)

IAPS, International Affective Picture System; IAPS Spanish validation norms (*Moltó et al., 1999; Vila et al., 2001*).

different branches of EI (Perception, Facilitation, Understanding, and Managing) were formed with the quartile 1 and 3 criteria. Results were considered statistically significant at $p < 0.05$. Bonferroni correction was used to adjust significance levels for multiple pair comparisons.

Results

There were no significant differences between male and female students on the variables of the study (**Table 2**).

As shown in **Table 3**, mood induction conditions had a powerful impact on STAI State and on POMS Total and on each of their components. Mood induction had elicited more negative than positive sentences in recovery phase ($t = 9.28$, $df = 63$; $p < 0.001$). This result indicates that the experimental manipulation had the desired effect.

TABLE 2 | Descriptive statistics of the different variables of the scales and comparison between sex.

Variables	*M* (SD)	CI 95%	*p**
MSCEIT Branch 1 Perceiving	0.48 (0.093)	(0.46, 0.51)	0.615
MSCEIT Branch 2 Facilitating	0.41 (.059)	(0.40, 0.43)	0.408
MSCEIT Branch 3 Understanding	0.49 (0.052)	(0.47, 0.50)	0.745
MSCEIT Branch 4 Managing	0.39 (0.047)	(0.38, 0.41)	0.626
MSCEIT Experiential Area	0.45 (0.069)	(0.43, 0.46)	0.516
MSCEIT Strategic Area	0.44 (0.035)	(0.43, 0.45)	0.935
Overall MSCEIT	0.44 (0.044)	(0.43, 0.45)	0.721
STAI-S Pre-IAPS	15.16 (8.592)	(13.01, 17.3)	0.531
STAI-S Post-IAPS	25.91 (11.790)	(22.96, 28.85)	0.531
STAI-S Follow-up	19.64 (11.773)	(16.7, 22.58)	0.102
POMS Overall Pre-IAPS	107.34 (9.058)	(105.08, 109.61)	0.495
POMS Tension Pre-IAPS	4.91 (2.659)	(4.24, 5.57)	0.694
POMS Depression Pre-IAPS	2.20 (2.154)	(1.67, 2.74)	0.384
POMS Anger Pre-IAPS	2.70 (2.355)	(2.11, 3.29)	0.824
POMS Fatigue Pre-IAPS	4.64 (2.698)	(3.97, 5.31)	0.781
POMS Vigor Pre-IAPS	7.11 (2.761)	(6.42, 7.8)	0.119
POMS Overall Post-IAPS	110.58 (9.498)	(108.21, 112.95)	0.217
POMS Tension Post-IAPS	5.94 (3.221)	(5.13, 6.74)	0.183
POMS Depression Post-IAPS	2.05 (2.264)	(1.48, 2.61)	0.309
POMS Anger Post-IAPS	3.86 (3.241)	(3.05, 4.67)	0.838
POMS Fatigue Post-IAPS	3.73 (2.632)	(3.08, 4.39)	0.600
POMS Vigor Post-IAPS	5.00 (2.417)	(4.4, 5.6)	0.217
POMS Overall Follow-up	99.84 (8.175)	(97.8, 101.89)	0.134
POMS Tension Follow-up	2.41 (2.926)	(1.68, 3.14)	0.170
POMS Depression Follow-up	0.86 (1.542)	(0.47, 1.24)	0.179
POMS Anger Follow-up	0.91 (2.187)	(0.36, 1.45)	0.643
POMS Fatigue Follow-up	2.39 (1.857)	(1.93, 2.85)	0.527
POMS Vigor Follow-up	6.72 (2.367)	(6.13, 7.31)	0.113
IAPS Mean Valence	1.66 (.609)	(1.51, 1.81)	0.281
IAPS Mean Arousal	7.19 (1.131)	(6.9, 7.47)	0.056

*MSCEIT, Mayer–Salovey–Caruso Emotional Intelligence Test; STAI-S, State-Trait Anxiety Inventory (State); POMS, Profile of Mood States; IAPS, International Affective Picture System. *p = value of significance related to Mann–Whitney U test.*

TABLE 3 | Mean of STAI-S and POMS Total and each of their components in each time-point.

	Time 1 Baseline	Time 2 Post emotional induction	Time 3 Recovery
	M (SD)	*M* (SD)	*M* (SD)
STAI-S Anxiety	15.16 (8.592)	25.91 (11.790)[a]**	19.64 (11.773)[b]**
POMS Total	107.34 (9.058)	110.58 (9.498)[a]*	99.84 (8.175)[b]**
POMS Tension	4.91 (2.659)	5.94 (3.221)[a]*	2.41 (2.926)[b]**
POMS Depression	2.20 (2.154)	2.05 (2.264)[a]*	0.86 (1.542)[b]**
POMS Anger	2.70 (2.355)	3.86 (3.241)[a]*	0.91 (2.187)[b]**
POMS Fatigue	4.64 (2.698)	3.73 (2.632)[a]*	2.39 (1.857)[b]**
POMS Vigor	7.11 (2.761)	5.00 (2.417)[a]**	6.72 (2.370)[b]**

STAI-S, State-Trait Anxiety Inventory (State); POMS, Profile of Mood States.
M, Mean; SD, Standard Deviation.
[a]*comparison time 1 vs. time 2.*
[b]*comparison times 2 vs. time 3.*
**p < 0.05; **p < 0.001.*

The hypotheses of this study were tested separately for each of the branches of the IE way, so results will be exposed for each of them.

EI Perception

A GLM of the effects of negative emotional induction on STAI-S showed that there was a significant effect of mood induction conditions ($F = 19.721$, $p < 0.001$). *Post hoc* analysis revealed that STAI-S score at time 3 (recovery) was higher than score at Time 1 ($F = 13.070$, $p < 0.001$) and lower than score at Time 2 ($F = 8.533$, $p < 0.01$). The difference between pre induction (Time 1) and mood induction (Time 2) was significant ($F = 45.87$, $p < 0.001$). A slightly main effect of EI-Perception was found ($F = 3.797$, $p = 0.061$), and there was no interaction between factors.

A GLM of the effects of negative emotional induction on the total score of POMS also showed a significant effect of mood induction conditions ($F = 20.29$, $p < 0.001$), with statistically differs along the three time-points. However, there was no effect related to Emotional Perception. Then, there were performed two different GLM: the first one of the Vigor score of POMS and the other one for the Tension score. The GLM of Vigor showed none main effect due to Emotional Perception, however, the GLM of Tension showed a slightly main effect of Emotional Perception ($F = 3.298$, $p = 0.070$) and there was not interaction between factors.

In summary, for the perception branch of EI, neither of the two hypotheses of the study has been confirmed. However, people with higher values in Emotional Perception showed less recall of negative phrases ($U = 72$, $p < 0.05$) and more of positive ones ($U = 184$, $p < 0.05$) in the recuperation phase.

EI Facilitation

The GLM of the effects on STAI-S showed that there was a significant effect of mood induction conditions ($F = 22.063$, $p < 0.001$). *Post hoc* analysis revealed that STAI-S score at Time 3 (recovery) was higher than score at Time 1 ($F = 8.609$,

$p < 0.01$) and lower than score at Time 2 ($F = 17.482$, $p < 0.001$). A main effect of Emotional Facilitation was found ($F = 13.767$, $p < 0.001$), and there was no interaction between factors (see **Figure 2**, upper left frame).

The GLM of the effects on total score of POMS showed a significant effect of mood induction conditions ($F = 16.887$, $p < 0.001$), with statistical differences along the three times. There was a main effect of EI Facilitation ($F = 4.374$, $p < 0.05$) and there was no interaction between factors (see **Figure 2**, lower left frame).

The GLM of Vigor showed no main effect due to Emotional Facilitation, however, the GLM of Tension showed a main effect of Emotional Facilitation ($F = 10.183$, $p < 0.01$) and there was an interaction between Tension scores and EI Facilitation ($F = 4.835$, $p < 0.001$). *Post hoc* contrasts revealed that the group with higher EI Facilitation showed a decrease between Time 1 and Time 3 steeper than the lower EI Facilitation group ($F = 8.388$, $p < 0.01$). In short, the first hypothesis was confirmed: individuals with higher facilitation branch of EI showed lower levels of anxiety along the three times of measurement. Regarding the second hypothesis, which refers to

the interaction between EI and recovery, is only true in relation to the negative mood states, being individuals with more facilitation which decrease more the negative mood states during recovery. Furthermore, in the Recovery phase, people with higher values in Emotional Facilitation showed less recall of negative phrases ($U = 76$, $p < 0.05$) and more of positive ones ($U = 180$, $p < 0.05$).

EI Understanding

The GLM of the effects on STAI-S showed that there was a significant effect of mood induction conditions ($F = 14.181$, $p < 0.001$). *Post hoc* analysis revealed that STAI-S score at Time 3 (recovery) was higher than score at Time 1 ($F = 7.829$, $p < 0.01$) and lower than score at Time 2 ($F = 7.193$, $p < 0.01$). A main effect of Emotional Understanding was found ($F = 5.113$, $p < 0.05$), and there was no interaction between factors (see **Figure 2**, upper right frame).

The GLM of the effects on the total score of POMS showed a significant effect of mood induction conditions ($F = 19.353$, $p < 0.001$), with statistical differences along the three times. There was a main effect of Emotional Understanding ($F = 5.113$,
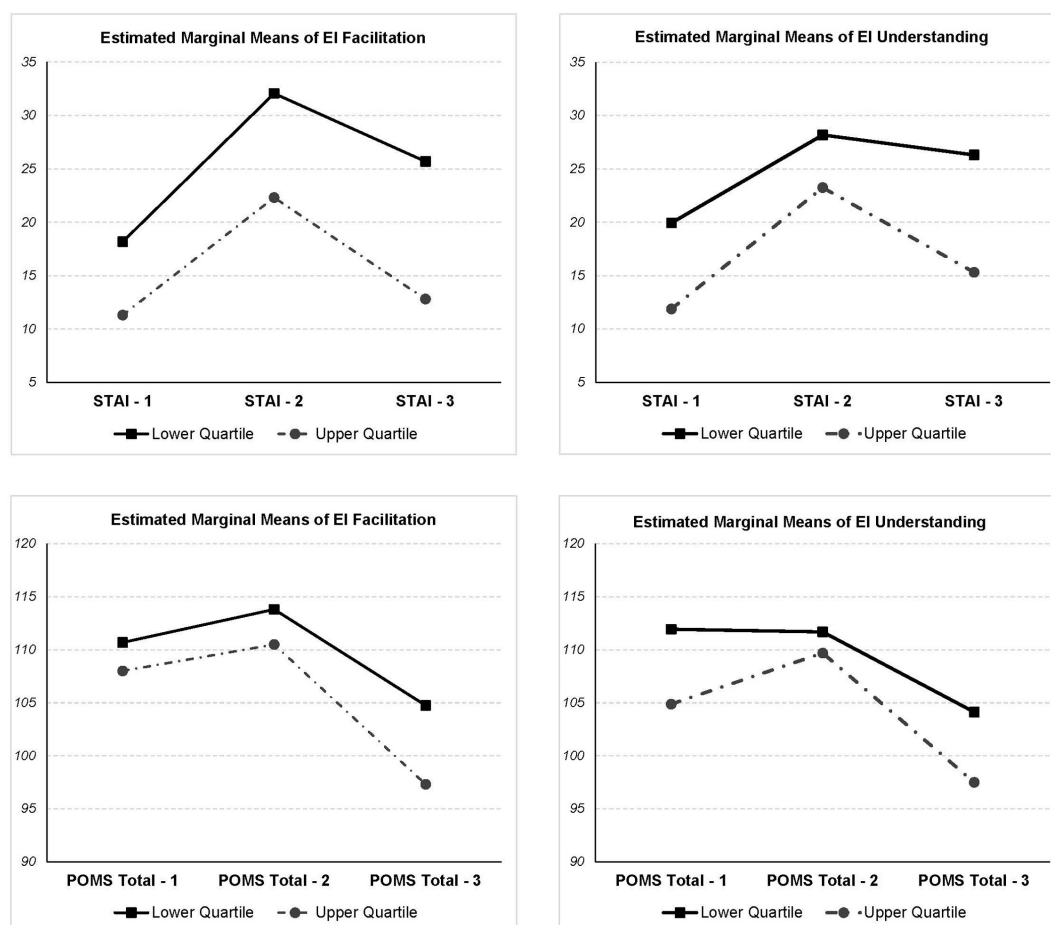

FIGURE 2 | Comparison of estimated marginal means of Emotional Facilitation and Emotional Understanding branches of MSCEIT. Observation: STAI-S = State-Trait Anxiety Inventory (State); POMS = Profile of Mood States.

$p < 0.05$) and there was no interaction between factors (see **Figure 2**, lower right frame).

The GLM of Vigor showed no main effect due to Emotional Understanding, however, the GLM of tension showed a main effect of Emotional Understanding ($F = 5.735$, $p < 0.05$) and there was no interaction between factors. In short, individuals with higher understanding branch of EI show lower levels of anxiety and negative mood states along the three times of measurement, so the first hypothesis was fulfilled. But the second hypothesis related to interaction was not confirmed. Furthermore, no difference was observed between the high and low levels of Emotional Understanding and the number of positive ($U = 136$, $p > 0.05$) and negative sentences ($U = 120$, $p > 0.05$) recalled.

EI Management

There were performed GLM of STAI and POMS with the comparison between the group of higher EI Management and the group of lower Emotional Management. No effects were found when Vigor scores or tension scores of POMS were analyzed, either. So, for the perception branch of EI, neither of the two hypotheses of the study has been confirmed. Furthermore, no difference were observed between the high and low levels of Emotional Management and the number of positive ($U = 155.5$, $p > 0.05$) and negative sentences ($U = 105.5$, $p > 0.05$) recalled.

Discussion

The induction of negative mood has been effective since subjects showed more anxiety, more negative moods (POMS total) and less vigor during the induction. Moreover, recovery after induction took place. Also we have observed that mood induction elicited more negative than positive sentences demonstrating the goodness of mood induction through selected IAPS pictures as observed in others studies (Mikels et al., 2005; Feliu-Soler et al., 2013).

Overall, results suggest that the branches of the MSCEIT Emotional Facilitation and Emotional Understanding are aspects of EI related to previous mood states and mood recovery, but not to mood reactivity. Emotional Facilitation has a main effect on anxiety and mood state. This means that emotional intelligence has two influences: first the negative emotional levels are lower in individuals with higher EI along the three phases of the process, and second, these individuals shown high recuperation. The analysis of the components of POMS shows that the influence of EI is mainly dropping down negative mood states and rising up the positive ones. This means that it has been found an interaction effect in individuals with higher EI recover n more than individuals with lower EI.

People with higher levels of Emotional Facilitation showed a more positive mood state. This state influences what people think and plays an important role in the recovering process toward generating positive thoughts (Mayer and Salovey, 1997), in our case, positive memories. In line with this, Baikie and Wilhelm (2005) have observed that writing about a meaningful aspect of life when one person is under negative emotional state

may result in enhanced positive emotions and reduce the effect of negative ones. On the other hand, the perception branch of EI also produces positive memories during recovering, but has neither effect on the negative mood states nor in the anxiety level. This incongruous fact should be clarified in future studies.

Emotional Understanding influences also recovery from negative emotional states. Emotional Understanding influences recovery in the same way as facilitation does, but no interactive effect has been found. In this sense, what gives rise to different emotions is a key component of EI. This fact includes the ability to understand emotional information, the manner in which they combine, and their causes and consequences. In the above-cited study of Fernández-Berrocal and Extremera (2006), the authors found that Emotional Perception (dimension of perceived emotional intelligence measured by Trait Meta-Mood Scale, Salovey et al., 1995) moderated mood reactivity, diminishing intrusive thoughts and negative mood. In another natural setting, Limonero et al. (2004) found that a higher level of Emotional Clarity reduces stress levels of nurses to facilitate the understanding of personal relationships, professional and intragroup communication. Ruiz-Aranda et al. (2014) found that among female student health professionals global EI measured by MSCEIT was an important predictor of well-being to assess situations as less stressful.

Emotional Perception has a weak effect on emotional induction and recovery. In fact this is not a surprise because the perception doesn't need to be related to the intensity and the change of emotional states, but with emotional states identification. In this point, it is important to note that perception has been measured by performance test. To believe that oneself has a good perception of his emotions it is not the same as to prove this skill for real. This effect has been observed in other applications of EI. For instance, empirical studies on burnout show that while perceived EI has been clearly related to burnout, even controlling for personality traits (Mikolajczak et al., 2007), the results are mixed in terms of the relationships between EI as a skill and emotional exhaustion, either no relationships were found (Brackett et al., 2010) or relations were only found with some components of EI (Palser, unpublished doctoral dissertation).

Emotional Management has not showed influence on recovery from mood induction. This result was not expected because people with higher Emotional Management or emotion regulation should show more emotional recovery to experience less stress (Limonero et al., 2004; Ruiz-Aranda et al., 2014; Peña-Sarrionandia et al., 2015). One possible explanation to these unexpected results could be related to the experimental procedure: subjects experienced negative emotions from mood induction procedure, and they did not face any active task to cope with negative moods afterward, so they might not mobilized active resources related to management emotion as for example, repairing or reducing the negative emotions.

The results provide mixed support for the initial hypothesis; only the Emotional Facilitation and Emotional Understanding components of EI were related to the recovery process after mood induction. In relation to the second hypothesis, we note that it was also partially confirmed.

In summary, in this study it has been found that Emotional Understating and Emotional Facilitation assessed by an ability-based measure are the key branches in promoting recovery in negative emotions induction settings, while EI is evaluated by self-report measures the main branches are perception and management. This result invited to reflect and draw practical conclusions: people believe that perceiving and controlling emotions help to recover better from negative emotional states, but in fact, according to the presented results, people who do use emotions to guide cognitive process are those who recover better. This suggests that recovery does not depend on controlling emotions, but it is related to more undirected processes as Fredrickson (1998, 2001) claims. His model promotes positive things to restore equilibrium. Therefore training for managing stressful situations would be based on facilitation of resources more than on direct control activities. Having said this, it would be useful to promote emotional capacities related to the components of emotional facilitation and understanding to cope more effectively with negative situations.

These findings are particularly applicable to situations of communicating bad news as serious diagnoses in a clinical setting, since it is a passive situation of receiving threat information. In this case, emotional facilitation and understanding could reduce the levels of negative emotions and thereby improve patient's understanding and retention of information. It also facilitates the involvement in their treatment plan and in the different ways of coping with a diagnosis of illness or with the illness (Edo et al., 2012).

Limitations and Future Research

Despite the insights that the present study provides, it does have several limitations. Firstly, a high percentage of the participants were female, so there is a possibility that findings may not be generalized to males. Secondly, participants were university students, so we must be cautious about generalizing the results to the general population. Future studies should increase the sample and include general population and increase the proportion of men to analyze data for possible gender differences. Another limitation of this research is that it has only been induced one kind of negative emotion, anxiety. In future research the induction and recovery of anxiety should be compared with other emotions as sadness and/or anger and it would also be interesting to identify the resources and strategies that emotionally intelligent people use to reduce negative effect.

Regardless of these limitations, the present study suggests that Emotional Facilitation and Emotional Understanding branches of EI are related to previous mood states and with mood recovery from negative mood induction.

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Perceived emotional intelligence as a moderator variable between cybervictimization and its emotional impact

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The negative effects of traditional bullying and, recently, cyberbullying on victims are well-documented, and abundant empirical evidence for it exists. Cybervictimization affects areas such as academic performance, social integration and self-esteem, and causes emotions ranging from anger and sadness to more complex problems such as depression. However, not all victims are equally affected, and the differences seem to be due to certain situational and personal characteristics. The objective of this study is to analyze the relationship between perceived emotional intelligence (PEI) and the emotional impact of cybervictimization. We hypothesize that EI, which has previously been found to play a role in traditional bullying and cyberbullying, may also affect the emotional impact of cyberbullying. The participants in our study were 636 university students from two universities in the south of Spain. Three self-report questionnaires were used: the "European Cyberbullying Intervention Project Questionnaire," the "Cyberbullying Emotional Impact Scale"; and "Trait Meta-Mood Scale-24." Structural Equation Models were used to test the relationships between the analyzed variables. The results support the idea that PEI, by way of a moderator effect, affects the relationship between cybervictimization and emotional impact. Taken together, cybervictimization and PEI explain much of the variance observed in the emotional impact in general and in the negative dimensions of that impact in particular. Attention and Repair were found to be inversely related to Annoyance and Dejection, and positively related to Invigoration. Clarity has the opposite pattern; a positive relationship with Annoyance and Dejection and an inverse relationship with Invigoration. Various hypothetical explanations of these patterns are discussed.

Keywords: perceived emotional intelligence, cyberbullying, cybervictimization, emotional impact, emotions

Introduction

Cyberbullying has been defined as intentional, unjustified attacks carried out repeatedly using computers, cell phones, and other electronic devices from which victims cannot easily defend themselves (Patchin and Hinduja, 2012). According to the review conducted by Kowalski et al. (2014), most of the studies that have addressed this problem show that between 10 and 40% of secondary school pupils have been involved in cyberbullying, while other research suggests that as

many as 72% have at some time experienced it (Juvonen and Gross, 2008). As all aggressive acts, and especially those sustained over a period of time, cyberbullying is or may be harmful to its victims. Cyberbullying negatively affects different areas of victims' lives, above all their emotional balance and social adjustment. Cyberbullying victimization has been associated with negative emotions such as sadness, shame, guilt, loneliness, and helplessness (Ortega et al., 2009, 2012b; Sahin, 2012), psychosomatic problems (Carter, 2011; Beckman et al., 2012), depressive symptomatology (Perren et al., 2010; Olenik-Shemesh et al., 2012), anxiety symptomatology (Sontag et al., 2011), low self-esteem and having a negative self-concept (Didden et al., 2009), and with alcohol, tobacco, and drug use (Ybarra and Mitchell, 2004). Cybervictimization has even been related to an increased likelihood of self-harm (Kessel Schneider et al., 2012) and suicidal thoughts (Bonanno and Hymel, 2013). Considerable overlap has also been identified between cybervictimization and traditional victimization (Gradinger et al., 2009; Katzer et al., 2009; Del Rey et al., 2012).

However, the effects of cybervictimization are not found with the same degree of intensity in all victims (Ortega et al., 2012a; Dredge et al., 2014; McVie, 2014), and different cybervictim profiles have been identified based on the type of experienced emotions (Ortega et al., 2009, 2012b). Different theoretical models have been proposed to help understand the relationship between cyberbullying – and aggression in general – and its effects on victims (see Kowalski et al., 2014), most of which focus almost exclusively on cognitive variables (Lazarus and Folkman, 1984; Crick and Dodge, 1994; Anderson and Bushman, 2002). Nevertheless, sufficient empirical evidence exists to suggest that other kinds of variables are also important in determining the relationship between cybervictimization and its final impact. These variables relate to two dimensions: the aggressive behavior itself, including the type of cyberbullying (Smith et al., 2008; Ortega et al., 2009; Staude-Müller et al., 2009), its duration and severity (Dyer and Teggart, 2007; Aluede et al., 2008); and the personal features of victims of cyberbullying. Besides cognitive variables, the latter dimension includes social and emotional variables: social skills, which can alleviate or reduce the risk of developing depressive symptoms (Vassallo et al., 2014); coping strategies, which help victims play down the importance of the problem and its consequences (Perren et al., 2012); resilience, with resilient individuals showing less vulnerability and a greater capacity to recover from adversity (Ttofi et al., 2014); personality traits, some of which – such as the tendency to over-control – are linked to a higher probability of a greater impact (Overbeek et al., 2010); social intelligence, which has been found to be negatively related to traditional victimization and cybervictimization (Schultze-Krumbholz and Scheithauer, 2009; Hunt et al., 2012); and emotional intelligence (EI), with higher levels of EI being associated with a lower likelihood of being involved in cyberbullying (Elipe et al., 2012; Baroncelli and Ciucci, 2014). This study focuses on the last of these variables.

Emotional intelligence is a concept established in the 1990s by Salovey and Mayer (1990; Mayer and Salovey, 1997). It refers to those aspects of intelligence that relate to the management of

one's own emotions and those of others. In the model proposed by these authors, EI is composed of four branches: recognizing or perceiving emotions, i.e., the capacity to perceive emotions in oneself and others efficiently; using emotions to facilitate thinking; understanding emotions; and managing emotions. Mayer et al. (2008) found that those individuals who are better at perceiving, understanding, using and managing both their own emotions and those of others display higher levels of social adjustment. Other empirical studies have found correlations between these skills and different social and emotional adaptation strategies (for an overview see Extremera and Fernández-Berrocal, 2005; Fernández-Berrocal and Extremera, 2008).

A related concept is emotional metacognition, or perceived emotional intelligence (PEI), a term used to refer to an individuals' perception of their own emotional skills. The most widely used instrument for measuring PEI is the Trait Meta-Mood Scale (TMMS; Salovey et al., 1995), which includes the following dimensions: Attention, defined as the perceived ability to focus on one's own emotions; Clarity, defined as the perceived ability to understand one's own emotional moods; and Repair, defined as the perceived ability to manage and control one's own emotions. Studies carried out in this area have revealed the existence of a link between the different components of PEI and different aspects of emotional adjustment. More specifically, high scores in Clarity and Repair are inversely associated with depressive symptoms (Extremera and Fernández-Berrocal, 2006; Fernández-Berrocal et al., 2006), social anxiety (Salovey et al., 2002) and personality disorders (Leible and Snell, 2004), but positively associated with levels of well-being and life satisfaction (Extremera et al., 2011). It has also been shown that individuals with higher levels of psychological adaptation generally score low on Attention, and high on Clarity and emotional Repair (Extremera and Fernández-Berrocal, 2005). So, whereas high levels of Clarity and Repair are related to understanding and managing emotions, Attention is related to perceiving one's own emotions, but too much of this without the accompaniment of good emotional management can lead to ruminative thought processes.

A number of studies have analyzed the relationship between aggressive behavior in general and EI, and most of them find significant empirical evidence to suggest a link does indeed exist. In a systematic review of the literature by García-Sancho et al. (2014) just over 94% of the listed studies found an inverse relationship between EI and aggressive behavior, regardless of the socio-cultural context of the studies, the age of the subjects in the samples or the type of aggression. Peláez-Fernández et al. (2014) revealed that PEI helps explain aggressive conduct over and above the effect of age, sex, and personality traits. In their study, the PEI dimensions moderate the relationship between aggression and personality. Research looking specifically at the relationship between EI and bullying has also found empirical evidence of the importance of this link (Oluyinka, 2009; Mavroveli and Sanchez-Ruiz, 2011; Kokkinos and Kipritsi, 2012). Several studies have explored the correlation in greater depth by looking at the different dimensions of EI separately. Lomas et al. (2012) showed that understanding

others' emotions is negatively related to the involvement in bullying, and that low scores in "emotion management and control" were linked to higher levels of self-reported victimization. Elipe et al. (2012) concluded that victims and bully-victims of traditional bullying are more likely to show higher levels of Attention and lower levels of Clarity, confirming results of an earlier study (Elipe et al., 2011), but they did not find these relationships to be significant in the case of cyberbullying. Other researchers have linked EI to certain dimensions of the dynamics of bullying and cyberbullying. Downey et al. (2010) found that people with lower scores in EI tend to use non-productive coping strategies, attempting to reduce their stress rather than to seek a solution to the conflict. Extremera and Fernández-Berrocal (2005) had previously argued that difficulty in identifying one's own emotions, often linked to high scores in Attention, could mean a decrease in the cognitive resources dedicated to choosing efficient coping strategies, i.e., individuals need to understand what is happening to them and without this may find it harder to successfully address the problem. Taking into account that coping strategies are considered key elements in tackling bullying and cyberbullying (e.g., Hunter and Borg, 2006; Nabuzoka et al., 2009), understanding the relationship between EI and coping could be important.

Despite the considerable attention in the literature given to the relationship between EI and (cyber)bullying, it is still not fully understood, especially with regard to EI's role in moderating the emotional impact. The aim of this study is precisely to make progress in this direction, and to learn more about how to counter or eliminate that impact.

Our principal objective is to analyze the role of PEI with regard to the emotional impact of cybervictimization. Our starting hypothesis is that PEI acts as a moderator between cybervictimization and emotional impact. More specifically, following earlier empirical evidence, we hypothesize the existence of a positive link between the level of focus on one's own emotions and negative emotional impact, and an inverse link between understanding and, above all, management of emotions and negative emotional impact.

Materials and Methods

Participants

The participants were 638 undergraduates from the Humanities and Educational Sciences faculties of the University of Jaén ($n = 328$) and the University of Seville ($n = 308$), in the south of Spain. Two uncompleted questionnaires were discarded, and the final sample therefore comprised 636 students, 68.7% of whom were girls. The age range was 18–61, with 95% of the population being between 18 and 25 ($M = 20.45$, $SD = 4.13$). The students were enrolled in courses leading to qualifications in Teacher Training ($n = 409$), Psychology ($n = 173$) and Psychopedagogy ($n = 54$). The participation in the study was voluntary. Data were collected following the general principles and the ethical research standards of the American Psychological Association (APA).

Procedure

After obtaining authorization from the teachers of the different courses, an informative talk was conducted with the students in which the objectives of the study were explained and the students were invited to collaborate. After informed consent, those interested completed a pencil and paper questionnaire during class time, which took ~30 min. The voluntary nature of participating in the study was highlighted so that any student could leave the class at that time if they did not want to participate. In addition, the complete anonymity of the questionnaires was explained to participants, and a guarantee was given that the data would only be used for research purposes.

Instruments

The instruments used to evaluate the variables under study were self-report questionnaires with Likert-type multiple-choice scales.

Cyberbullying was evaluated using the Spanish version of the "European Cyberbullying Intervention Project Questionnaire, ECIPQ" (Del Rey et al., in press). This questionnaire has 22 items covering cyberbullying in the 2 months prior to participation in the survey, with one subscale for cybervictimization (11 items) and another for cyber-aggression (11 items). Answers are entered on a scale of 1 to 5: 1 Never; 2 Once or twice; 3 Once or twice monthly; 4 About once a week; 5 More than once a week. The included forms of cyberconduct are: Insults said to me; Insults about me said to others; Threats; Identity theft; Use of personal identity without permission; Private information theft; Display of private information; Embarrassing videos or pictures; Manipulation of pictures; Social exclusion; and Spreading of rumors. This scale has displayed good psychometric properties in studies carried out to date (Ortega-Ruiz et al., 2012; Casas et al., 2013). However, since this study employed only the cybervictimization (CV) subscale, a confirmatory factor analysis (CFA) was used in order to test its appropriateness. The results indicated a good-fit for the measurement model, except for the Chi-square (due to its sensitivity to sample size): $X^2_{S-B} = 102.95$; $DF = 49$; $NNFI = 0.99$; $CFI = 0.99$; $GFI = 0.98$; $RMSEA = 0.038$; $SRMR = 0.047$; $ECVI = 0.78$ (for more details about the analysis and the interpretation of indices, see the statistical analysis section). The internal consistency, Cronbach's alpha, was 0.90.

Emotional impact was evaluated using the "Cyberbullying Emotional Impact, CBEI" scale (Elipe et al., unpublished). This scale is an adaptation of the PANAS scale specifically designed to analyze cyberbullying situations. It lists a series of emotions and asks subjects to grade the extent to which they would feel those emotions if they were a cybervictim on a scale of 1 to 5 (Not at all [1] to A lot [5]). The scale has three subscales for different types of impact: Invigoration (including Animated; Energetic, Lively; Satisfied, Proud; Determined, Daring; Active); Dejection (Tense, Distressed; Guilty; Lonely; Ashamed; Defenseless; Depressed; Worried; Scared); and Annoyance (Upset, Bothered; Angry, Annoyed; Irritable, In a bad mood). Since this scale had not been validated beforehand, a measurement model was estimated to test whether the observed items reliably reflected the latent variables. The results confirmed the proposed model's

goodness-of-fit: $X^2_{S-B} = 305.48$; DF $= 101$; NNFI $= 0.967$, CFI $= 0.97$; GFI $= 0.99$; RMSEA $= 0.057$; SRMR $= 0.059$; ECVI $= 2.26$. Cronbach's Alpha was 0.71 for the overall scale, 0.84 for Invigoration, 0.90 for Dejection, and 0.76 for Annoyance.

Perceived emotional intelligence was evaluated using the Spanish version of the "Trait Meta-Mood Scale-24" (Fernández-Berrocal et al., 2004), a scale comprising 24 items with which subjects are asked to express their degree of agreement on a Likert-type scale of 1 to 5 (Not at all [1] to Totally [5]). The scale, which has three subscales – Attention, Clarity, and Repair – has displayed good psychometric properties in earlier studies (Fernández-Berrocal et al., 2004), and the CFA confirmed its appropriateness for the sample in our study: $X^2_{S-B} = 1052.96$; DF $= 249$; NNFI $= 0.95$, CFI $= 0.96$; GFI $= 0.95$; RMSEA $= 0.071$; SRMR $= 0.074$; ECVI $= 1.82$. In this case, Cronbach's Alpha was 0.91 for the overall scale, 0.90 for Attention, 0.88 for Clarity, and 0.85 for Repair.

Statistical Analysis

The proposed models were tested using structural equation methods. Taking into account the ordinal nature of the variables involved, robust methods were employed (Flora and Curran, 2004). Specifically, in those analyses which included the cybervictimization variable – the CFA of the cybervictimization scale and Models 1 and 3 – the unweighted least squares (ULSs) method was used to take into account deviations due to non-normally distributed variables. This was necessary because neither the normality nor the kurtosis conditions were satisfied (see **Table 1**). This method has proved to be one of the most accurate and reliable methods for estimating models with ordinal variables that do not fulfill normality conditions (Forero et al., 2009). In the other analyses – the CFA of the emotional impact and EI scales and Model 2, in which the included variables (PEI and emotional impact) did not significantly deviate from normality conditions – robust maximum likelihood (RML) was adopted as the most appropriate method (Hu and Bentler, 1998).

Since this scale had not been validated previously, both exploratory factor analysis (EFA) and CFA were used to do so. The sample was randomly divided into two halves, using EFA to assess the factor structure from sample A ($n = 298$) and then using CFA to confirm the obtained factor structure using Sample B ($n = 338$).

To compare the suitability of the proposed models, we adhered to the recommendations by Hu and Bentler (1995, 1999), and combined different fit indices with the recommended cutoff values: Chi-square over degrees of freedom ratio with a recommended cutoff of <3; root mean square error of approximation (RMSEA) with recommended cutoff values <0.08; standardized root mean square residual (SRMR) <0.05; goodness of fit index (GFI); non-normed fit index (NNFI), and comparative fit index (CFI) with recommended values >0.90; and expected cross-validation index (ECVI), for which the smallest values indicate the greatest potential for replication (Browne and Cudeck, 1989).

Since missing data for the different variables did not exceed 2% (13 cases), and for most variables being lower than 1%, they were not imputed.

The analyses were performed using the SPSS 21 statistical package, and LISREL 9.1 (Jöreskog and Sörbom, 2012), a package that allows the estimation of polychoric correlations, which are best suited to the variables involved (Jöreskog, 1994).
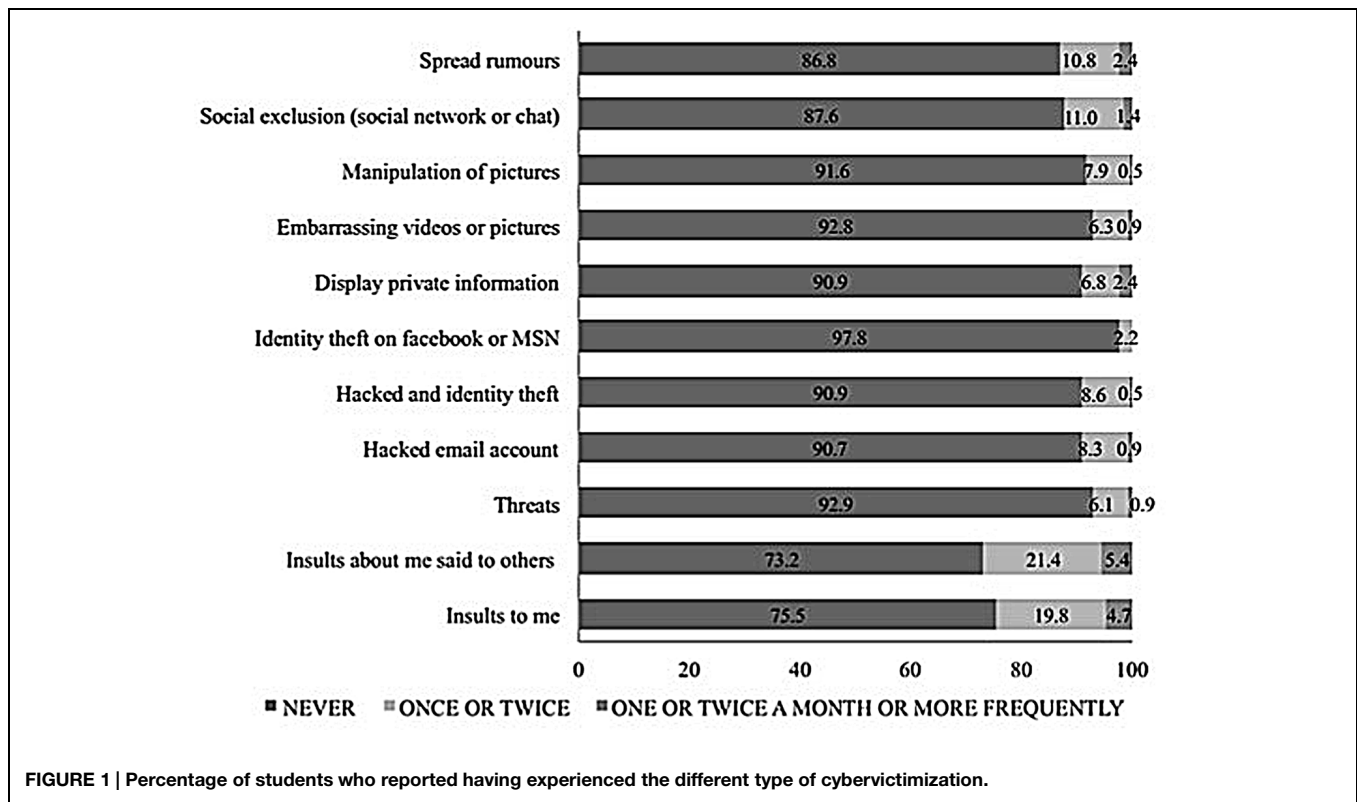
Results

Over half of the subjects (54%) reported having experienced one or more of the 11 listed types of cybervictimization in the past 2 months (**Figure 1**) . The most frequently experienced forms were insults about me said to others via internet or SMS messages, followed by direct personal insults via email or SMS messages (one out of every four pupils). Just over one in ten reported having been excluded or ignored in a social network or chat site and having been the subject of rumors spread via internet. Only 2.2% said that somebody had created a false Facebook or MSN account to steal their identity; in those cases this happened once or twice.

With regard to the distribution of the latent variables included in the study, **Table 1** shows the main univariate descriptive statistics and the correlation between the variables. It is interesting to note the existence of significant correlation between all the EI factors and the different emotional impact factors. Attention is

TABLE 1 | Descriptive statistics and Spearman correlation for the variables included in the study.

	1	2	3	4	5	6	7
(1) CV	1						
(2) Invigoration	0.06	1					
(3) Dejection	0.01	−0.44**	1				
(4) Annoyance	−0.05	−0.24**	0.53**	1			
(5) Attention	0.06	−0.07	0.25**	0.16**	1		
(6) Clarity	−0.21**	0.11*	−0.13**	−0.05	0.13**	1	
(7) Repair	−0.11*	0.24**	−0.21**	−0.12**	−0.01	0.41**	1
M (range: 1–5)	1.14	1.72	3.03	3.64	3.44	3.47	3.49
SD	0.24	0.84	1.01	0.98	0.78	0.74	0.76
Skewness	2.99	1.43	−0.19	−0.54	−0.19	−0.14	−0.15
Kurtosis	11.94	1.63	−0.96	−0.34	−0.50	−0.39	−0.46

*$p < 0.01$; **$p \leq 0.001$.

FIGURE 1 | Percentage of students who reported having experienced the different type of cybervictimization.

positively related to the Dejection and Annoyance Impacts, while Repair is inversely related to those factors and positively related to Invigoration. Clarity was found to have a significant positive link with Invigoration and an inverse link with Dejection. There was also an inverse link between CV and Clarity, and CV and Repair.

Structural Models

The correlations between the different constructs were analyzed using structural equation models. First, two simple models were created to analyze how CV and PEI correlated with emotional impact. A third model was then designed, incorporating both variables simultaneously.

The fit indices of these models are shown in **Table 2**. **Figures 2**, **3**, and **4** show the models themselves, including their standardized regression coefficients. For ease of viewing, observed items of the latent variables and error terms have both been omitted from the figures.

As can be seen in **Table 2**, the fit of the first model (**Figure 2**), which describes the relationship between CV and emotional

impact, is not satisfactory; most of the index values lie outside the proposed cut-off points.

In contrast, all fit indicators of Model 2 (**Figure 3**) lie within the commonly accepted cut-off points. However, as can be seen in the figure, the explained variance for each impact factor is rather low, not exceeding 21%. Whereas Attention has a significant positive correlation with the three impact factors, especially with Annoyance and Dejection, Repair correlates positively with Invigoration and inversely with Dejection and Annoyance. Clarity was found to have no significant correlations with emotional impact.

The third model (see **Figure 4**) produced better fit indices than the first two models. The explained variance of the included variables can also be considered satisfactory, rising as high as 85% for Dejection. Analysis of the beta coefficients showed that when the two constructs were included in the same model, significant correlation appears between all variables. Specifically, in the case of Attention, the simultaneous inclusion of CV considerably altered the correlations with emotional impact, leaving a significant positive link only with Invigoration and changing the

TABLE 2 | Model fit indicators.

	X^2_{S-B}	df	GFI	NNFI	CFI	RMSEA	SRMR	ECVI
Model 1	1786.04	321	0.79	0.89	0.85	0.085 (0.081; 0.089)[a]	0.17	2.99
Model 2	1963.00	725	0.95	0.96	0.96	0.036 (0.030; 0.039)[a]	0.04	2.86
Model 3	3555.88	1202	0.98	0.95	0.95	0.042 (0.040; 0.044)[a]	0.09	5.98

[a]*Confidence interval 90%.*

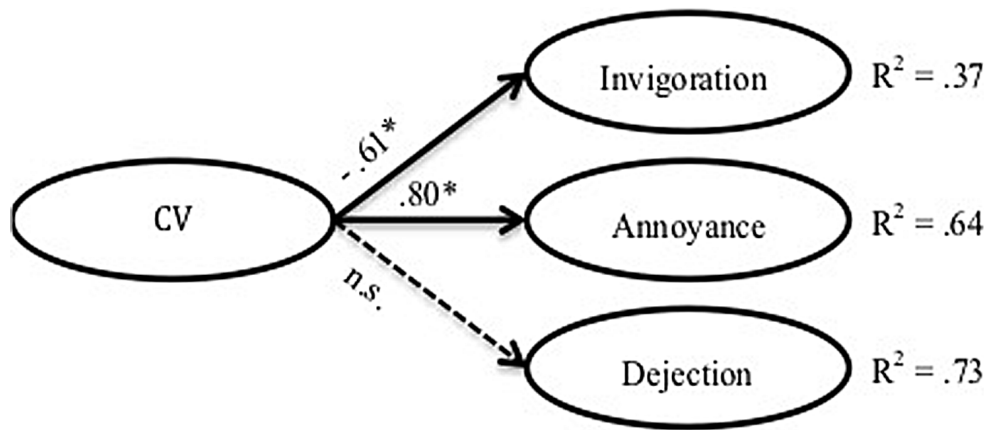**FIGURE 2 | Model of the direct link between CV and emotional impact.** *$p < 0.05$. The discontinuous arrows indicate non-significant correlations.
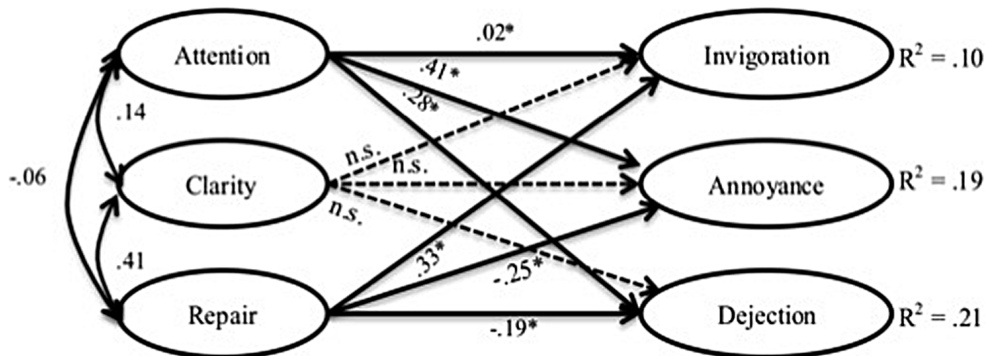

FIGURE 3 | Model of the direct link between perceived emotional intelligence and emotional impact. *$p < 0.05$. The discontinuous arrows indicate non-significant correlations.
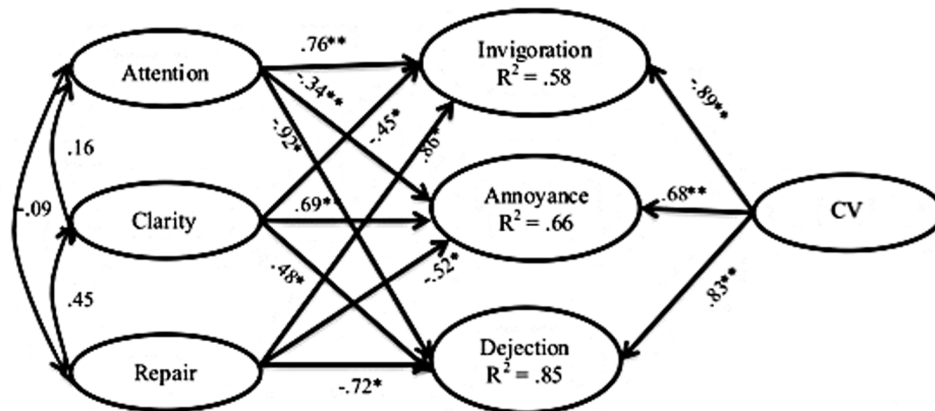

FIGURE 4 | Model of the links between cybervictimization, perceived emotional intelligence and emotional impact. *$p < 0.01$; **$p \leq 0.005$.

earlier positive links with Annoyance and Dejection into inverse ones. Correlations between Clarity and emotional impact became significant, showing an inverse link with Invigoration (that is to say, the greater the clarity the lower the impact) and positive links

with Annoyance and Dejection. Repair displayed the same correlations as in the earlier model – a positive link with Invigoration and inverse links with Annoyance and Dejection – although the magnitude of those correlations increased considerably. CV was

found to correlate significantly with all three types of impact, inversely in the case of Invigoration and positively in the case of the other two.

Discussion

The results obtained in this study show that cyberbullying is a problem, albeit not an excessively serious one, among university students. Over half the subjects in the sample reported to have experienced some type of cybervictimization in the 2 months prior to the survey. For two reasons, this prevalence rate is difficult to compare to those found in other studies: (a) major conceptual and methodological differences can cause substantial variation in prevalence rates; and (b) very few studies investigating this phenomenon have used samples drawn from university populations. In fact, of the 131 studies in the meta-analysis conducted by Kowalski et al. (2014), only eight had samples made up of university students.

The most common forms of cyberbullying found in this study are defamation, insults and exclusion from social networks and/or chat or messaging groups. Defamation and insults were also found to be the most frequent types of conduct in earlier studies on cyberbullying (Katzer and Fetchenhauer, 2007; Staude-Müller et al., 2009). Moreover, these three types of behavior – insults, defamation and social exclusion – also constitute the most frequent forms of conduct found in studies into traditional bullying (e.g., Nansel et al., 2001; Díaz-Aguado et al., 2010; Lemstra et al., 2011). This supports the idea that cyberbullying, or part of cyberbullying, should be understood as a variation or an indirect form of traditional bullying (Ortega and Mora-Merchán, 2008; Olweus, 2013; Ortega-Ruiz et al., 2014). Several studies have shown how cyberbullying, and more specifically cybervictimization, occur as the result of, and can be predicted by, traditional victimization, although this relationship is not seen in the other direction (Del Rey et al., 2012; Hemphill et al., 2012; Kowalski et al., 2012; Olweus, 2012).

The principal objective of this study was to analyze the role of PEI with regard to the emotional impact of cybervictimization. The first interesting discovery was that CV and PEI have no clear, significant link with emotional impact when the two variables are analyzed separately. Models created to explore these links resulted in a poor model fit in the case of CV and in low proportions of explained variance in the case of PEI. However, including both variables together improved the model fit, and led to a considerably higher proportion of variance explained for each emotional impact factor. These results appear to confirm our starting hypothesis, that PEI acts as a moderator variable between cybervictimization and emotional impact, attenuating or increasing the different dimensions of emotional impact – Invigoration, Annoyance, and Dejection – depending on the factor being considered.

Contrary to what might have been expected, CV was found to have no direct relationship with emotional impact. This was indicated both by the absence of any significant correlations and by the poor fit of model 1. These results seem to contradict studies that have identified links between frequency of harassment and emotional impact of traditional bullying (Dyer and Teggart, 2007; Aluede et al., 2008). The explanation may lie in their use of repetition as a defining criterion of cyberbullying. Due to the nature of ICT, one single episode of cyberbullying can live on in time and/or may be witnessed by a very large audience (Vandebosch and Van Cleemput, 2008; Menesini et al., 2012). Therefore, in the case of CV, the emotional impact may not depend on frequency. However, when PEI is included in the analysis, the results become very different and reveal that CV and emotional impacts are linked. This suggests the existence not of a direct link but of an indirect one, which is moderated by PEI. As Dredge et al. (2014) pointed out when discussing the varying impact of cyberbullying on victims, it is necessary to identify which variables affect and/or moderate the correlation. Without these variables it is impossible to gain a full understanding of the relationship.

The same applies to the link between PEI and emotional impact. Although in this study we found a model with good fit indices, the low proportion of variance explained shows that, when analyzed separately, PEI cannot sufficiently explain the emotional response to cyberbullying (at best it explained 21% of the variance of the Dejection response). However, PEI becomes much more important when it is included in the model alongside CV, explaining up to 85% of the variance of the Dejection response, and also reaching high levels for the two other categories of emotional impact. This highlights the importance of meeting the challenge to understand the true weight of the emotional variables. That is to say, it is only when the needs or the specific problem at hand – in this case CV – are taken into account that emotional skills take on importance as an aid in understanding the impact. When considered in an abstract manner they do not produce the same results. This appears to concur with findings in certain coping strategy analyses, which suggest it is not possible to evaluate the effectiveness of coping responses abstractly, because they are only effective when linked to a specific result (Somerfield and McCrae, 2000).

With regard to the relationship between the specific dimensions of PEI and emotional impact, the results in part support our hypotheses and in part contradict what we expected. The results of the second model confirm the proposed hypothesis that there exists an inverse relationship between Repair and negative emotional impact – Annoyance and Dejection – and a positive relationship between Attention and these two responses. These findings also corroborate the results obtained in earlier studies, in which comparative profiles between PEI and different emotional adjustment indicators follow the same pattern (Extremera and Fernández-Berrocal, 2005; Fernández-Berrocal and Extremera, 2008; Elipe et al., 2011; Ortega et al., 2011; Lomas et al., 2012; Peláez-Fernández et al., 2014).

When PEI is considered together with CV, however, the results are more difficult to interpret, especially those pertaining to the Attention and Clarity dimensions. Contrary to our expectations, the Attention variable had the same profile as the Repair variable – a positive link with Invigoration and an inverse link with Annoyance and Dejection – while Clarity showed just the opposite – an inverse link with Invigoration and a positive link with Annoyance and Dejection. It therefore appears that in cybervictimization high levels of Attention together with high levels of

Repair tend to reduce both anger and depression-related manifestations of negative emotional impact, while at the same time facilitating a more dynamic response, which would presumably trigger more effective coping strategies. In contrast, Clarity seems to work the other way round, which leads us to think that a high level of Clarity when unaccompanied by an ability to change emotions cannot abate the negative emotional impact of CV and merely makes individuals more aware of the discomfort they are experiencing. In other words, knowing how you feel but do not knowing how to handle these feelings is not helpful in adapting to the situation. It is possible that our results are influenced by variables not considered in this study. As Peláez-Fernández et al. (2014) found in their study, PEI dimensions interact with personality variables in such a manner that, generally speaking, a high level of Attention tends to maximize the emotional experience and prolong negative moods, especially when accompanied by low levels of Clarity and Repair but this may vary with personality type. The above mentioned study also showed that understanding one's own emotional state may contribute to an increase in anger, especially in provocation scenarios.

Once PEI was included in the model, the relationship between CV and emotional impact was as expected: CV had a positive link with the two negative emotional dimensions – Annoyance and Dejection – and an inverse link with Invigoration. This result supports the findings of earlier studies into cyberbullying, in which the most prevalent emotions among victims were, firstly, those associated with anger, such as anger and upset, followed by range of other negative emotions, such as helplessness, fear and worry (Katzer and Fetchenhauer, 2007; Ortega et al., 2009). The inverse relationship with Invigoration may indicate that it is those students who have not experienced cyberbullying or have experienced it very infrequently, who detect and report these types of emotions. If true, it could indicate the existence of differences between perceptions prior to experiencing the problem and perceptions once the problem is being experienced. Exploration of this possibility is beyond the scope of this study, but constitutes a possible avenue for future research.

Summarizing the obtained results, it can be concluded that PEI is clearly a variable which affects emotional impact, although its importance mainly emerges when considered in the context of a specific cause of that emotional impact, such a CV. Our findings suggest that strengthening emotional skills, especially emotional repair, could be an interesting addition to the traditionally used variables (e.g., improving social skills or giving information about ICT) in programs to prevent cyberbullying or to minimize its negative consequences.

Strengths, Limitations, and Future Research

This study has a number of strengths and limitations worth mentioning. The first strength to highlight is its analysis of emotional impact. Numerous earlier studies have focused on the "most devastating" consequences of cybervictimization, such as depression and personality disorders, but few have proposed any way of measuring its specific, "immediate" emotional impact. Moreover, as far as we know, no other study on this theme has ever included a "non-negative" dimension of emotional impact such as Invigoration. Although it may seem logical to assume

that all the emotional consequences of cybervictimization are emphatically negative, the fact that some students, albeit very few, reported non-negative responses may suggest that this assumption is a distortion of reality. Another strong point of the study is its sample of university students. As mentioned earlier, very few studies to date have analyzed cyberbullying in this layer of the population. Our results reveal the need for further research within the university population, given the confirmed presence of cyberbullying therein.

The study's limitations mainly have to do with its sample and design. Although, as mentioned above, the sample is one of the strengths of this research project, it would nevertheless be interesting to extend it to subjects from lower education levels – secondary and high school pupils – to make evolutionary comparisons. In addition, a bigger sample would have allowed us to study the effect of gender and age on the relationship between our variables with enough statistical and methodological rigor. Furthermore, the study's transversal design limited interpretation with regard to the directionality of the found relationships. A more dynamic approach, using longitudinal data, would make it possible to monitor the way cybervictimization evolves in subjects with specific emotional profiles, and this would contribute much toward our understanding of the phenomenon. It would reveal, for example, whether impact profiles remain the same or alter in the same person depending on the length of time they are ensnared in cyberbullying.

While providing answers to some questions, this study has also opened up avenues to future research. One of the first issues to emerge in the analysis was whether impact profiles were linked to specific courses of action or coping strategies. Key for understanding this aspect is to clarify the sequence of phases from initial subjection to cyberbullying, its emotional impact, to the conduct displayed by the victim, and to determine how the situation changes depending on the impact and the victim's reaction. It is important to unravel the dynamic entanglement of actions and responses which shape the process of cybervictimization. Besides, it should be pointed out that although this study has focused exclusively on cybervictims, sufficient empirical evidence exists to show that emotional and behavioral problems are also experienced by perpetrators (Leiner et al., 2014). In view of the practical implications, specific analysis of the role played by PEI with regard to students' different forms of involvement – as cybervictims, cyberbully-victims or cyberbullies – may also improve our understanding of the phenomenon and suggest courses of action to help the different parties.

Finally, it would be useful to replicate the study using instruments capable of evaluating the phenomena from other perspectives. In the case of EI, it would be interesting to compare the results found here with those obtained using an ability-based EI test such as the MSCEIT (Brackett and Salovey, 2006).

Acknowledgments

Innovation, Economy and Employment Office (Consejería de Economía, Innovación, Ciencia y Empleo) of the Andalusian Government, and "Violencia escolar y juvenil: riesgos del cortejo violento, la agresión sexual y el cyberbullying" (Ps-2010-17246)

and "Sexting, ciberbullying y riesgos emergentes en la red: claves para su comprensión y respuesta educativa" (EDU2013-44627-P), funded by the National Research Plan I +D. The authors are grateful for the support received.

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Long term impact of emotional, social and cognitive intelligence competencies and GMAT on career and life satisfaction and career success

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Career scholars have called for a broader definition of career success by inviting greater exploration of its antecedents. While success in various jobs has been predicted by intelligence and in other studies by competencies, especially in management, long term impact of having intelligence and using competencies has not been examined. Even in collegiate outcome studies, few have examined the longer term impact on graduates' careers or lives. This study assesses the impact of demonstrated emotional, social, and cognitive intelligence competencies assessed at graduation and g measured through GMAT at entry from an MBA program on career and life satisfaction, and career success assessed 5 to 19 years after graduation. Using behavioral measures of competencies (i.e., as assessed by others), we found that emotional intelligence competencies predict career satisfaction and success. Adaptability had a positive impact, but influence had the opposite effect on these career measures and life satisfaction. Life satisfaction was negatively affected by achievement orientation and positively affected by teamwork. Current salary, length of marriage, and being younger at time of graduation positively affect all three measures of life and career satisfaction and career success. GMAT (as a measure of g) predicted life satisfaction and career success to a slight but significant degree in the final model analyzed. Meanwhile, being female and number of children positively affected life satisfaction but cognitive intelligence competencies negatively affected it, and in particular demonstrated systems thinking was negative.

Keywords: Intelligence, life satisfaction, career satisfaction, Emotional Intelligence, competencies

INTRODUCTION

Perhaps more than ever before, the career environment appears to be in constant flux. Even with the key work that emphasized a career model wherein individuals become more self-directed or "protean" (Hall, 2002), few could anticipate the impact technology (e.g., Internet, Google, LinkedIn, etc.) and market instability (e.g., the great recession) would have on individuals' careers. Technological advances have made career boundaries more permeable than ever before. Vast amounts of information are now available to us and global collaborations between individuals are daily, routine occurrences. Changes are so rapid and evolving, that it is doubtful we fully understand the impact they are having on how we characterize the concept of a career.

Amidst this flux, there has been an ongoing call for greater clarity as to the drivers of career success (Gunz and Heslin, 2005; Heslin, 2005). Career success has long been defined by objective outcomes (e.g., pay, promotion, etc.). Yet, these have not always been shown to be what equates with career or life satisfaction (Heslin, 2005). This has led researchers to explore subjective outcomes to define career success (e.g., career satisfaction, life satisfaction, etc.) (Hall, 2002; Greenhaus, 2003; Heslin, 2005).

Over the years, the findings that *g* (i.e., general mental ability) is a predictor of performance in jobs and success has steadily gained ground, but the relatively low predicted variance and mixed results of unique variance have raised questions (Nisbett et al., 2012).

At the same time, other career scholars argue that careers are becoming increasingly more interdependent as the need for support from others (i.e., career support and psychosocial support) increases (Higgins et al., 2010). Higgins et al. (2010) showed that, as people receive increasing amounts of support over time, they are more positive about their careers later in life. This key support from others to help navigate through increasing career complexity comes to those who have the interpersonal skills to develop relationships whereby others will want to offer such support. Thus, what inherently emerges from the complexity found in today's career environment, is the importance of individuals' ability to learn via relationships with others, for it is in collaboration with others where we begin to make sense of current circumstances and innovate to succeed in the future. Whether these relationships are dyadic, in teams, or assembled in organizations, we propose that career success will depend more than ever on having the

emotional and social skills essential to developing strong, trusting, and resonant relationships with others (Boyatzis and McKee, 2005).

In addition, while effectiveness in various jobs has been predicted by demonstrated emotional and social competencies, especially in management (Boyatzis, 1982, 2009; Spencer and Spencer, 1993; Goleman, 1998; O'Boyle et al., 2011; Joseph et al., 2014; Miao et al., 2014), long term impact of using competencies has not been examined. Competency and job performance theory both predict that people will be more effective in managerial and professional jobs when they use competencies relevant to performance frequently (Boyatzis, 1982). Holistic theories of adult development would, therefore, predict that the use of these same competencies would predict life satisfaction (Schein, 1978).

In programs seeking to develop people for promising careers—whether undergraduate or MBA programs—one of the objectives has always been to prepare people to perform well in their professional roles by helping them develop or enhance management and leadership competencies during their programs. In fact, MBA programs have been shown to increase these competencies (e.g., Boyatzis et al., 2002; Boyatzis and Saatcioglu, 2008). On the other hand, surprisingly, no outcome studies have examined the longer-term impact of key emotional and social competencies on graduates' careers or lives.

Our work is unique in contrast to prior work in that it (1) focuses on outcome assessment of MBA management education, (2) presents a long term, lagged impact study, and (3) explores the impact key emotional and social competencies have on three areas of wellbeing related to careers (i.e., life and career satisfaction and career success) and its relationship to *g*. We draw upon theoretical and empirical work on emotional and social competence, intelligence, career and life satisfaction, and career success to inductively explore the relationship between these constructs. To date, there is no single theory that accounts for the relationship among the constructs in question.

Our study contributes to the literature on careers, competency development, and management education outcome assessment in several ways. First, although growing as a viable stream of research, emotional and social intelligence competence is still relatively new and certainly new to investigation in management education programs (e.g., Jordan et al., 2002; Cote and Miners, 2006; Petrides et al., 2007; Lindebaum, 2009; Cherniss, 2010; Walter et al., 2011). Further, the relationship of these competencies to career constructs is a neglected and highly promising area for research.

This study could help link competency theory with career and adult development theory. Our study examines the impact of emotional, social, and cognitive intelligence competence on important constructs of wellbeing. Specifically, we investigate the impact of demonstrated emotional, social, and cognitive intelligence competencies 5 to 19 years after graduation from an MBA program on career and life satisfaction and career success. We hypothesize that the more emotional, social, and cognitive intelligence competence a person demonstrates, as seen by others at graduation, the greater will be the person's life and career satisfaction and career success years after graduation.

Second, unlike many studies that have relied on self-assessment of emotional intelligence (Carmeli et al., 2009), our study assesses students' behavioral demonstration of competence as rated by other informants. In doing so, we overcome many of the challenges related to student self-assessment (Taylor, 2014). Namely, it has been consistently shown that people are frequently both biased and unreliable when they assess their own abilities (Dunning et al., 2004).

Third, although more of an empirical than theoretical contribution, among the MBA outcome studies that have been conducted, none, to our knowledge, have taken a long term approach or endeavored to look at both career and life satisfaction together.

THEORY AND HYPOTHESES
EMOTIONAL, SOCIAL AND COGNITIVE INTELLIGENCE COMPETENCIES
Emotional intelligence emerged from research done on emotion and social intelligence (Matthews et al., 2002) and was made popular in the 1990s by several scholars (e.g., Salovey and Mayer, 1990; Goleman, 1995). Emotional intelligence encompasses abilities like emotional self-regulation that are not assessed by IQ tests. Emotional intelligence mingles neocortical and subcortical skills, combining affective and cognitive abilities (Goleman, 2006). Competency and job performance theories claim that to be an effective leader, manager or professional, a person needs to apply knowledge in order to influence people toward desired outcomes (Boyatzis, 1982). These capabilities can be called competencies, which Boyatzis (1982) defined as "the underlying characteristics of a person that lead to or cause effective and outstanding performance" (pp. 20–21). Emotional intelligence competencies are the behavioral level of emotional intelligence (Boyatzis, 2009; Cherniss and Boyatzis, 2013).

Although some scholars claim these are not intelligences but competencies (Ashkanasy and Daus, 2005), others as cited above claim that they are a capability emanating from neural activity that appear at a different level than an internal processing ability. Emotional intelligence and emotional competence are intimately related; one emerges from the other (Goleman, 2006; (Cherniss, 2010). Specifically, emotional intelligence competencies are based on a platform of emotional intelligence wherein emotional intelligence competencies mark a fundamental difference from competencies like technical skills, which rely solely on cognitive, IQ-type abilities based in the Task Positive Network (TPN) predominantly in the neocortex.

In their comprehensive meta-analysis, O'Boyle et al. (2011) showed that although all measures of EI had predictive ability regarding job performance, what they called stream 3 measures had the strongest relationship to performance, not MSCETI which is stream 1 or self-perception measures based on the MSCEIT model which is stream 2. This is consistent with the meta-analysis from Joseph et al. (2014). But stream 3 results may mask even stronger relationships because the variety of measures include self-perception measures, like the EQ-i and behavioral measures, like 360 views from informants or coded video and audio tapes of work samples or simulations. In this study, we chose to focus on the behavioral level of EI and SI, and even include a behavioral level variable for cognitive intelligence. The emotional intelligence (EI), social intelligence (SI) and cognitive

intelligence (CI) competencies are the behavioral level of the larger constructs called EI, SI and g.

Emotional intelligence competencies have empirically been shown to cause or predict outstanding leader, manager, or professional performance (Boyatzis, 1982, 2009; Kotter, 1982; Thornton and Byham, 1982; Luthans et al., 1988; Druskat et al., 2005)[1]. Conceptual syntheses have also shown a relationship between emotional intelligence competencies and effectiveness (Campbell et al., 1970; Spencer and Spencer, 1993; Goleman, 1998). Cognitive intelligence competencies have also been shown to be effective in these studies.

Synthesizing this prior work, these competencies appear in three clusters: (1) Cognitive intelligence (CI) competencies, such as systems thinking or pattern recognition; (2) Emotional intelligence (EI) competencies, such as adaptability, emotional self-control, self-confidence, initiative, emotional self-awareness, positive outlook, and achievement orientation; and (3) Social intelligence (SI) competencies, such as empathy, organizational awareness, inspirational leadership, influence, coaching and mentoring, conflict management (i.e., negotiation), and teamwork. Several other cognitive capabilities appear to be "threshold competencies" from the research cited (Boyatzis, 1982), meaning they are needed to be adequate, but more use of them does not lead to effectiveness. Given research to date, such threshold competencies would include: knowledge (technical and functional); deductive reasoning, and quantitative reasoning (Boyatzis, 1982).

Two measures of g will be assessed in this study. One behavioral level measure is composed of the two cognitive intelligence competencies, Systems Thinking and Pattern Recognition. The other is a more traditional measure of g, the GMAT (Detterman and Daniel, 1989).

OUTCOME ASSESSMENT: PREDICTING LIFE AND CAREER SATISFACTION AND CAREER SUCCESS

Although outcome studies have shown that an MBA program can add value to a person's competencies, the longer term impact of outcomes from their development in such programs (i.e., how students act at the time of graduation) has not been shown (Pascarella and Terenzini, 1991; Mentkowski and Associates, 2000). Many argue that the most relevant outcome from management programs is the amount of money people earn. But salary and bonuses are only one possible measure of success in life and careers and often a short term indicator (Luthans et al., 1988). As outcome measures, salary and bonuses are also contaminated by other factors. For example, wages and bonuses vary tremendously according to the type of industry and country. In addition, those graduates going into careers in non-profit organizations or public sector organizations will generally not be making as much as those in large, for-profit companies.

A more inclusive set of desired outcomes than salary is life and career satisfaction. Life satisfaction refers to a cognitive assessment of one's entire life (Diener et al., 1985). Career satisfaction refers to the satisfaction one receives from internal and external aspects of one's career, including income, advancement and developmental opportunities (Greenhaus et al., 1990). Although subject to progress on one's aspirations and expectations, a sense of how well one is doing in life and work appears a more holistic measure of one's progress than simply assessing one's salary.

Components of career and adult development theories claim that early successes stimulate self-confidence, efficacy and a self-image that enhances goal seeking behavior (Alexander et al., 1990). Using competencies in jobs early in one's career would lead to positive reinforcement (i.e., early "wins"). It is likely that this would alter a person's expectations and strivings. In turn, this would lead to greater striving and, if successful, greater satisfaction.

Competency theory would predict that early career use of EI and SI competencies would result in a person being seen as "good with people." This may lead to more leadership opportunities and positive feedback (Boyatzis, 2009). In contrast, early career use of CI competencies may result in being seen as a problem solver, analyst or strategic thinker, which in turn could lead to opportunities in staff jobs but not necessarily ones associated with moving up the managerial hierarchy (McClelland, 1985).

EI and SI might lead to greater sense of satisfaction with one's career and progress in terms of personal expectations and social comparison theory (Miao et al., 2014). CI might lead to early career success, but interfere with further advancement because people high on CI might focus more on the analytics of the work than on the people, in a similar way that McClelland and Boyatzis (1982) found that Need for Achievement helped people get promoted to middle level management but was negatively related to further promotion over a 20 follow-up. Satisfaction in one's life, assuming that is a larger sense than career satisfaction, might rely more on EI and SI than CI. In part, the differences may be a result of repeated socialization and rewards for using one's CI and neural TPN which also suppresses the Default Mode Network (DMN) and ability to work well with others (Jack et al., 2012).

Recent research has shown a positive relationship between emotional and social intelligence and psychological wellbeing at work (Carmeli et al., 2009). In their study, Carmeli et al. (2009) found that employees with higher EI reported greater self-esteem, life satisfaction, and self-acceptance. There is also evidence to suggest that having greater emotional management abilities is related to feeling more satisfied with one's career (Lounsbury et al., 2003). Cote et al. (2011) investigated whether a prosocial orientation has an effect on career satisfaction, when mediated and moderated by empathetic accuracy and power. Their findings illustrate that when people have greater prosocial orientations and higher power positions their empathetic accuracy is associated with greater career satisfaction. This result implies that people who are able to accurately infer emotions may be more likely to evaluate their career experiences in a favorable light. Unfortunately, the findings do not show predictive power, only an association, leading the scholars to call for more research to investigate the causal link between ability to understand others and career satisfaction. On

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[1]See also the special issue of the *Journal of Management Development* in February, 2008 on "Competencies in the 21st Century;"; special issue of the *Journal of Management Development* in April, 2009 on "Competencies in the EU"; special issue of the *Journal of Cross-Cultural Management*, 2012, called "Emotional and Social Intelligence Competencies: Cross Cultural Implications).

the other hand, these recent findings lead us to believe there will be a positive relationship between emotional, social, and cognitive competencies and career and life satisfaction and career success.

This study is, in part, a response to the call for further exploration between EI and wellbeing related outcomes. From the literature just reviewed, it appears that emotional and social intelligence are linked to important life and career outcomes in the workplace. However, what is unknown is whether showing high emotional and social competence upon graduation from an MBA program will later predict greater career and life satisfaction.

Another important measure for graduates of professional programs, like MBAs, is career success. Career success refers to a subjective reaction to one's career experiences (Heslin, 2005). Few enter an MBA with the primary concern to grow, mature, or morally and esthetically develop. Most enter such professional programs because they wish to enter a new career or enhance their success in an existing career. Rode et al. (2008) hypothesized that emotional intelligence for recent graduates should be linked to early career success upon entry into the workplace. They explain that people with greater emotional intelligence show a greater ability to adapt to new environments and build strong bonds with others (Lopes et al., 2003), which should help them acquire necessary support in transitioning to the workplace. This study is encouraging since it looks at how emotional intelligence levels in students predict early career success within 2 years of graduation and entry into the workplace. Unfortunately these findings are not significant. Their results show that in early careers only personality predicted career success, whereas behavioral skills and abilities did not. The authors conclude that it is likely that those with less personality but greater abilities may experience success only later in their careers, once knowledge and skills are

developed (Dreher and Bretz, 1991). We extend research in this area by examining how emotional, social, and cognitive competence developed through an MBA program can predict career success throughout people's careers.

In sum, given the above review of the discussed relationship emotional and social competence have shown to important outcomes, this study was designed to examine the relationship of emotional, social, and cognitive intelligence competence with three dependent career variables, namely life and career satisfaction and career success. Therefore, the model being tested in this study is shown in **Figure 1**. The specific hypotheses we explore are:

H1. The greater a person's demonstration of emotional intelligence competencies, as seen by others at graduation, the greater the person's life and career satisfaction and career success.

H2. The greater a person's demonstration of social intelligence competencies, as seen by others at graduation, the greater the person's life and career satisfaction and career success.

H3. The greater a person's demonstration of cognitive intelligence competencies, as seen by others at graduation, the greater the person's life and career satisfaction and career success.

METHODS

SAMPLE AND PROCEDURE

This study utilizes longitudinal data on the graduates of the MBA program at the Weatherhead School of Management (WSOM), Case Western Reserve University. It focuses on how students'

FIGURE 1 | The model being tested.
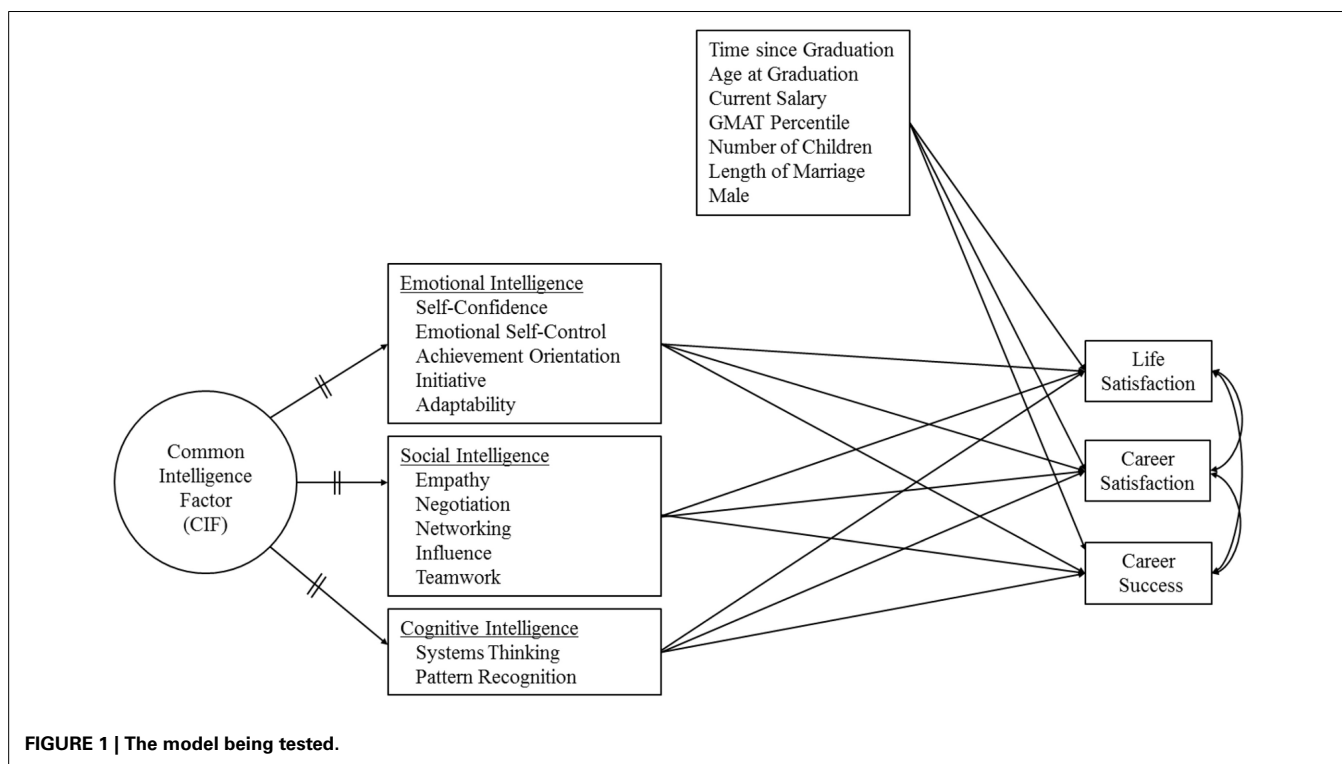
competencies, at the time of graduation, predict their perceived career satisfaction, career success and life satisfaction later on in their work lives. Starting in the early 1990's, data have been collected from all MBA students in the Leadership Assessment and Development (LEAD) course. For a detailed description of the course, see Boyatzis (1994) and Goleman et al. (2002). For past studies examining the impact of the MBA program on the development of emotional, social and cognitive intelligence competencies, see Boyatzis et al. (2002), Boyatzis et al. (1995), Boyatzis et al. (1995) and Boyatzis and Saatcioglu (2008).

We compiled data on the emotional, social and cognitive intelligence competencies from full-time MBA students who graduated between 1992 and 2006. The total number of full-time MBA students graduating between 1992 and 2006 was 1382 (plus the graduates of 1996 and 2003 for whom outcome data was not collected). However, we only had permission to keep data from some of the graduates. Additionally, some of the data was lost over the 15 year span, which resulted in a sample of complete data for 1108 of the graduates.

A number of factors contributed to the smaller number of students' data being available for study. First, letters of informed consent were asked of each student upon completion of the LEAD course. Between 1992 and 2006, the typical permission rate was 85–90%, but in several years of social disarray in the school's administration the permission rate dropped to about 50%, (for further explanation see Boyatzis and Saatcioglu, 2008). When a student did not grant permission, the reasons appeared to be concerns over their privacy, especially for those coming from countries in which such data might be used to harm them, or suspicion about the nature of such outcome research. Second, for early years of 1992 through 1995, randomized sub-samples were used for cost and administrative purposes. For example, the critical incident interview is highly labor intensive for both the researchers and students, so these sub-samples were often 33 to 50% of the graduating group. Third, although attendance at the exit assessment prior to graduation became required in 1998, not all students attending the class completed all of the assessments.

With the sample of 1108, we next matched the graduating data with current addresses from our alumni services department. This narrowed our sample to 975, but we only had graduating data on 625 (46%). Finally, From February 2010 to January 2011, we sent out five email and three direct mail requests for alumni to participate in the present study. The study consisted of one online survey that asked participants to rate their life satisfaction, career satisfaction and career success. Of the letter and email invitations sent, 148 were returned as non-deliverable, which further reduced the potential pool for this study to 477. Graduates had moved, changed companies, countries, or otherwise eluded the donation seeking alumni relations office. In exchange for participating in the study we entered participants in a raffle. We retained a final sample for analysis of 266 of eligible graduates from these cohort years (266/477 = 56%).

Alumni who graduated between the years 1992–1996 made up 21% of the sample. Data from graduates of 1997–1999 and 2002 were accidentally destroyed in two computer crashes and a clerical error of discarding two boxes of data. As such, data from those years do not appear in this paper. Alumni who graduated in

2000, 2001, and 2003 made up 40% of the sample. Finally, alumni who graduated between the years 2004–2006 made up 39% of the sample.

Of this usable sample, 71% were male and the average age was 39. Alumni worked in a number of different industries, such as financial services (20%), manufacturing (14%), consulting services (12%), healthcare (11%), and information technology (9%). The remaining 34% percent were in industries including agriculture, architecture/engineering, construction, education, government, hospitality/tourism, insurance, legal, manufacturing, media services, mining, not-for-profit, publishing, professional science, property management, real estate, transportation, waste management, and retail.

Due to the possible mortality of the sample, we decided to run t-tests between the study sample ($n = 266$) and the original entire sample on whom graduating data was available ($n = 975$) with the original sample. We found no statistically significant differences between the two groups on graduating competencies and the demographic and control variables. Therefore, we conclude that the study sample is a reasonably representative sample.

DEPENDENT VARIABLES

Life satisfaction was measured with a five item scale (Diener et al., 1985). Sample items included "In most ways my life is close to my ideal" and "If I could live my life over, I would change almost nothing." Participants rated the extent to which they agreed or disagreed with the statement, using a 7-point Likert scale (1 = strongly disagree to 7 = strongly agree). The scale showed good reliability with α = 0.93.

Career satisfaction was measured with Greenhaus et al.'s (1990) five item scale. Sample items were: "I am satisfied with the progress I have made toward meeting my overall career goals" and "I am satisfied with the progress I have made toward meeting my goals for income." Participants were asked to rate the extent to which they agreed or disagreed with the statement, using a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). This scale yielded α = 0.94, in this study.

Career success was measured with Heslin's (2003) two item scale. The first item asked participants the following, "Everything considered, how successful do you consider your career to date?" Participants used a Likert scale (1= not too successful to 7= very successful). The second item asked participants to rate the level of their success compared to their peers, using Likert responses (1= below average to 7= above average). This scale had good reliability with α = 0.88 in this study.

INDEPENDENT VARIABLES

The emotional, social, and cognitive intelligence competency assessment items were measured using two different instruments. These instruments included: (1) the Critical Incident Interview (CII), which was a 1-h, audiotaped interview (Flanagan, 1954; Boyatzis, 1982; Spencer and Spencer, 1993) on which the competencies were coded; (2) a 360-degree informant based assessment (i.e., the EAQ and later the ECI-U) (Boyatzis et al., 2002; Boyatzis and Saatcioglu, 2008).

In the CII, coders, who were PhD students, coded 16 competencies in the audiotapes according to the number of

times the student displayed each competency. The competencies included: Efficiency Orientation, Planning, Initiative, Attention-to-Detail, Self- Control, Flexibility, Self-Confidence, Empathy, Social Objectivity, Persuasiveness, Networking, Negotiating, Group Management, Developing Others, Systems-Thinking and Pattern Recognition. All of the competencies were coded independently by two or three people and the coders averaged an 89% inter-rater reliability on 16 of the competencies. Because of the cost of doing and coding these interviews, random sub-samples of full time students graduating in the years 1992–1995 were assessed at the time using the CII.

The External Assessment Questionnaire (EAQ) is a 73-item 360-degree format questionnaire in which informants rate the participants on a 1–4 scale on the frequency of which the person being assessed demonstrates each behavior. Informants include a boss, work colleagues, subordinates, professionals, family, fellow students, or friends. There were 21 competencies included in this inventory including: Efficiency Orientation, Planning, Initiative, Attention-to-Detail, Self-Control, Flexibility, Self-Confidence, Empathy, Social Objectivity, Persuasiveness, Networking, Negotiating, Group Management, Developing Others, Systems-Thinking, Pattern Recognition, Oral Communication, Use-of-Concepts, Quantitative Analysis, Use-of-Technology, and Written Communication. The last five items were dropped in 2002, because they did not predict effectiveness in management, leadership or professional jobs (Boyatzis and Saatcioglu, 2008). Students graduating in the years 2000–2004 were rated with the EAQ.

The Emotional Competence Inventory - University (ECI-U) is an expanded version of the EAQ and directly assesses emotional and social intelligence (Wolff, 2007). The ECI-U has the same 360-degree format as the EAQ and asks informants to rate many of the same competencies.

Since three different measures were involved in the outcome assessment studies at different years, we selected only those competencies that had 67% or more of the items the same across measures. That resulted in 12 competencies being analyzed in this study. *Emotional Intelligence* was measured with the five following competencies: Self-Confidence, Emotional Self-Control, Achievement Orientation, Initiative and Adaptability. ($\alpha = 0.75$). *Social Intelligence* was measured with the five following competencies: Empathy, Negotiating, Networking, Influence and Teamwork ($\alpha = 0.82$). *Cognitive Intelligence* included the final two competencies of Systems Thinking and Pattern Recognition ($\alpha = 0.76$).

Since the competencies were measured using three different instruments with different measurement scales (CII, EAQ, ECI-U), we transformed the data by breaking the scores into deciles. We ran frequencies on each of the competencies, and identified the cut-off points for 10 deciles along the percentile distribution. Since each alumnus was only rated with one inventory, we treated the decile scores to represent ability for each competency. For instance, an alumnus who scored in the 70th percentile of displaying influence on the ECI-U, received a score of 7 for the influence competency. As a last step, we created the emotional intelligence, social intelligence and cognitive intelligence clusters, by taking the averages of the decile competencies for each of

the respective clusters. For the emotional intelligence cluster we took the average decile scores of self-confidence, emotional self-control, achievement orientation, initiative and adaptability. For the social intelligence cluster we took the average decile scores of empathy, negotiating, networking, influence and teamwork. Finally for the cognitive intelligence cluster we took the average decile scores of systems thinking and pattern recognition.

CONTROLS

Several variables were specified as controls that prior research has shown to have some impact on either career or life satisfaction, or career success. We included common demographic, work-related controls and general life status controls that may affect satisfaction and success. Specifically we included gender, age at the time of graduation, GMAT percentile, current salary, time since graduation, number of children, and length of marriage.

RESULTS

Descriptive statistics and two-way correlations for the constructs used in the analysis are shown in **Table 1**. All correlations among the key measures are in the expected direction. Life satisfaction is correlated only to adaptability (0.13, $p \leq 0.05$), while career satisfaction is related to achievement orientation (0.16, $p \leq 0.05$) as well as adaptability (0.17, $p \leq 0.01$). Career success, on the other hand, is correlated strongly to self-confidence (0.13, $p \leq 0.05$), achievement orientation (0.14, $p \leq 0.05$), adaptability (0.16, $p \leq 0.01$), and networking (0.13, $p \leq 0.05$). Subsequent analyses test these relationships in a multivariate context, accounting for the effects of several control measures.

Regarding the relationships of EI and SI to g, we find that EI, SI and CI show non- significant correlations with GMAT, which is an approximation of g. We can also see that GMAT shows non-significant first order correlations with each of the dependent variables: life satisfaction, career satisfaction and career success.

We conducted a series of structural equation modeling (SEM) analyses to test the central hypotheses. The general form of the basic structural model is shown in **Figure 1**. The SEM approach involves two important advantages. First it allows testing effects on several dependent variables simultaneously. As seen in **Figure 1**, three different dependent variables are predicted by seven covariates and three distinct competence measures, and are also allowed to correlate with one another. The procedure involves three consecutive SEMs. In Model 1, the controls are specified as the only predictors (the baseline model) and GMAT. Model 2 includes emotional, social, and cognitive intelligence competence measures in composite form (no subscales) along with the controls and GMAT. Model 3 is similar to Model 2 but includes the emotional, social, and cognitive intelligence competence subscales rather than the composite measures to examine the independent effects of the specific competencies that collectively constitute the composite competence measures.

The second advantage of the SEM approach is that it includes a latent factor, labeled "Common Intelligence Factor" (CIF) in **Figure 1**. CIF is specified in Model 2 and Model 3 in order to capture potential overlaps among emotional, social, and cognitive intelligence measures. To model these overlaps, CIF loadings on

Table 1 | Means, Standard Deviations and Correlations.

Variables	M	SD	1	2	3	4	5	6	7
1. Life satisfaction	5.30	1.28	(0.93)						
2. Career satisfaction	5.43	1.29	0.61**	(0.94)					
3. Career success	4.90	1.33	0.62**	0.73**	(0.88)				
4. Emotional Intelligence	5.40	1.96	0.06	0.15*	0.15*	(0.75)			
5. Social Intelligence	5.39	2.12	0.06	0.08	0.09	0.69**	(0.82)		
6. Cognitive Intelligence	5.35	2.53	−0.02	0.05	0.06	0.66**	0.51**	(0.76)	
7. Self Confidence	5.41	2.67	0.02	0.09	0.13*	0.71**	0.48**	0.43**	—
8. Emotional Self-Control	5.42	2.78	0.02	0.07	0.04	0.58**	0.48**	0.34**	0.22**
9. Achievement Orientation	5.41	2.82	−0.01	0.16*	0.14*	0.75**	0.47**	0.53**	0.45**
10. Initiative	5.41	2.83	0.07	0.07	0.08	0.72**	0.43**	0.52**	0.41**
11. Adaptability	5.34	2.75	0.13*	0.17**	0.16**	0.78**	0.59**	0.51**	0.45**
12. Empathy	5.37	2.84	0.02	0.10	0.05	0.49**	0.77**	0.43**	0.23**
13. Negotiation	5.41	2.70	0.06	0.04	0.02	0.53**	0.78**	0.43**	0.37**
14. Networking	5.38	2.83	0.08	0.08	0.13*	0.50**	0.75**	0.30**	0.38**
15. Influence	5.40	2.82	−0.02	−0.02	0.03	0.53**	0.72**	0.40**	0.48**
16. Teamwork	5.38	2.74	0.09	0.10	0.09	0.59**	0.79**	0.37**	0.37**
17. Systems Thinking	5.30	2.84	−0.05	0.01	0.01	0.57**	0.42**	0.90**	0.34**
18. Pattern Recognition	5.41	2.81	0.01	0.08	0.10	0.61**	0.49**	0.90**	0.44**
19. Time Since Graduation	9.73	4.12	0.07	0.10	0.01	−0.12	−0.09	−0.09	−0.12
20. Current Salary	112.25	83.79	0.16**	0.29**	0.38**	0.06	−0.04	0.04	0.10
21. GMAT Percentile	46.78	41.67	0.04	0.03	0.12	−0.02	−0.09	0.09	0.02
22. Number of Children	1.25	1.27	0.28**	0.16**	0.15*	0.12	0.07	0.01	0.04
23. Length of Marriage	7.79	7.10	0.22**	0.15*	0.12	0.06	0.02	0.00	0.02
24. Age at Graduation	29.55	4.06	−0.12	−0.14*	−0.13*	0.01	0.05	0.02	−0.09
25. Gender	0.71	0.45	−0.05	−0.02	0.12	0.00	0.02	0.02	0.00

Variables	8	9	10	11	12	13	14	15	16
8. Emotional Self-Control	—								
9. Achievement Orientation	0.25**	—							
10. Initiative	0.18**	0.49**	—						
11. Adaptability	0.21**	0.46**	0.45**	—					
12. Empathy	0.50**	0.34**	0.23**	0.44**	—				
13. Negotiation	0.31**	0.38**	0.36**	0.44**	0.53**	—			
14. Networking	0.33**	0.32**	0.29**	0.43**	0.41**	0.49**	—		
15. Influence	0.22**	0.36**	0.39**	0.44**	0.43**	0.46**	0.41**	—	
16. Teamwork	0.49**	0.39**	0.35**	0.50**	0.54**	0.50**	0.53**	0.44**	—
17. Systems Thinking	0.29**	0.50**	0.44**	0.45**	0.40**	0.35**	0.24**	0.33**	0.29**
18. Pattern Recognition	0.32**	0.46**	0.49**	0.46**	0.37**	0.42**	0.29**	0.40**	0.37**
19. Time Since Graduation	−0.12	−0.06	−0.06	−0.07	−0.04	−0.02	−0.10	−0.07	−0.12
20. Current Salary	0.00	0.08	0.04	−0.02	−0.03	−0.02	0.05	−0.10	−0.04
21. GMAT Percentile	−0.04	−0.01	0.00	−0.04	−0.08	−0.02	−0.09	−0.05	−0.12
22. Number of Children	0.10	0.11	0.08	0.09	0.07	0.14*	−0.00	−0.02	0.07
23. Length of Marriage	0.07	0.04	0.08	−0.01	0.02	0.09	−0.01	−0.01	−0.01
24. Age at Graduation	0.08	0.08	0.01	−0.06	0.08	0.12	0.02	−0.04	0.02
25. Gender	0.09	0.01	−0.04	−0.05	−0.12	−0.07	−0.02	−0.10	−0.07

Variables	17	18	19	20	21	22	23	24
17. Time Since Graduation	—							
18. Current Salary	0.61**	—						
19. Time Since Graduation	−0.07	−0.10	—					
20. Current Salary	0.04	0.03	0.28**	—				
21. GMAT Percentile	0.09	0.08	−0.05	0.10	—			

(Continued)

Table 1 | Continued

Variables	17	18	19	20	21	22	23	24
22. Number of Children	0.07	0.09	0.32**	0.24**	−0.04	–		
23. Length of Marriage	0.00	0.02	0.47**	0.22**	−0.05	0.70**	–	
24. Age at Graduation	−0.00	0.01	−0.02	−0.08	−0.07	0.16*	0.35**	–
25. Gender	−0.02	0.05	−0.03	0.18**	0.21**	0.18*	0.14*	0.03

N ranges from 255-266 for all variables except GMAT Percentile which has an N of 238. Higher numbers represent more Life Satisfaction, Career Satisfaction, Career Success, Emotional Intelligence, Social Intelligence, Cognitive Intelligence, Self-Confidence, Emotional Self-Control, Achievement Orientation, Initiative, Adaptability, Empathy, Negotiating, Networking, Influence, Teamwork, Systems Thinking, Pattern Recognition GMAT Percentile, Number of Children and Age at Graduation. Time since Graduation is 2011 minus the year of graduation and measured in years. Current Salary is rounded to the nearest thousand dollars, 100 = $100,000. Length of Marriage is measured in years. For Gender, 0 = female, 1 = male. Alpha coefficients are on the diagonal in parentheses. **p < 0.01, *p < 0.05. Numbers in italics in parentheses on the diagonal are the Cronbach's alpha for these constructed scales.

emotional, social, and cognitive intelligence measures were constrained to be *equal*, depicted by "=" signs on the respective loadings. Model 2 includes only three such equality constraints for CIF loadings, since only three composite competence measures are used. In Model 3, however, a total of 12 equality constraints are specified, one for each of the 12 specific competencies that collectively constitute the composite competence measures. The results of the SEM analyses are presented in **Table 2**.

The results for Model 1 indicate that people who have higher salaries ($\beta = 0.002$, $p \leq 0.05$), more children ($\beta = 0.247$, $p \leq 0.01$), longer marriages ($\beta = 0.034$, $p \leq 0.10$), are younger at the time of graduation ($\beta = -0.070$, $p \leq 0.01$), and are female ($\beta = -0.43$, $p \leq 0.05$), are more satisfied with their lives. These relationships remain relatively stable across Models 2 and 3, suggesting that the predictors do not interact with the controls in confounding ways. Being further away from graduation appears to have no effect on life satisfaction in Model 1. However, this relationship changes in Model 3, indicating that net of the 12 competencies, being further away from graduation, matters to some degree ($\beta = -0.037$, $p \leq 0.100$).

Regarding g, having stronger GMAT scores does not predict how satisfied people are with their lives in Model 1, but they do in Model 3 ($\beta = 0.003$, $p \leq 0.050$). This is indicative of a likely suppression effect. We address this dynamic further in our later discussion of Model 3.

Graduates with higher salaries ($\beta = 0.005$, $p \leq 0.010$), longer marriages ($\beta = 0.043$, $p \leq 0.050$) and who are younger at the time of graduation ($\beta = -0.066$, $p \leq 0.010$) are more satisfied with their careers. It should be noted that number of children does not significantly predict feeling greater career satisfaction, like it does with life satisfaction. As with life satisfaction, the effects of control measures on career satisfaction remain stable in Models 2 and 3, when the competence measures are introduced.

A similar pattern is observed for career success. Graduates who earned their degrees in more recent years ($\beta = -0.064$, $p \leq 0.010$), those who have higher salaries ($\beta = 0.005$, $p \leq 0.010$) and longer marriages ($\beta = 0.042$, $p \leq 0.05$), and those who were younger at the time of graduation ($\beta = -0.054$, $p \leq 0.010$) feel more successful in their careers. People who have been working for a shorter period of time since graduation also feel more successful, however, as time passes since graduation, sense of achieved success declines ($\beta = -0.064$, $p \leq 0.010$). The control variables again remain stable in Models 2 and 3.

However, like with life satisfaction, GMAT scores become predictive of career success ($\beta = 0.003$, $p \leq 0.100$) only when entered along with competencies in Model 3. This effect is discussed later with the predictor effects in Model 3. Given how stable the control effects are across the models we do not see a pattern of interaction or mediation effects that affect the model.

Model 2 introduces the composite predictors of emotional, social, and cognitive intelligence competence and is significant overall for model fit (chi square= 31.5, $p < 0.085$; CFI= 0.905; TLI= 0.961; RMSEA= 0.044). While having greater emotional competence does not significantly predict how satisfied people feel about their lives, it predicts satisfaction with career ($\beta = 0.161$, $p \leq 0.050$) and career success ($\beta = 0.115$, $p \leq 0.100$). People who have higher cognitive intelligence competence are less likely to be satisfied with their lives ($\beta = -0.085$, $p \leq 0.050$).

Model 3 introduces the 12 individual intelligence competencies as predictors of life satisfaction, career satisfaction and career success. While this models fits the data well (chi square= 298.3, $p < 0.001$; CFI= 0.894; TLI= 0.850; RMSEA= 0.068), a slight drop in fit indices is observed relative to Model 2. This drop plausibly stems from the limited degree of residual dependence among clusters of individual competencies that constitute emotional, social, and cognitive intelligence. When these clusters of competencies are entered as three composite intelligence scores in Model 2 (rather than as 12 distinct measures as in Model 3), residual dependence among them (no matter how small, both within and across clusters) remains a non-issue, resulting in a slightly better overall model fit. The 12 individual intelligence competencies are included in Model 3, in order to provide a broader sense of the drivers of the composite factors. The findings suggest that those with greater achievement drive tend to be less satisfied with their current situation in life ($\beta = -0.061$, $p \leq 0.100$), which is consistent with the expectation that high achievers often strive for greater accomplishments. Adaptability is highly predictive of later life satisfaction ($\beta = 0.079$, $p \leq 0.050$) and career satisfaction ($\beta = 0.089$, $p \leq 0.05$), as well as career success ($\beta = 0.097$, $p \leq 0.010$). It appears that when people are able to accommodate life and career demands, they are better able to appreciate their life and career circumstances.

When it comes to social intelligence competencies, people who use more influence (i.e., which can be viewed as "selling") are less satisfied with their lives ($\beta = -0.071$, $p \leq 0.050$) and careers ($\beta = -0.099$, $p \leq 0.010$) and view their level of success

Table 2 | Results of structural equation models predicting the effects of emotional intelligence, social intelligence, and cognitive intelligence life and career outcomes.

	Model 1			Model 2			Model 3		
	Life satisfaction	Career satisfaction	Career success	Life satisfaction	Career satisfaction	Career success	Life satisfaction	Career satisfaction	Career success
Controls									
Time Since Graduation	−0.035	−0.025	−0.064***	−0.036	−0.017	−0.058**	−0.037*	−0.020	−0.060***
	(0.023)	(0.024)	(0.023)	(0.023)	(0.024)	(0.023)	(0.022)	(0.023)	(0.022)
Current Salary	0.002**	0.005***	0.005***	0.002*	0.004***	0.005***	0.002*	0.004***	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
GMAT Percentile	0.002	0.001	0.002	0.003	0.001	0.003	0.003*	0.001	0.003*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Number of Children	0.247***	0.039	0.010	0.247***	0.016	−0.010	0.237***	−0.012	−0.018
	(0.089)	(0.093)	(0.089)	(0.088)	(0.092)	(0.088)	(0.087)	(0.091)	(0.087)
Length of Marriage	0.034*	0.043**	0.042**	0.033*	0.041**	0.041**	0.035**	0.048***	0.044**
	(0.018)	(0.019)	(0.018)	(0.018)	(0.019)	(0.018)	(0.018)	(0.019)	(0.018)
Age at Graduation	−0.070***	−0.066***	−0.054***	−0.072***	−0.062**	−0.053***	−0.066***	−0.067***	−0.051**
	(0.020)	(0.021)	(0.020)	(0.020)	(0.021)	(0.020)	(0.020)	(0.021)	(0.020)
Male	−0.423**	−0.280	0.062	−0.419**	−0.282	0.086	−0.445**	−0.293	0.096
	(0.182)	(0.190)	(0.182)	(0.182)	(0.188)	(0.181)	(0.178)	(0.187)	(0.180)
Emotional Intelligence				0.070	0.161**	0.115*			
				(0.062)	(0.064)	(0.062)			
Self Confidence							−0.001	−0.001	0.008
							(0.037)	(0.038)	(0.037)
Emotional Self-Control							−0.025	−0.009	−0.050
							(0.034)	(0.035)	(0.034)
Achievement Orientation							−0.061*	0.057	0.026
							(0.034)	(0.035)	(0.034)
Initiative							0.055	0.012	0.009
							(0.034)	(0.035)	(0.034)
Adaptability							0.079**	0.089**	0.097***
							(0.036)	(0.038)	(0.036)
Social Intelligence				0.019	−0.037	0.024			
				(0.050)	(0.052)	(0.050)			
Empathy							−0.021	0.026	0.030
							(0.036)	(0.037)	(0.036)
Negotiation							0.002	−0.017	−0.024
							(0.038)	(0.039)	(0.038)
Networking							0.033	0.012	0.039
							(0.034)	(0.035)	(0.034)
Influence							−0.071**	−0.099***	−0.062*
							(0.035)	(0.036)	(0.035)
Teamwork							0.069*	0.027	0.033
							(0.038)	(0.040)	(0.038)
Cognitive Intelligence				−0.085	−0.043	−0.059			
				(0.041)**	(0.042)	(0.041)			
Systems Thinking							−0.046	−0.051	−0.067*
							(0.036)	(0.037)	(0.036)
Pattern Recognition							−0.025	0.017	0.017
							(0.039)	(0.040)	(0.039)
Intercept	7.168***	7.000***	6.108***	7.165***	6.424***	5.588***	7.117**	6.704***	5.664***
	(0.664)	(0.694)	(0.667)	(0.712)	(0.738)	(0.711)	(0.699)	(0.731)	(0.704)

(Continued)

Table 2 | Continued

	Model 1			Model 2			Model 3		
	Life satisfaction	Career satisfaction	Career success	Life satisfaction	Career satisfaction	Career success	Life satisfaction	Career satisfaction	Career success
Correlations									
Life Satisfection		0.703***	0.778***		0.688***	0.757***		0.640***	0.703***
		(0.100)	(0.100)		(0.098)	(0.097)		(0.091)	(0.091)
Career Satisfaction			0.875***			0.838***			0.772***
			(0.106)			(0.103)			(0.096)
Model fit									
Chi-Square (d.£)		0.000(0)			31.572(22)			298.343(148)	
p-value					0.085			0.000	
CFI		1.000			0.985			0.894	
TLI		1.000			0.961			0.850	
RMSEA		0.000			0.044			0.068	

Standardized estimates are reported. Loadings on the common intelligence factor (CIF) constrained to be equal, as shown in **Figure 1**, *are 0.918 (p ≤ 0.010) in Model 2 for EI, SI, and CI, and 1.245 (p ≤ 0.010) in Model 3 for the subscales of intelligence measures. Intercepts for these loadings are not shown.* *p< 0.100; **p < 0.05; *** p < 0.01 (two tailed tests).*

as inadequate ($\beta = -0.062$, $p \leq 0.100$). As shown here, people with greater teamwork abilities feel more satisfied with their lives ($\beta = 0.069$, $p \leq 0.100$).

The relationship between greater cognitive intelligence competence and feeling less satisfied with life appears to be due to the factor level, since neither systems thinking nor pattern recognition are individually predictive of life satisfaction and thus, the relationship is not being driven by either of the competencies separately. People who show systems thinking in their behavior and communications with others feel less career success ($\beta = -0.067$, $p \leq 0.050$).

Finally, it is important to note that while the other control variables mainly remain stable in Model 3, having a higher GMAT score changes to significantly predict higher life satisfaction and career success. As noted earlier, these changes are likely due to a suppression effect. In Model 1 the suppression is likely due to the omission of the cognitive competencies. This suppression likely reoccurs in Model 2, since cognitive intelligence competence is only introduced in the composite form.

By contrast, in Model 3, when cognitive competence is broken into systems thinking and pattern recognition, systems thinking gains significance with negative career success. It appears to adjust GMAT percentile upward, which suggests that without a behavioral, specific measure of systems thinking, the GMAT percentile effect is slightly biased down. Therefore, people who discuss systems and multiple causal relationships with others might be seen as too analytic by others and hamper their sense of career success. This could suppress the efficacy of their cognitive intelligence "ability" (i.e., how they can think and analyze, but not necessarily explain or discuss the analysis with others as suggested by scoring higher in standardized tests like the GMAT).

As noted earlier, we introduce the competencies in Model 3 in order to see which subscale has the strongest effect independent of the competence composites. However, we believe the higher-order factors to be better predictors of life satisfaction, career satisfaction and career success. We also tested the strength and

significance of plausible interaction effects by specifying two-way interactions among the three competency measures, as well as two-way interactions of each competency measure with key control variables, such as time since graduation, GMAT percentile, and age at graduation. None of these interaction effects were large or statistically significant at 0.050 level.

It should be noted that we relied on the "residual centering" approach in constructing our interaction terms to reduce collinearity with main effects which typically results in inflated standard errors for estimated interaction effects. Residual centering is a two-stage procedure that ensures orthogonality between a two-way interaction term and its constituent main effects (see Little et al., 2006). First, the interaction term is regressed (using ordinary least squares procedure) on its two constituent main effects and the residuals from this regression are saved. These residuals are then used to represent the interaction term in the SEM. Relying on residuals in this way isolates the *pure* interaction effect independent of the main effects and thus reduces the potential collinearity that may otherwise inflate the standard error for the interaction term. This procedure is particularly effective in SEM analyses with small data sets, as in our study (Lance, 1988; Marsh et al., 2007).

DISCUSSION

The significant findings are summarized in **Figure 2**. We found that Hypothesis 1 was partially supported, in that demonstrating emotional intelligence competencies at the time of graduation did predict career satisfaction and success, but not life satisfaction. Hypothesis 2 is weakly supported. While SI in composite did not predict life or career satisfaction or career success, when disaggregated into its constituent competencies, teamwork predicted life satisfaction and influence negatively predicted all three of the dependent variables. Hypothesis 3 was slightly supported in a mixed manner. The GMAT measure of g did not show any impact on any of the three dependent variables in models 1 and 2, but did for life satisfaction and career success in Model 3. Furthermore,

Life Satisfaction	Career Satisfaction	Career Success
- Achievement orientation	+ Emotional intelligence	+ Emotional intelligence
+ Adaptability	+ Adaptability	+ Adaptability
- Influence	- Influence	- Influence
+ Teamwork		
- Cognitive intelligence competencies		- Systems thinking
+ GMAT		+ GMAT
+ Current salary	+ Current salary	+ Current salary
- Age at graduation	- Age at graduation	- Age at graduation
+ Length of marriage	+ Length of marriage	+ Length of marriage
+ Being female		- Time since graduation
+ Number of children		

FIGURE 2 | Summary of significant findings from any of the three models tested.

the cognitive competencies showed a negative effect on life satisfaction in Model 2, and its component of System Thinking showed a negative impact on career success in Model 3.

This confirms the expectations from competency and career theory, and a recent meta-analysis on EI and job satisfaction (Miao et al., 2014). But it does not support holistic adult development theory with a lack of findings on life satisfaction. Our results confirm Lounsbury et al.'s (2003) findings but conflict with Rode et al. (2008) and Carmeli et al. (2009). As suggested by Rode et al. (2008), who did not find support for emotional intelligence and career success, it appears that later career abilities have a positive impact on career success.

With time, employees who display stronger skills and abilities receive greater appreciation which may lead to better opportunities and optimistic career assessments. Carmeli et al. (2009) showed a positive relationship between emotional intelligence and life satisfaction. One possible explanation is that Carmeli et al. (2009) measured emotional intelligence with the Schutte et al. (1998) scale, which is a self-report measure of appraisal, regulation and utilization of emotion. Emotional intelligence in this study was measured by specific competencies and rated by others in addition to the self, but only the others' views were used in this study as a behavioral measure, avoiding the possible self-deception effects of self-assessment (Dunning et al., 2004; Hollander, 2008) and common method bias. Another major difference lies in the design. Carmeli et al. (2009) measured participant's emotional intelligence and then measured career satisfaction 3 weeks later. It is possible that the link between how employees felt about their ability to manage their emotions was due to an overall feeling of general well-being, which accounted for higher ability and satisfaction scores. Our results seem to indicate that over time how well people can manage their emotions as a whole, may not impact how satisfied they are in their lives.

However, in taking a closer look, we see that some emotional competencies do impact assessment of life satisfaction. In particular, demonstrating adaptability positively predicted all three dependent variables and demonstrating achievement orientation negatively predicted life satisfaction. This suggests that people who are emotionally competent at the time of graduation can use some of their emotional competence to cultivate better careers,

where they are more satisfied and feel successful. Adapting to life's challenges and taking advantage of opportunities seems to be an important competence to develop in order to respond to the complex world of work and life in 1992—2006. Others have cited adaptability as a "meta-competency" in leadership (Heifetz and Linsky, 2002) and careers (Hall, 1996). It may not be the composite set of competencies that affect life satisfaction as predicted by competency theory, but specific ones. From a holistic adult development perspective, adaptability may be a core capability for all of life's domains.

Adaptability is seen in the evolutionary psychology literature as a core competence (Buller, 2005). It allows a person to adapt or go along with emerging conditions, which is the opposite to the influence competence in which the person seeks to obtain compliance from others and "push" his/her environment. Adaptability also allows a type of problem solving or adjustment. It seems to require noticing and selecting or choosing to which aspect of a situation one should adjust. For example, when a spouse complains about their partner not doing things together, one reaction would be to plan more things. But this ignores the possibility that the real issue is emotional availability and presence with the spouse. Adaptability as a competence allows a person to attend to such changes and when used well provides an ability to adapt more effectively. Adaptability seems less ego-involved in selecting choices as to what to change and probably attaches less self-affirmation to acceptance and continuity to an earlier idea or approach.

As to the negative relationship of achievement orientation and life satisfaction, as we described earlier, McClelland and Boyatzis (1982) showed that achievement motivation helped a person advance from entry to middle-level of management but was negatively related to promotion beyond middle level management. Furthermore, McClelland (1961) explained how people with higher needs for achievement were perpetually dissatisfied—when they reached a goal, they immediately set another one and did not have much interest in relishing or even languishing on the goal attained.

Surprisingly, demonstrating social intelligence competence overall failed to significantly predict any of the dependent variables in the model. These results seem to echo the non-significant

findings by Cote et al. (2011) in attempting to predict social understanding on career satisfaction. But this may have been a result of some social intelligence competencies having a positive effect and some having a negative effect, thereby washing out the overall cluster impact. The same dynamic may have contributed to the lack of the emotional intelligence competence cluster showing results for life satisfaction.

Hypothesis 2 was weakly supported in that demonstrating influence had a negative effect on all three dependent variables, and teamwork had a positive effect on life satisfaction. These findings suggest that people who use influence more frequently than others are pushing on their environment and trying to get more from others. This finding may speak to a level of frustration that they feel when others do not respond by showing sufficient impact. The ability to work with others appears to move beyond the team setting and into other aspects of life. When people develop cooperation skills they are more likely to have better relationships in other arenas of life. People who are successful at convincing others may be acting out of a high need to control social interactions. While these people may in fact be successful at controlling social interactions and getting what they need from others, they may subsequently feel dissatisfied when their attempts are unsuccessful. Long term life satisfaction may emerge from less pushing others and more working with others.

A contribution from this study to competency and adult development theory may be that the ability to adapt to events, opportunities and the environment may be more functional in life and careers than asserting oneself on others and trying to change things. In this sense, adaptability, used as just described, satisfies a more Eastern philosophical position.

Other aspects of social intelligence competence have been shown to relate to long term career success, such as networking (Wolff and Moser, 2009), but our findings did not show this effect. The difference might have been that prior work only looked out 3 years and ours was 5–19 years. But this defies common sense and advice for people to network and build and use relationships. It is more likely that the difference between these results and the Wolff and Moser (2009) results is that they used a self-report measure of a person's networks, and we used a behavioral measure of how frequently others saw a person using the networking competence.

Hypothesis 3 was also weakly supported in a complex manner in that demonstrating cognitive intelligence competencies negatively affected life satisfaction, and systems thinking in particular negatively affected career success. But once all variables were entered in to the model, GMAT scores were positively predictive of life satisfaction and career success. This could originate from a dynamic where higher cognitive intelligence competence may stimulate a more skeptical view of life or less social skills and result in others being offended or not "liking" a person at work.

Contrary to more traditional views, higher levels of cognitive intelligence competencies appear to have no bearing on career satisfaction or career success levels. This may be because people come across to others as more abstract, analytic, or intellectual than desired. It may also suggest that people who often see and discuss multiple causal relationships see so many factors in situations that they may imply difficulty in being rational or even display an inability to make a clear or easy decision.

An important distinction between this research and most other comparable studies is that they often use self-assessment measures of a person's competence, EI/SI/CI, or skills. In this study, we used a behavioral measure coming from multiple informants' reports of a person's behavior. The difference has repeatedly been shown as crucial but often research administration convenience overwhelms good sense and practice. For example, McClelland (1985) reported results from a study by Carol Constantian showing a Thematic Apperception Test (TAT) measure of a person's affiliation motives predicted how often a person was with others. In the same study, self-assessed social skills predicted a person's social values, but not their behavior. On the other hand, there may be competencies or arenas of talent that are more sensitive in self-assessment than in demonstrated behavior, such as cognitive competencies involving thought processes.

Another distinction worth noting is that although all of the behavioral competencies assessed in these measures are related to effectiveness in various jobs, most of the studies have been concurrent or 1 to 2 year longitudinal studies of performance. In this study, we examined a much longer time period. Even if all of the competencies are predictive of effectiveness in a job, it does not mean they all carry the same weight. The SEM analysis helps us to determine the strongest relationships. In addition, we examined career satisfaction and self-perceived career success, not effectiveness.

Demographic variables showed some interesting effects. Current salary positively predicted life and career satisfaction as well as career success as motivation theory would predict (Herzberg, 1966). Salary is a popular measure or comparative social status indicator of how well one is progressing according to social comparison theory. Being younger at the time of graduation from the MBA predicted all three dependent variables. Relative deprivation theory would claim that older graduates, when adding 5–19 years more, feel that time has slipped by and the future is known rather than a rosy hope (Walker and Smith, 2001). The negative relationship of time since graduation to career success supports this argument that people who had graduated more recently were reporting greater career success.

Length of marriage positively predicted all three dependent variables, but the number of one's children only predicted life satisfaction. Again, Herzberg's theory, which built on Maslow's hierarchy of needs would suggest that salary satisfies needs for security and social status, but a stable marriage and children satisfy higher social needs. Length of marriage suggests stability at home may allow for energy and attention to be devoted at work and to one's career. Having more children may possibly put a strain on people's ability to engage with work. Finally, another interesting result was that being female was positively related to life satisfaction, but gender showed no consistent relationship to the career variables.

Satisfaction is a self-attributed, perception of one's inner state in the context of social comparison. Career satisfaction was distinctly predicted by the set of EI competencies as compared to life satisfaction. But this was most likely because Achievement Orientation negatively predicted life satisfaction. In addition, teamwork, being female and having children led to greater life satisfaction. CI competencies were negatively related to life

satisfaction. Achievement orientation and cognitive competencies are more individualistic and analytic. The distinctive positive predictors of life satisfaction are social. These two sets reflect the antagonistic neural domains (Jack et al., 2012). Competency theory explains that behavioral dispositions (i.e., competencies) at graduation increase the likelihood of seeking opportunities for the effective use of these competencies, which in turn reinforce those dispositions. This data suggests the analytic find less social experiences and then may feel they have sacrificed too much in life for work.

IMPLICATIONS FOR FUTURE CAREER RESEARCH AND FOR MANAGEMENT EDUCATION PRACTICE

People define and redefine their careers over time via learning experiences (Hall, 2002). An opportunity for further research exists in better understanding the relationship between emotional and social competencies and cognitive ability in terms of the sense-making and learning people experience regarding their careers. For example, it seems likely that those who are high in self-awareness and social awareness upon entering the workforce may have a different level of insight in making sense of their career experience than those with lower levels of experience. To better prepare for the complexity of their careers, there has been a call for management educators to help students better understand their emotions to be better equipped to understand the emotions associated with failure and setback during their careers (Kaiser and Kaplan, 2006). We see the work done by career scholars as a key area to draw upon to further scholarly work on emotional and social competence that can in turn influence management education practice. These results also show that more research must be done to explore the different levels of cognitive intelligence, not just fluid and crystalized intelligence and other various forms of general mental ability (Nisbett et al., 2012).

Concern over the efficacy of management degree programs has resulted in outcome assessment becoming standard practice in higher education. Outcome assessment is now required from all management degree programs by the accrediting agencies, such as the Association to Advance Collegiate Schools of Business (AACSB), European Foundation for Management Development, and for universities within the European Union through the Bologna Accord (Porter and McKibbin, 1988). Still, management educators often struggle with how to organize and conduct outcome assessment (Batista et al., 2012). Our study provides an example of how such assessment studies can be conducted.

While we have laid the groundwork for theorizing on the relationship between emotional, social, and cognitive intelligence and subsequent life and career satisfaction, as well as career success, future researchers should continue the development of an overarching theory to explain these relationships. Alternatively, future researchers might further explore the differential impact of specific emotional, social and cognitive intelligence competencies on long-term career outcomes of interest. Developing a greater understanding of how the various competencies impact career and life outcomes could have significant implications for which competencies are targeted for development in management education programs. Doing so will also help working professionals

better understand where to target their time and resources to help them navigate turbulent career waters.

In our study, adaptability and teamwork in particular were significant predictors of the selected career outcome measures. While teamwork is often an area of focus for student development, management programs might better prepare their students for successful careers, as well as increase their likelihood of achieving career and life satisfaction by also helping them develop their adaptability. Our results also suggest potential value in helping students become aware of and learn to mitigate the potential negative impact of influence and achievement orientation competencies. While we need to enhance general cognitive ability, it is possible that given the high level of g of people admitted to MBA programs, spending more time attempting to further enhance their fluid intelligence and abstract reasoning may be more of a distraction from other capabilities on which they need development.

This study used a multi-rater assessment to measure student emotional and social competence. MBA students and managers at work are often inundated with self-assessment surveys and the respective feedback from those surveys. On the other hand, as noted earlier, it is well established that people are both biased and unreliable when they assess their own abilities (Dunning et al., 2004), and management education practice and research are not immune to these challenges (Taylor, 2014). Providing students with multi-rater feedback not only serves as a source of outcome assessment upon graduation and beyond (as used in this study), but such feedback will also aid students and managers by proving them more reliable feedback earlier in their careers that can better prepare them for the workplace where the use of multi-rater feedback assessments has become routine (Taylor, 2014).

Finally, our study emphasizes the importance of scholars continuing to investigate the impact of emotional, social, and cognitive intelligence on key outcomes after graduation. This in turn invites management scholars to measure the degree to which management education and leadership development programs are helping graduate students develop emotional and social competence more than the focus on cognitive development. At a time when scholars are making a clarion call for management education to become more relevant (e.g., Druskat et al., 2005; Lorsch, 2009; Bennis, 2010), we believe further study of the development and application of emotional and social competence in management education is an important way to add relevance.

LIMITATIONS

One limitation to this study is the fact that we could not get comparable sized samples from each of the cohort years. While we controlled for time since graduation and age at graduation, the unevenness of the subsamples may have distorted the findings. Another limitation is that we were not able to account for culture or country of origin nor country in which the person has been working. Future research should seek to replicate these results with a sample of professionals who have not been through an MBA program. The degree program itself may bias the original sample. Future research should also examine the pattern of predictive results from self-assessment of the same competencies, as well as the value added of what students learned from their

MBA program (i.e., the difference between how they were seen by others at graduation as compared to entry into the program).

Although the compilation of results from three measures might be seen as a limitation, The SEM analysis reported here was replicated for only those respondents whose scores were based on either the EAQ or the ECI instruments which had predominantly the same items (67% of the items were the same, and others were similar). We excluded respondents whose scores were based on the CII which might be considered to overlap with the other two to a lesser degree. The objective of auxiliary analysis was to determine if the estimates reported here were sensitive to potential differences across the three instruments. The results indicated negligible differences compared to findings shown in **Table 2** and none that changed levels of significance, suggesting that our estimates were not sensitive to differences across the instruments used for key measures in the study.

Finally, it is important to note that our results are limited in their generalizability given the sample we have used in this study. Participants in this study were not representative of the general population, but instead were MBA graduates and, therefore, likely have an above average cognitive intelligence.

CONCLUSION

A person's emotional, social and cognitive competencies can predict life and career satisfaction and career success years, if not decades later. It increases the importance that should be placed on development of these competencies in management and leadership development, whether in a graduate program or organization-based training and development. Our work also extends the call for career scholars to further study the ways in which emotional and social competencies can redefine how we understand careers and career success.

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Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Maintaining Life Satisfaction in Adolescence: Affective Mediators of the Influence of Perceived Emotional Intelligence on Overall Life Satisfaction Judgments in a Two-Year Longitudinal Study

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Much attention has been paid to the psychological processes underlying the improvement in mood states and human well-being, particularly during adolescence. Theoretical and empirical research suggests that emotional skills may play a role in enhancing perceived well-being; however, the mechanisms involved in during adolescence are unclear. The purpose of this study was to extend understanding by investigating the potential mediators of the relationship between emotional intelligence (EI) and life satisfaction in a 2-years study. Participants were 269 high school students (145 girls and 124 boys) who completed the self-report perceived emotional intelligence (PEI) Scale, the Satisfaction with Life Scale, and the Positive Affect and Negative Affect Scale three times at 1-year intervals. The three-step longitudinal design corroborated earlier research indicating that positive and negative affect mediate the relationships between EI and life satisfaction. Students with high PEI tended to have more positive experiences and fewer negative experiences, which contributed to their greater life satisfaction. No sex differences were found in the multi-group analyses, suggesting that the causal relationships are similar in both sexes. These findings extend our understanding of the complex network of relationships involving PEI and life satisfaction in adolescence. Implications and limitations of the findings are discussed.

Keywords: perceived emotional intelligence, subjective well-being, life satisfaction, positive and negative affect, mediation, positive psychology

INTRODUCTION

In recent decades many studies have reported positive relationships between emotional skills and well-being outcomes (Mikolajczak et al., 2008; Zeidner et al., 2009). Although there is growing interest in identifying the psychological processes that enhance positive emotions and life satisfaction, there is a lack of understanding of the emotional processes which underpin subjective well-being. Research indicates that emotional skills play a vital role in coping with stress (Salovey et al., 1999), suggesting that inappropriate use of emotional skills might result in various emotional

disorders (Gohm and Clore, 2002a; Nolen-Hoeksema, 2003). There is, however, a dearth of scientific literature on the relationship between emotional skills and well-being (Sánchez-Álvarez et al., in press). This study focuses on the influence of emotional self-efficacy, also known as perceived emotional intelligence (PEI), and subjective well-being (SWB), and considers how the different components of SWB (cognitive and affective) might act as mediators.

PEI and Cognitive SWB

The concept of PEI should be defined relative to trait emotional intelligence (EI) and ability EI (Petrides and Furnham, 2000). Following the development of the theory of EI (Mayer and Salovey, 1997) two approaches to evaluating emotional skills have emerged: self-assessment scales such as the Trait Meta-Mood Scale (TMMS; Salovey et al., 1995) and ability measures such as the Mayer–Salovey–Caruso Emotional Intelligence Test (MSCEIT 2.0; Mayer et al., 2002), a multi-dimensional measure based on performance on various tasks. Although ability measures are beginning to be recommended (Mayer and Salovey, 1997), self-assessment measures are more commonly used in the mental health field owing to the interest in emotional beliefs (Fernández-Berrocal and Extremera, 2008). Scores on the TMMS, which evaluates an individual's perception of his or her emotional skills, or PEI (Salovey et al., 2002) have been shown to correlate with many mental health and psychological adjustment variables in non-clinical populations. PEI is a constellation of emotional self-perceptions and thus located at the lower end of Eysenckian and Big Five factor personality hierarchies (Petrides et al., 2007). PEI, as measured with the TMMS, is defined as a continuous, reflective process associated with beliefs about the attention one pays to one's emotional state (attention to feelings), mood clarity and perceived ability to regulate one's emotional state (emotional repair) (Salovey and Mayer, 1990). Cognitive SWB is a measure of one's evaluation of emotional information throughout one's life (Pavot and Diener, 2008) and is usually evaluated using the Satisfaction with Life Scale (SWLS; Diener et al., 1985). There is some controversy about the nature of the relationship between PEI dimensions and life satisfaction; some studies have reported that life satisfaction was related to attention to feelings, mood clarity and emotional repair (Bastian et al., 2005) whereas others found that only mood clarity and emotional repair were related to life satisfaction (Extremera and Fernández-Berrocal, 2005; Augusto-Landa et al., 2006; Rey et al., 2011), or that only mood clarity (Palmer et al., 2002) or emotional repair was related to life satisfaction (Thompson et al., 2007). In summary, these studies indicate that TMMS-based measures of various PEI dimensions are important predictors of scores on indices of cognitive SWB.

In general, individuals with high perceived ability to interpret emotional information and deal more effectively with emotional issues achieve a greater sense of life satisfaction (Lazarus, 1991; Mayer and Salovey, 1997; Salovey et al., 1999). Although there are several reports that PEI is associated with life satisfaction (Gohm and Clore, 2002b; Palomera and Brackett, 2006; Kong et al., 2012), few longitudinal studies have been carried out

(for an exception see Extremera et al., 2011). Experimental and longitudinal research is required to elucidate the causal structure of the relationships between PEI dimensions and life satisfaction.

PEI and Affective SWB

Affective well-being represents the balance between an individual's experience of positive and negative emotions (Diener et al., 1999) and is usually evaluated using the Positive Affect and Negative Affect Scale (PANAS; Watson et al., 1988). Certain PEI dimensions are associated with high rates of positive emotions and lower rates of negative emotions (Palmer et al., 2002; Palomera and Brackett, 2006; Gallagher and Vella-Brodrick, 2008; Augusto-Landa et al., 2012; Koydemir and Schütz, 2012). Attention to feelings is positively correlated with negative affect (Augusto-Landa et al., 2006; Thompson et al., 2011), and negatively correlated with positive affect (Palmer et al., 2002; Augusto-Landa et al., 2006; Palomera and Brackett, 2006) whereas mood clarity is negatively correlated with negative affect (Palmer et al., 2002; Palomera and Brackett, 2006) and positively correlated with positive affect (Gohm and Clore, 2002a; Palmer et al., 2002; Augusto-Landa et al., 2006). Like mood clarity, emotional repair is negatively correlated with negative affect (Augusto-Landa et al., 2006; Palomera and Brackett, 2006) and positively with positive affect (Gohm and Clore, 2002a; Kafetsios and Zampetakis, 2008; Augusto-Landa et al., 2012). This body of research suggests that individuals with high PEI may spend less time in negative moods and more time in positive moods relative to those with low PEI (Salovey and Mayer, 1990; Koydemir and Schütz, 2012). Again, most of this empirical evidence is from cross-sectional studies, although there has been one longitudinal study (Ciarrochi et al., 2008).

PEI, Cognitive, and Affective SWB

The two components of SWB are considered separate constructs although they are moderately associated (Diener, 1994). PEI is differently related to the two components, offering evidence of continuity of the processes involved in SWB (Brackett and Mayer, 2003; Austin et al., 2005; Schutte and Malouff, 2011). Some research has suggested that PEI, positive and negative affect and life satisfaction are sequentially related (Karademas, 2007; Vergara et al., 2015). Affective SWB is a measure of one's current experience of positive and negative emotions, whereas cognitive SWB is one's assessment of emotions experienced in the past and present (Diener, 1994). This implies the existence of a direct path from affective SWB to cognitive SWB (Augusto-Landa et al., 2006; Kesebir and Diener, 2008); in other words, individuals rely on the balance between their experiences of pleasure and displeasure to judge their life satisfaction (Schimmack et al., 2008). Schimmack et al. (2002) found that affective SWB was directly influenced by certain personality traits, whilst their influence on cognitive SWB was mediated by affective SWB. Another psychological process which might underlie this relationship is the ability to use the information provided by emotions intelligently, which is essential to physical and psychological adaptation (Mayer and Salovey, 1997). Gignac

(2006) and Kong and Zhao (2013) devised and tested models of the relationship between PEI and life satisfaction in young adults, demonstrating that it is mediated by certain affective processes. Both studies used structural equation modeling with latent variables based on a global PEI variable and therefore did not provide information about the relationships in which specific aspects of PEI were involved. The lack of findings in previous studies, where the relationship between the different dimensions of PEI with affective processing and life satisfaction, is not described (Kong and Zhao, 2013). Previous research indicated that attention to the feelings was prospectively related to negative affect, but not positive affect (Thompson et al., 2011). There is also some evidence that there positive emotions are strongly associated with mood clarity and emotional repair (Palmer et al., 2002; Palomera and Brackett, 2006). As the various TMMS subscores relate to different aspects of emotional skill their relationships with the two aspects of SWB may also vary.

Because all the studies discussed above were cross-sectional they do not provide evidence about causality (Gignac, 2006; Kong and Zhao, 2013). Longitudinal data are needed to determine the direction of causal relationships (Willett and Sayer, 1996). In an emerging field such as SWB research, longitudinal studies have the potential to provide evidence that would otherwise remain lacking. For example, Wright (2007) pointed out that one of the advantages of longitudinal research is that it allows the researcher to model time as an independent variable. Whereas theories often explicitly state the importance of time, longitudinal data actually allow the use of time as a research variable. Second, in a meta-analysis (Conley, 1984) it was pointed out that longitudinal data enable one to estimate the temporal stability of a construct, i.e., determine the extent of intra-individual temporal variance. Cross-sectional research investigates inter-individual variance in order to determine associations between variables at individual level, whereas longitudinal data also provide information about intra-individual variance over time. Longitudinal data can address questions about temporal fluctuation in scores (do individuals' responses vary significantly over time) or questions related to both intra- and inter-individual variance (e.g., do attitudes fluctuate more over time in neurotics than emotionally stable individuals?). Longitudinal research can also yield information about the sequence of changes in variables or responses. If we can show, for example, that an increase in PEI is followed by an increase in SWB and that a decrease in PEI is followed by a decrease in SWB this provides some basis for inferring a causal relationship between SWB and PEI, whereas cross-sectional data only provide evidence of an association between the two variables. Although there is no substitute for experimental research when it comes to providing evidence of causality, longitudinal design research can help to tease out complex relationships among variables by asking questions such as, does cognition go before emotion, vice versa, or both? Data on the pattern of temporal changes in a set of variables may lead to insights that cross-sectional research would not. In summary, longitudinal research has several advantages to over cross-sectional research or even experimental research (Avey et al., 2008).

This Study

This study had three aims. The first was to examine the relationships between the various aspects of PEI, positive and negative affect and life satisfaction. Second, we wanted to use longitudinal research to determine the extent to which the various aspects of PEI could account for life satisfaction after taking into account the role of positive and negative affect. Third, we sought to extend the previous literature by investigating positive and negative affect as potential mediators of the relationship between PEI and life satisfaction over a 2-years period.

Based on earlier findings we expected that PEI, mood clarity and emotional repair would be positively associated with life satisfaction and positive affect, and that attention to feelings would be negatively associated life satisfaction and positively associated with negative affect. We also expected that positive affect would be positively associated with life satisfaction and negatively associated with negative affect. Furthermore, we hypothesized that positive and negative affect would mediate the relationship between PEI and life satisfaction during a 2-years follow-up study.

MATERIALS AND METHODS

Participants

The sample for this study consisted of 269 adolescents from southern Spain (145 girls and 124 boys) recruited from various high schools; they participated voluntarily and anonymously. Participants completed the package of questionnaires at the beginning of the first academic semester in three successive years. The package of questionnaires comprised the TMMS, the PANAS and the SWLS as part of a larger battery of questionnaires used for other purposes. At the first assessment ages ranged from 12 to 16 years ($M = 13.26$, $SD = 1.05$), the mean age of the boys was 13.24 years ($SD = 1.11$) and the mean age of the girls was 13.28 years ($SD = 1.10$). This study was carried out in accordance with the Declaration of Helsinki and ethical guidelines and was approved by the Research Ethics Committee of the University of Málaga.

Measures
Perceived Emotional Intelligence
It was measured with the self-report TMMS (Salovey et al., 1995), which is considered a proxy for PEI (Salovey et al., 2002). The TMMS evaluates the extent to which people attend to and value their feelings (attention to feelings), feel clear rather than confused about their feelings (mood clarity), and use positive thinking to repair negative moods (emotional repair). The shortened Spanish version (Fernández-Berrocal et al., 2004) includes 24 items from the original version (eight for each subscale). The original 48 items were subjected to principal components analysis with varimax rotation. Items with loadings ≤0.40 were removed. The analysis indicated that the scale had three main factors - attention, clarity, and repair – which is consistent with evidence an analysis of the structure of the original English version (Salovey et al.,

1995). This Spanish version has shown acceptable internal consistency and satisfactory test–retest reliability and scores are negatively correlated with depression and ruminative responses and positively correlated with life satisfaction. Further details on the scoring, reliability, and validity of the Spanish version of TMMS can be found elsewhere (Fernández-Berrocal et al., 2004).

Life Satisfaction

It was measured with the Spanish version of the SWLS (Diener et al., 1985) to assess perceived global life satisfaction. Both English and Spanish versions are considered to have adequate discriminant validity and internal consistency (Diener et al., 1985; Atienza et al., 2003). The SWLS consists of five items to which responses are given on a seven-point Likert scale ranging from 1 = strongly disagree to 7 = strongly agree.

Positive Affect and Negative Affect

It was assessed with PANAS (Watson et al., 1988), a twenty-item inventory consisting of 10 adjectives describing positive affect (e.g., excited, interested) and 10 adjectives describing negative affect (e.g., distressed, irritable). The scale was administered in the general format with the instructions to 'rate the extent to which you generally feel this way' on a scale ranging from 1 (very slightly or not at all) to 5 (extremely).

Procedures

The questionnaires were administered to the sample in the following order: TMMS, PANAS, and finally the SWLS. The questionnaires were administered in scheduled high school classes by trained instructors. The average time taken to complete the set of questionnaires was 40 min. A researcher was present throughout testing and participants were encouraged to ask questions about the questionnaires. Informed consent was obtained from all participants.

Design

We used a three-step, longitudinal design with 1 year between assessments. Our longitudinal model also included the effect of positive affect and negative affect (mediating variables) on the relationship between the TMMS dimensions (independent variables) and life satisfaction (dependent variable).

Analysis Strategy

We used structural equation modeling (SEM) with maximum likelihood estimation (a common SEM method; Schermelleh-Engel et al., 2003), implemented in the AMOS 20 software, to assess the direct and indirect relationships between investigated variables. The estimated model consisted of three assessments at 1-year intervals. SEM is used to determine predictive relationships between variables (Cole and Maxwell, 2003). The adjusted model was evaluated with residual mean squared error approximation (RMSEA; values <0.08 indicate acceptable fit), normed fix index (NFI), incremental fix index (IFI), and

comparative fit index (CFI); for all these fit indices values >0.90 indicate acceptable fit (Kline, 1998).

RESULTS

Descriptive Statistics

Means, standard deviations, and pairwise correlations for all variables are presented in **Table 1**. Attention to feelings was positively correlated with negative affect at all three timepoints, whereas mood clarity and emotional repair were positively correlated with positive affect and life satisfaction at all three timepoints.

Structural Model

Based on earlier research (Gignac, 2006; Kong and Zhao, 2013), we developed a cross-lagged panel model, drawing on mediation models proposed by Baron and Kenny (1986). The model included all measured variables, direct paths from TMMS dimensions to positive affect, negative affect, and life satisfaction, and direct paths from positive affect and negative affect to life satisfaction. Preliminary analysis indicated two types of mediation, one involving positive affect and the other involving negative affect. In accordance with the recommended protocol for the AMOS software we then tested a three-step longitudinal model with two-way mediation. The results are reported in **Figure 1**. Both mediation effects (affection negative way, and positive affect way) are integrated into a single model. This model was an acceptable fit to the data ($X^2 = 173,074$; $p = 1.502$; $g.l. = 67$; $NFI = 0.908$; $IFI = 0.941$; $CFI = 0.938$; $RMSEA = 0.073$), overall the model accounted for 32% of the variance in life satisfaction.

As shown in **Table 2** there were indirect associations between TMMS dimensions and positive and negative affect and life satisfaction. The strongest indirect associations were those involving attention to feelings and mood clarity; those involving emotional repair were weaker.
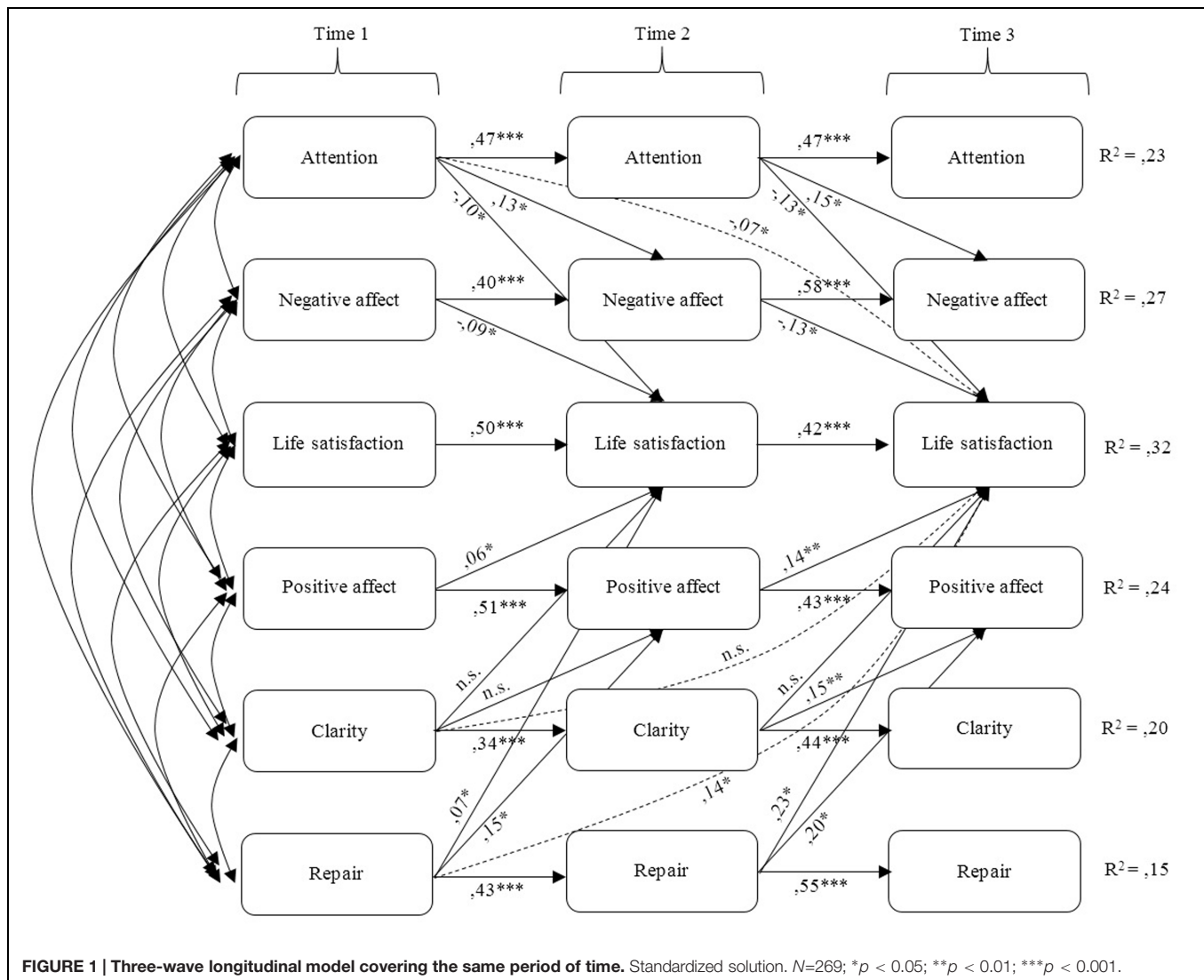
DISCUSSION

This study was designed to examine the mediation of the relationships between PEI and life satisfaction by positive and negative affect in a sample of adolescents. Consistent with our hypothesis, correlational analysis showed that attention to feelings was positively correlated with negative affect (Augusto-Landa et al., 2006; Thompson et al., 2011), whereas mood clarity was positively correlated with positive affect (Gohm and Clore, 2002a; Palmer et al., 2002; Augusto-Landa et al., 2006; Rey et al., 2011) and life satisfaction (Palmer et al., 2002; Bastian et al., 2005; Extremera and Fernández-Berrocal, 2005). Emotional repair was positive correlated with positive affect (Gohm and Clore, 2002a; Augusto-Landa et al., 2006, 2012; Kafetsios and Zampetakis, 2008) and life satisfaction (Bastian et al., 2005; Extremera and Fernández-Berrocal, 2005; Augusto-Landa et al., 2006; Rey et al., 2011). Our data indicated that these association are stable over time and are consistent with

TABLE 1 | Pearson product moment correlation coefficients, means, and coefficient Alphas.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
(1) Attention (T1)	—																	
(2) Clarity (T1)	0.39**	—																
(3) Repair (T1)	0.25**	0.54**	—															
(4) Positive affect (T1)	0.12**	0.42**	0.44**	—														
(5) Negative affect (T1)	0.29**	−0.01	0.01	−0.10	—													
(6) Life satisfaction (T1)	−0.07	0.24**	0.29**	0.46**	−0.34**	—												
(7) Attention (T2)	0.46**	0.08	0.01	0.05	0.14*	0.01	—											
(8) Clarity (T2)	0.05	0.33**	0.34**	0.23**	−0.16*	0.17**	0.17**	—										
(9) Repair (T2)	0.02	0.16**	0.42**	0.22**	−0.17**	0.22**	0.07	0.49**	—									
(10) Positive affect (T2)	0.02	0.17**	0.18**	0.49**	−0.07	0.35**	0.04	0.27**	0.27**	—								
(11) Negative affect (T2)	0.23**	0.01	−0.01	−0.08	0.44**	−0.30**	0.23**	−0.05	−0.18**	0.01	—							
(12) Life satisfaction (T2)	−0.14*	0.12*	0.17**	0.29**	−0.29**	0.57**	−0.05	0.24**	0.31**	0.43**	−0.33**	—						
(13) Attention (T3)	0.38**	0.19**	0.14*	0.13*	0.13*	0.09	0.47**	−0.01	0.07	−0.02	0.02	−0.01	—					
(14) Clarity (T3)	0.15**	0.34**	0.27**	0.27**	−0.04	0.28**	0.21**	0.41**	0.29**	0.23**	−0.08	0.27**	0.42**	—				
(15) Repair (T3)	0.10	0.22**	0.43**	0.25**	−0.03	0.22**	0.06	0.33**	0.48**	0.26**	−0.17**	0.31**	0.30**	0.55**	—			
(16) Positive affect (T3)	0.02	0.20**	0.22**	0.39**	−0.06	0.28**	0.01	0.27**	0.22**	0.47**	−0.07	0.28**	0.19**	0.45**	0.39**	—		
(17) Negative affect (T3)	0.22**	−0.01	−0.04	−0.05	0.29**	−0.23**	0.14*	−0.01	−0.05	−0.01	0.50**	−0.22**	0.19**	−0.02	−0.08	0.02	—	
(18) Life satisfaction (T3)	−0.10	0.13*	0.23**	0.30**	−0.24**	0.57**	−0.14	0.17**	0.25**	0.34**	−0.26**	0.54**	0.08	0.34**	0.34**	0.36**	−0.31**	—
M	3.05	3.07	3.35	3.44	2.26	4.82	2.98	3.09	3.30	3.47	2.24	4.90	3.11	3.21	3.32	3.40	2.35	4.90
SD	0.81	0.77	0.81	0.69	0.64	1.41	0.79	0.71	0.79	0.65	0.64	1.27	0.79	0.78	0.80	0.58	0.64	1.25
Alpha	0.83	0.79	0.78	0.81	0.79	0.84	0.85	0.81	0.80	0.81	0.80	0.85	0.86	0.86	0.84	0.77	0.79	0.87

$N = 269$; $*p < 0.05$; $**p < 0.01$.

FIGURE 1 | Three-wave longitudinal model covering the same period of time. Standardized solution. $N=269$; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

previous studies showing that emotionally intelligent people can use positive emotions to manage anxiety and stress in the face of negative events (Tugade and Fredrickson, 2002) and that they are likely to use adaptive strategies, such as social support and emotional expression, rather than maladaptive strategies, such as rumination, to cope with stressful situations (Matthews et al., 2006). In general, it appears that emotional skill, as assessed by the TMMS dimensions, is negatively associated with physical symptoms of stress and positively associated with a more adaptive reaction to stressors. It may be that individuals who perceive their feelings clearly and believe that they can repair negative mood states turn their attentional resources toward coping with and minimizing the impact of stressful events (Salovey et al., 2002) whereas individuals with low scores on TMMS dimensions tend to engage in extended rumination in order to understand how they feel. Rumination and the absence of attempts to attend to, clarify, and repair mood might lead to prolonged physiological arousal and hence to negative health outcomes (Nolen-Hoeksema et al., 1994; Gross, 1998; Fernández-Abascal and Martín-Díaz,

2015). It is likely to retrieve positive memories as a way of regulating mood (Ciarrochi et al., 2000) and to take advantage of high social competence, extensive social networks, and effective coping strategies (Salovey et al., 2000). The individuals are able to identify and interpret emotional signals and regulate their actions

TABLE 2 | Standardized indirect effects and 95% confidence intervals.

	Attention (T1)	Clarity (T1)	Repair (T1)
Positive affect (T3)	–	0.034	0.012
Negative affect (T3)	0.084	–	–
Life satisfaction (T3)	−0.026	0.027	0.016

To check the robustness of the three-step longitudinal model, the integrity of the model was verified by gender, multi-group analysis was used to identify significant differences in the model by sex (Marsh, 1987). Test results invariance (Byrne et al., 1989) showed that differences between groups in the model were not significant [X^2 (122, N = 269) = 117.497; p = 0.598]. Therefore the three-wave longitudinal model is consistent and provides a robustness test for both sexes (Kong and Zhao, 2013).

autonomously, thus promoting positive affect and avoiding negative affect (Mayer and Salovey, 1997) and experiencing a sense of satisfaction with their lives. In line with these findings, our results provide evidence that adolescents with high PEI experienced more positive affect, less negative, and greater life satisfaction than those with lower PEI over the course of a 2-years period.

The most important finding of this study is that in adolescents positive and negative affect partially mediated the relationship between PEI and life satisfaction over a period of 2 years. The three-step longitudinal model of this study corroborates other reports that positive and negative affect act as mediators of the relationship between EI and life satisfaction (Gignac, 2006; Kong and Zhao, 2013), indicating that high PEI tends to results in more positive experiences and fewer negative experiences, thus contributing to greater life satisfaction. Kong and Zhao (2013) reported that the relationship between EI and life satisfaction was fully mediated by positive and negative affect, but we found only partial mediation, implying that PEI influences various life satisfaction factors indirectly by maintaining enabling individuals to maintain a positive affective balance. Our data are consistent with the model described by Gignac (2006). The differences between our finding and those of Kong and Zhao (2013) might be due to differences in the instruments used to measure PEI, the latent variables in the structural equation model or cultural differences between the samples.

This study also differs from previous studies in the use of TMMS dimensions to represent emotional variables in the model. Including the TMMS dimensions allowed us to assess how they were individually related to affective balance and life satisfaction. Attention to feelings was found to have more influence on negative affect than the component of PEI with positive affect, in line with previous results linking attention to feelings with negative ruminative processes over time. It has been suggested that rumination might be partly responsible for emotional distress and lack of well-being associated with greater attention to feelings (Fisher et al., 2010; Salguero et al., 2011). In general, our results support our initial hypothesis about the indirect effects of aspects of PEI on life satisfaction, providing perhaps the strongest evidence so far that PEI is an effective predictor of SWB.

This study was based on longitudinal data from a large sample of adolescents collected at three timepoints over a 2-years period. This longitudinal design allowed us to evaluate the timing of PEI and components of well-being. In line with our hypothesis, our results suggest that PEI plays a causal role in positive and negative affect and life satisfaction, and that affective balance is causally related to life satisfaction (Schimmack et al., 2008). Multi-group structural analysis confirmed that the temporal sequence model was identical for both sexes (Marsh, 1987),

suggesting that the structure of the causal relationships is similar in both sexes.

Early research suggested that EI interventions improve well-being in young people (Brackett et al., 2010; Ruíz-Aranda et al., 2012), but the mechanisms underlying their effects were not understood. This study allowed us to evaluate how various emotional processes influenced SWB in adolescents (Qualter et al., 2012; Keefer et al., 2013). We found that all aspects of PEI influenced life satisfaction, positively in the case of mood clarity and emotional repair, and negatively in the case of attention to feelings. But an effect indirect predictors were also found through positive and negative affect (Gignac, 2006). This suggests that adolescents who pay less attention to their feelings experience less negative affect and more positive affect and hence feel greater satisfaction with their lives. Similarly, adolescents who perceived their mood more clearly and are better at emotional repair experience less negative affect and more positive affect and hence greater satisfaction with their lives (Frederickson et al., 2012; Gugliandolo et al., 2015). Becoming more aware one's emotions and regulating them effectively are negatively associated with negative emotions (Salovey et al., 1999) and positively associated with positive emotions through time (Mikolajczak et al., 2008).

The findings of this study should, however, be interpreted in the light of several limitations. First, we did not assess personality traits, which are another potential influence on perceptions of well-being. Future research in this field should include some assessment of personality type (Andrei et al., 2014; Di Fabio and Saklofske, 2014). To increase generalisability of results future studies should use more diverse samples (Kristensen et al., 2014). We also recommend investigating whether these findings can be replicated in other cultures and nationalities (Bastian et al., 2014).

Despite these limitations the study makes an important contribution to understanding in this field and provides some support for a model of in which affective balance acts as a partial mediator of the relationship between EI and life satisfaction in adolescence. By using a longitudinal design we were able to probe the causal relationships between variables and achieve a better understanding of the chronology of the influence of PEI on affective and cognitive SWB. These findings could be used to improve interventions designed to increase adolescents' sense of well-being.

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READING and FEELING: the effects of a literature-based intervention designed to increase emotional competence in second and third graders

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Emotional competence has an important influence on development in school. We hypothesized that reading and discussing children's books with emotional content increases children's emotional competence. To examine this assumption, we developed a literature-based intervention, named READING and FEELING, and tested it on 104 second and third graders in their after-school care center. Children who attended the same care center but did not participate in the emotion-centered literary program formed the control group ($n = 104$). Our goal was to promote emotional competence and to evaluate the effectiveness of the READING and FEELING program. Emotional competence variables were measured prior to the intervention and 9 weeks later, at the end of the program. Results revealed significant improvements in the *emotional vocabulary, explicit emotional knowledge,* and *recognition of masked feelings.* Regarding the treatment effect for detecting masked feelings, we found that boys benefited significantly more than girls. These findings underscore the assumption that children's literature is an appropriate vehicle to support the development of emotional competence in middle childhood.

Keywords: emotional competence, emotion understanding and knowledge, literature-based intervention, after-school care center, second and third graders

INTRODUCTION

Over the past two decades, there has been an increasing interest in the importance of emotional competence not only in adults but also in children. Children with a high level of emotional competence are more able to regulate their feelings and are more successful at interacting with their peer group (Schultz et al., 2001; Smith, 2001; Trentacosta and Fine, 2010). They are not only quite popular among their classmates and make more friends but they also have better relationships with teachers (Ladd et al., 1999; Hamre and Pianta, 2001) and perform better academically (Gumora and Arsenio, 2002; Trentacosta and Izard, 2007; Denham et al., 2012). Thus, emotional competence is just as important as the improvement of cognitive and social skills.

Every individual will acquire various emotional skills in the course of his or her lifespan, thus becoming more and more emotionally competent. This paper uses the definition suggested by Saarni (1999, p. 5) who conceptualized emotional competence as a set of eight skills:

(1) Awareness of one's emotional state, including the knowledge that it is possible to experience mixed feelings
(2) Ability to discern others' emotions based on the knowledge about situational and expressive cues
(3) Ability to use the vocabulary of emotion and expression terms of one's (sub)culture

(4) Capacity of empathic and sympathetic involvement in others' emotional experience
(5) Understanding that inner emotional states do not need to correspond to outer expression, neither in oneself nor in others (masked feelings)
(6) Capacity for adaptive coping with aversive or distressing emotions by using self-regulatory strategies
(7) Awareness that the structure of relationships is largely defined by how emotions are communicated within the relationship
(8) Capacity for emotional self-efficacy

Saarni (1999) pointed out that these skills are not independent from each other because an increase in one skill can lead to gains in competence in one or more of the other skills. Like Denham (1998), she emphasized that each child has an emotional understanding and knowledge according to the child's age which can be practiced and increased only within the framework of interpersonal situations. The quality of interaction with parents as well as the management of emotions in interaction with peers or teachers is decisively influenced by the child's possession or lack of these skills. Thus, emotional and social competence are not entirely distinct: both follow overlapping developmental pathways and are complex, transactional, multifaceted constructs, consisting of a number of components (Rose-Krasnor, 1997; Saarni, 1999; Halberstadt et al., 2001) which are influenced by the continuous interplay between internal (e.g., ego identity,

emotional self-efficacy) and external (e.g., school practices) factors (Humphrey et al., 2010).

The transition from kindergarten to elementary school can be regarded as an important milestone for social emotional development. With the start of kindergarten or school, the daily emotional challenges children have to face become more manifold, complex, and intensive. It is not only the case that children's attachment needs with peers, (Salisch, 2001; Kerns et al., 2006) as well as with teachers, (Hamre and Pianta, 2001; Garner and Waajid, 2008) play an increasingly important role—the emotional lexicon, viewed as the comprehension and the use of mental states with an emotional dimension, also grows decisively in the time period from kindergarten to fifth grade (Baron-Cohen et al., 2010). Thus, it is especially important to foster emotional competence in elementary school, that means to train children explicitly in understanding how certain situations evoke specific emotions, in how to reflect one's own and others' emotional experience and in how to talk in an adequate way about them.

To improve emotional competence, intervention programs designed for children can play a major role. Nevertheless, Buckley et al. (2003, p. 11) criticize:

> "Intervention programs most often emphasize broad social competencies as opposed to emotional competencies (…). For the most part existing assessment tools focus on three specific skills of emotional competence: emotional expression, empathy, and adaptive coping (see skills 3, 4, and 6). Less attention has been given to the remaining three skills: emotional awareness, understanding the emotions of others, and emotional dissemblance (see skills 1, 2, and 5). Given that the skills of emotional competence are reciprocally related, these omissions present a noteworthy limitation."

Indeed, the socialization of emotional competence includes not only behavioral but also emotional understanding and knowledge aspects (i.e., knowledge about one's own feeling, emotional dissemblance). The level of a child's understanding of emotions or emotional knowledge is one essential source of individual differences that correlates with socioeconomic status in the peer group, attachment to teachers and school achievement (Izard et al., 2001, 2008; Miller et al., 2005). For instance, children with a low level of emotion knowledge are often rejected by peers, what in turn leads to withdrawal and, under vulnerable dispositions, to social anxiety (Schultz et al., 2001) or other, more externalizing, behavior problems (Speltz et al., 1999). In addition, Izard et al.'s (2001) path analysis identified emotion knowledge as a mediator of associations between verbal ability and academic competence. They argued that deficits in this ability, viewed as misperception or misinterpretation of emotion cues, contribute to negative behavioral outcomes and learning problems. Furthermore, to be aware of one's own feelings and to acknowledge associated causes can be seen as a resilience factor in adolescence. For example, a teenager who is able to be aware of his or her own feeling of anger has a lower risk of drug abuse (Hessler and Katz, 2010). In sum, the knowledge and understanding aspects of emotional competence provides the foundation for emotional communication and social relationships with a long-term effect on motivational, psychological, occupational, and private development (Saarni, 1999; Izard et al., 2001; Trentacosta et al., 2006).

Furthermore, children in elementary school with lower emotional competence not only exhibit poorer academic development but they may also have less opportunity to improve their emotional skills, both at home and in the classroom. Therefore, a process that promotes emotional knowledge and understanding needs to be implemented within the framework of the peer group.

From the aspect of an adequate means to influence and enhance emotional competence, it is evident that a large body of stimulus material can be found in the field of children's literature (Hogan, 2011). Through the reading of books which explicitly represent emotional experience through words, children gain not only in their cognitive abilities but also in their emotional knowledge (Beazidou et al., 2012). Obviously, both language abilities and the representation of emotional processes can be communicated via the framework of children's literature (Hogan, 2011; Isbell et al., 2004; Wasik et al., 2006). Beazidou et al. (2012) indicated that, if teachers use the right literacy strategies, children's books hold the potential to increase the specific emotional vocabulary (see skill 3). Moreover, storybook reading provides the opportunity to adopt several emotional perspectives of various characters and to engage children in emotional discourse (Hogan, 2011).

Language abilities, especially the presence of an emotion vocabulary, operate as a key factor in increasing emotional competence (Saarni, 1999, 2002). For instance, Troesch et al. (2012) showed that language skills predicted emotional knowledge in kindergarten children with an immigrant background. Indeed, a considerable amount of research revealed not only a significant relationship between language and emotional competence (Cutting and Dunn, 1999; Izard et al., 2001; Schultz et al., 2001; Harris and Pons, 2003; Pons et al., 2003; Bosacki and Moore, 2004; Beck et al., 2012), but also demonstrated that children with language impairment have limited abilities in several aspects of emotional competence (Redmond and Rice, 1998; Lindsay and Dockrell, 2000; Ford and Milosky, 2003; McCabe and Meller, 2004; Brinton et al., 2007; Nelson et al., 2011). This is in line with new research results that confirm a strong interrelation between various facets of emotional and language competences in middle childhood (Beck et al., 2012).

Altogether, it seems that language and literature are appropriate vehicles to develop emotional knowledge. Nevertheless, after thoroughly reviewing the existing literature we did not find any study that explicitly used the interactive reading of books to foster emotional competence in middle childhood. Hence, the major aim of the present study was to develop and evaluate a new intervention program on the basis of children's literature aimed at improving emotional competence in children within the peer group setting. The development of adaptive and age-appropriate material and techniques was ensured by an interdisciplinary research team consisting of psychologists, linguists, psychiatrists, and literary scholars. Within the intervention program, the following aspects of emotional competence should be addressed: the understanding of emotions and emotional processes of others (in children's literature), and the conscious perception and comprehension of emotional dissemblance and mixed feelings as well as emotional language in the story.

DEVELOPMENT OF THE LITERATURE-BASED INTERVENTION READING AND FEELING

Particular attention was paid to the selection of the book. It needed to be age-appropriate, and it had to offer stimulus material for our subsequent work on the emotion-focused goals of the intervention. The book was selected in cooperation with specialists of children's literature and children themselves. The final decision was made in favor of the book *Ein Schaf fürs Leben* (English title: Sheep with boots) written by the Dutch author Matter (2003). A literary analysis was conducted by a literary scholar in order to ensure the age-appropriateness of the book.

Certain characteristics of *Ein Schaf fürs Leben* (Matter, 2003), a story about a wolf and a sheep, were important for our decision to use it for our intervention: the emotional states and related thoughts, action tendencies, the physical body, and the facial expressions of both—the protagonist (the wolf) and the antagonist (the sheep)—are described in great detail. In addition, the wolf displays a lot of masked and mixed feelings while the sheep is very emotionally direct and displays congruence between inner state and outer expressions. The book explicates behavioral tendencies and the regulation of an emotion using the example of anxiety. Thus, *Ein Schaf fürs Leben* provides its readers a stage for various forms of empathetic shifts in perspective and can be considered to be an adequate stimulus material.

The content of the book was divided into units to be read and discussed by the participants. The length of the intervention was set to eight sessions of 90 min each. In addition, the general and detailed aims for each of the eight units were specified. Finally, an intervention manual with detailed explanations (e.g., precisely formulated, open questions concerning the text) was developed. Each reading unit was discussed after a first draft by our interdisciplinary research team and evaluated in terms of helpful learning strategies and age-appropriateness before it was included as part of the manual. An overview of the eight units composing the READING and FEELING program is given in **Table 1**.

Each of the eight sessions included the introduction of the topic (by reading the selected text), a free discourse concerning the present topic, a structured group activity (often with body experiences, theater, or other creative techniques) and individual silent work (by using an emotion diary). During discourses concerning the selected text, the intervention instructors were encouraged to share their experiences and feelings with the group and, thus, assist as a role model in demonstrating appropriate emotional communication skills (Waliski and Carlson, 2008). Furthermore, the instructors were trained to support the group processes: with the help of open questions, they should enable each child to participate as a full member of the literature discussion group and to verbalize own thoughts about the text in order to learn that one's own personal interpretation might differ from the interpretation of peers (Astington and Filippova, 2005; Certo et al., 2010).

Prior to the intervention, parents received a letter containing detailed information about the reading program and about how the acquired data would be utilized. According to government regulations, parental authorization was required for the free participation of all children in the READING and FEELING program (LDA Brandenburg, 2010). To support the aims of the intervention, we especially encouraged them to answer all questions raised by their children about emotions during the course of the 8-week program.

The development of the literature-based intervention aimed at increasing four language-related emotional competences: explicit emotional knowledge, emotional vocabulary, detection and appropriate labeling of mixed feelings, and recognition of masked feelings. Primarily, we wanted to know whether the READING and FEELING program is an appropriate vehicle to increase emotional competence in second and third graders. In addition, we sought to determine whether children had increased their capability of analyzing and understanding texts.

MATERIALS AND METHODS
DESIGN

The study was carried out in the form of a controlled quasi-experimental intervention and control group design ($n = 208$) with pre- and post-test assessment. An equal number of intervention and control group children were selected from ten after-school care centers. Children were asked to participate in the intervention or the control group as part of their afternoon care program. The control group took part in the regular day care program, i. e., the children were playing in groups instructed by an educator. The major aim of the evaluation study was to find out whether replacing the regular daycare program by a literature-based intervention would increase emotional competences. The educators were asked to assign the children to one of the two groups. Finally, 15 groups, each with seven children, participated in our intervention program during two consecutive weekly lessons (45 min per lesson) over a period of 8 weeks. All children (including the 104 in the control group) were tested before the first session of the intervention and directly after the last session of the intervention (in the following called "time t1 and t2").

Prior to the program implementation, four intervention instructors were specially trained and prepared during a 2-day training session based on a standardized intervention manual (description and overview; see **Table 1**). The instructors then had the opportunity to practice teaching the lessons. All of the intervention instructors were aged between 30 and 40 years. In all but one case, they were students of psychology who had already successfully completed an apprenticeship in a corresponding professional area and, in some cases, they even possessed working experience in the educational field. Weekly supervision sessions with the intervention instructors were implemented to ensure the accuracy, quality, and consistency of the program across the 15 groups. Thus, any problem that arose could be addressed, discussed, and supervised in the supervision sessions.

SUBJECT SELECTION AND DATA COLLECTION

Participants were recruited from 10 after-school childcare centers in a small city in Brandenburg, which is a federal state of Germany. Brandenburg has a very low proportion of immigrants (2.6%). Consequently, ethnic minorities were severely underrepresented in the present sample of children. Ninety-eight percent of the participants were Caucasian, while four children were either Asian or African. A majority of the children (98.1%) were German-speaking (monolingual), while a minority of the participants was speaking another mother tongue such as Vietnamese or Lingala.

Table 1 | Overview of eight lessons for the literature-based intervention READING and FEELING.

Topic	Aims	Diary of emotion tasks
1. Reading unit: The evaluation of an emotional stimulus from the perspective of the protagonist	Reflect on implicit prejudices related to the role models in the children's book (sheep/wolf). When considering techniques of sensory perception, motor actions and introspective experience show that emotions are interactions between feeling, thinking, and behavior (e.g., embodied experiences with the verb "trotting"). Affective empathy: Empathize with the perspective of the protagonists and assign them appropriate emotions.	Semantic research project: Elaborate on the term "experiences" (a key concept in the book) through personal interviews with others and observation
2. Reading unit: The difference between true and masked feelings	Work out the different emotional motivations of the two protagonists for the example of the emotion "joy": The sheep shows emotions directly/the wolf hides his intention. Work on the connection between the valence of emotions and the showing of emotions directly or masking them. Clarify the meaning of the term "experiences." Understand that emotions can be recognized by describing movements, facial expressions, gestures, and breathing.	Emotion reporter: Interview other people about the topic "hiding/masking emotions"
3. Reading unit: Masked feelings	Introduction and development of the topic "masked feelings" by analyzing relevant text excerpts. Lying and body language: examine the indicators that make masked feelings readable. Narrative abilities: present progress of the story visually and continue telling the story with the help of a different illustration.	Emotion reporter: Interview people on "mixed feelings"
4. Reading unit: Mixed feelings	Introduction and development of the topic "Ambivalence of feelings/mixed feelings": after playfully imitating the two opposite inner voices of the wolf, passages with two different emotions are analyzed to promote understanding of the connection between inner voices and emotions. The inner voices of wolf and sheep are hidden in the text. Those feelings have to be extracted from the text so that they become apparent.	Emotion reporter: Interview people about "fearful situations" and how they handle them
5. Reading unit: Inner voices of the characters and their feelings.	Closer look at the connection between inner voices and emotions, in picking up the inner phrases (aspects of the last unit), and physiological aspects of an emotion. Corresponding emotions are to be assigned to the inner voices. Individually select inner voices in the text. Experience that the inner voices in the new text unit elicit fear. As an example examine the feeling of fear: Recognize the sheep's emotion, name it, and describe the four components of perception.	Emotion reporter: Collect emotion words for 1 week and write them down
6. Reading unit: Coping with anxiety and changeability of feelings	Understand that sheep and wolf change due to their (emotional) encounter. (Make reference to the stereotypical prejudices of the first reading unit.) Use the character of the wolf to show that emotions change. Bring up the wolf's perception and coping strategy for fear based on the text.	Bring a stuffed animal or a pillow to the next meeting.
7. Reading unit: Memorization	Memorize by listening: The whole story is presented as an audio book. By this, the children have the opportunity of repeating the topics they have worked on so far.	
8. Reading unit: Applying the newly acquired knowledge to a different text.	"Emotion-in-text-task": The children will apply their newly gained knowledge to an unfamiliar text during the reading exercise. Note: The children in the control group complete the same exercise.	

The children completed one unit per week; one unit consisted of two subsequent lessons (45 min each). The diary of emotion was completed by the children between the different units.

Within each of the 10 after-school childcare centers, a minimum of two groups (an intervention group and a control group with seven children each) were created. In sum, 208 second and third grade children were selected for the study.

To determine the appropriate sample size, we consulted power tables for research designs where the assignment to the intervention or control group is not done on the level of individuals but on the level of groups. This was necessary because our literature-based intervention is a group-based program. We assumed a medium effect size of the intervention, a small intraclass correlation, and we determined that each group should consist of seven children because this group size seemed to be appropriate for implementing the literature-based intervention. According to power tables, 15 intervention groups of seven children each were needed (Barcikowski, 1981). Thus, 104 intervention group children (65 female; 30 7-year-olds, 50 8-year-olds, 24 9-year-olds) and 104 control group children (62 female; 31 7-year-olds, 55 8-year-olds, 18 9-year-olds) completed emotional competences tests before the intervention (t1). At time t1, the mean age in the literature-based intervention group was $M = 7.94$ (SD = 0.72) and in the control group, $M = 7.91$ (SD = 0.72).

Due to illness and relocation we experienced 6% attrition. Therefore, we conducted a logistic regression to analyze whether systematic dropouts existed in terms of sex, age, language, and emotional competence variables. Regarding the observed variables, there were no systematic dropouts at the post-test [χ^2 (7) = 8.43, $p = 0.30$]. At time t2, the mean age in the intervention group was $M = 8.13$ (SD = 0.72) and in the control group, $M = 8.06$ (SD = 0.66).

MEASURES

The present study assessed emotional and language competence as well as text analysis capability as follows:

Emotional competence variables, which we expected to change due to the intervention (emotional vocabulary, identification of masked feelings, explicit emotional knowledge, ability to discover mixed feelings), were assessed prior to (t1) and after the intervention (t2) with the help of a board game that was specifically developed for this purpose. In order to control language proficiency, multiple facets of language competence were measured at t1. Research assistants conducted direct assessments with children in the control group and intervention group in quiet locations at the after-school childcare centers. Each assessment involved a face-to-face interaction between the investigator and each tested child, which lasted for approximately 1½ h.

In addition, the text analysis capability of the children concerning different emotional aspects (performed only once at t2) was measured in the framework of a group test. Using a new text, the children were supposed to complete a reading exercise and apply the knowledge they had obtained throughout the course of the literature-based intervention. This *emotion-in-text-task* comprised the last session of the emotion-centered literary program. Control children also completed this task, and this assessment was carried out as a paper-and-pencil version suitable for group testing. The children worked independently on the emotion-in-text-task with limited response time.

EMOTIONAL COMPETENCE VARIABLES

The *laboratory of feelings* is a board game consisting of five rooms drawn on the board through which the child must lead the figure of a Martian who does not know what emotions are. In each room the child has to solve a riddle or to answer questions about emotions in order to help the Martian understand the concept of emotions. This board game allowed the assessment of the following areas of emotional competence:

Emotional vocabulary

After being asked *Please name all of the different feelings you can think of*, children should list all the feelings they could think of (see also Kusche et al., unpublished). Children received one point for each correctly stated feeling but none for an incorrect response (e.g., the description of the behavior). The target variable was the number of correctly listed feelings (open–ended response format).

Explicit emotional knowledge

In response to a short sample situation (*e.g., "Imagine a boy, let's call him Peter. Peter plays in a soccer game and he just scored the winning goal"*) we asked the children five questions concerning different components of an emotion (Scherer, 2001): (a) The conceptual attribution or label for the feeling in the given situation (How does Peter feel?), (b) Peter's thoughts concerning that feeling, (c) the physiological reaction involved in that feeling, (d) the behavioral tendencies connected with that feeling, and (e) the facial expressions and body language that go along with that feeling. Sample situations were provided for five basic emotions: joy, sadness, surprise, fear, and anger. One point was given for each component answered correctly and none for an incorrect response. Thus, children were assigned a number of points ranging from 0 to 25 (Cronbach's α pre-test = 0.75; α post-test = 0.75). All responses were assessed by two independent, trained raters. Interrater reliability was computed on 625 randomly selected answers (Cohen's κ pre-test = 0.93; κ post-test = 0.91).

Recognition of masked feelings

After listening to a short story, the children had to recognize if somebody was masking or hiding his/her real feeling and to identify the true feeling. A multiple choice response scale with four categories was presented with the instruction to choose one answer. The scale consisted of six items presenting short stories according to which the children had to estimate the hidden feelings of two people. For example: *Peter comes home. His parents have been arguing repeatedly in recent months. "Is Daddy there?" he asks. His mother sighs and says in a husky voice. "Hmm …, not tonight. No." Then she claps her hands, smiles and shouts a bit too cheerfully: "To the table, rascal! I've made you a pancake!" Peter does not think it is a good sign if Dad is not there. He feels lonely and like he is being let down by the whole world but he smiles and responds: "Wow, delicious pancakes!" What feeling is Peter masking? What feeling is his mother masking?* (*Response possibilities:* joy, disgust, sadness, pride, anger). The task was considered to be correct only if the child correctly recognized the masked feelings of both people. (The items are homogeneous according to a one parameter logistic test model, model-based reliability estimates: pre-test:0.61; post-test:0.60).

Recognition of mixed feelings

After listening to a short story (presented on the computer), the children had to decide what the protagonist was feeling. A multiple choice item with four categories (two of them correct) was provided for each story. The children had to select the correct two feelings by pressing a computer button. The target variable was the number of correctly detected feelings. This scale covered seven situations. Item example: *imagine that you spent your vacation together with your beloved grandmother. Today is the day of your departure. Your grandmother brings you to the train station and at the last moment she gives you a present that you have been wanting for a long time. What are you feeling? Response possibilities: sadness, anger, jealousy, happiness, and/or disgust.* (The items are homogeneous according to a one parameter logistic test model, model-based reliability estimates: pre-test:0.61; post-test:0.63).

To avoid memory effects from the pre- to the post-test, parallel tests with different stories were developed for the recognition of masked and mixed feelings as well as for the knowledge about different dimensions of emotions. All new measures that were developed by the authors were checked for reliability, validity, and feasibility during preliminary studies.

LANGUAGE COMPETENCE VARIABLES

In order to control for differences in language competence, a measure of general language abilities was constructed and used as a covariate in further analyses. In the study, the following facets of language competence were assessed.

Receptive vocabulary

To measure the receptive vocabulary, the German adaptation of the Peabody Picture Vocabulary Test (PPVT) from Dunn and Dunn (2004) was used. In this test the children had to match an image with the correct word. For each item four possible images were presented. This test consisted of 88 computer-based items. Internal consistency was $\alpha = 0.83$. For each correct answer, one point was given.

Literacy

We assessed children's reading comprehension by using the "Information comprehension test for primary schools," (ELFE; Lenhard and Schneider, 2006). ELFE 1–6 is a reading comprehension test that is used for children from first to fifth grade. For our purposes we used the computer-based version of the test. Reading comprehension is assessed on the basis of the following aspects adding up to three subscales: comprehension of words, comprehension of phrases, and comprehension of texts (comprehensive reading). According to Lenhard and Schneider (2006), Cronbach's α varies between $\alpha = 0.92$ and $\alpha = 0.97$.

Verbal fluency

To assess semantic-lexical skills, children were encouraged to list as many animals as possible in 60 s. No point was given for repetitions. The calculated interrater reliability of this test was Cohen's $\kappa = 0.90$.

Narrative abilities

Within the scope of this test of narrative skills, children were encouraged to tell a story based on the textless picture book

A Boy, a Dog, a Frog and a Friend (Mayer and Mayer, 1971). The children's narratives were coded by two independent raters regarding the presence of 25 basic components (e.g., the introduction of the characters, fading of goal one, conflict theme one, resolution of conflict one, and so on). The interrater reliability computed on the basis of 20 randomly chosen narratives is Cohen's $\kappa = 0.87$. The test has an internal consistency of $\alpha = 0.87$. As another aspect of children's narrative skills we assessed the applied evaluative devices (ED). ED form a heterogeneous group of interpretative, linguistic devices including explicit and implicit perspective marks. These perspective marks are used to make a story more exciting and to guide the attention of the listener. According to the categories of Reilly et al. (1990) and Bamberg and Damrad-Frye (1991), the following linguistic marks were coded by two independent raters: mental states (e.g., to think, to know, to remember, to believe), causality (why, because), verbal marks of being unsure (e.g., maybe), onomatopoeic telling (e.g., the dog barks: "woof woof"), and negation (something is marked by a negation: e.g., He had *no* parents). The computed interrater reliability of 20 randomly chosen narratives was Cohen's $\kappa = 0.90$.

A factor analysis showed that these facets measure a general factor of language abilities (Beck et al., 2012). Thus, a language factor score for every child was calculated by computing an intial principal component analysis.

TEXT ANALYSIS CAPABILITY

Emotion-in-text-task

To test the increase in children's general analysis capability of different emotional aspects in children's literature, we conducted an emotion-in-text-task (this was also carried out with the children in the control group). Each child had to stop at five tables situated in a room. At each table the child was required to answer emotion-focused questions to a text excerpt. Before beginning this test, the test instructor determined that each child was capable of understanding the underlying text. This was important because all tasks were time limited and based on five different text excerpts from one and the same underlying text. Furthermore, all tasks (the children completed in rotation) were related to issues that had been processed in the emotion-centered literary program. Thus, children had to recognize mixed and masked feelings, to locate and detect emotional words on the basis of another text excerpt, and to mark the components of an emotion (cognitive, physiological, expression, and behavior tendencies). Furthermore, they had to label a feeling after reading the description of an emotional situation. The reliability of this scale was $\alpha = 0.64$.

DATA ANALYSES

To test the effects of the literature-based program, a multivariate, manifest Change-Model was conducted. The analysis was performed with the computer program Mplus (Muthén and Muthén, 2010). Since the children were educated in small groups we had to include the multilevel structure in the database by selecting the MLR Complex estimation method. Thus, a cluster variable was incorporated in the model for the small group membership. Furthermore, the missing values were

taken into account by the use of the Mplus full-information maximum likelihood estimator. The model is displayed in **Figure 1**.

The independent variables were language competence, age, group (intervention versus control), sex, and the interaction of the latter two. The correlations between the five independent variables were permitted. As already mentioned, for language competence we performed a confirmatory factor analysis (CFA) including the variables of receptive vocabulary, literacy, verbal fluency, and narrative abilities (Beck et al., 2012). The age variable was centered.

The dependent variables were emotional vocabulary, explicit emotional knowledge, recognition of masked feelings, and recognition of mixed feelings. In the multivariate Change-Model, the difference values for all four variables of emotional competence were defined so that for each criterion variable an intercept and a

slope could be estimated. The correlations between the residuals of the criterion variables were permitted—also across the various facets of emotional competence.

For the analysis of the emotion-in-text-task, we conducted an ANCOVA with the between-subject factor group (control/intervention) and the control variables language competence and age.

RESULTS

RELATIONSHIPS BETWEEN THE INDEPENDENT VARIABLES

Correlations of the five independent variables as well as means and SDs are depicted in **Table 2**. We found a significant positive relationship between language competence and age ($r = 0.22$, $p < 0.01$). Moreover, the interaction of the group and sex variables correlated with the factor group ($r = 0.67$, $p < 0.01$) and with sex ($r = 0.53$, $p < 0.01$). Apart from that, there were no significant
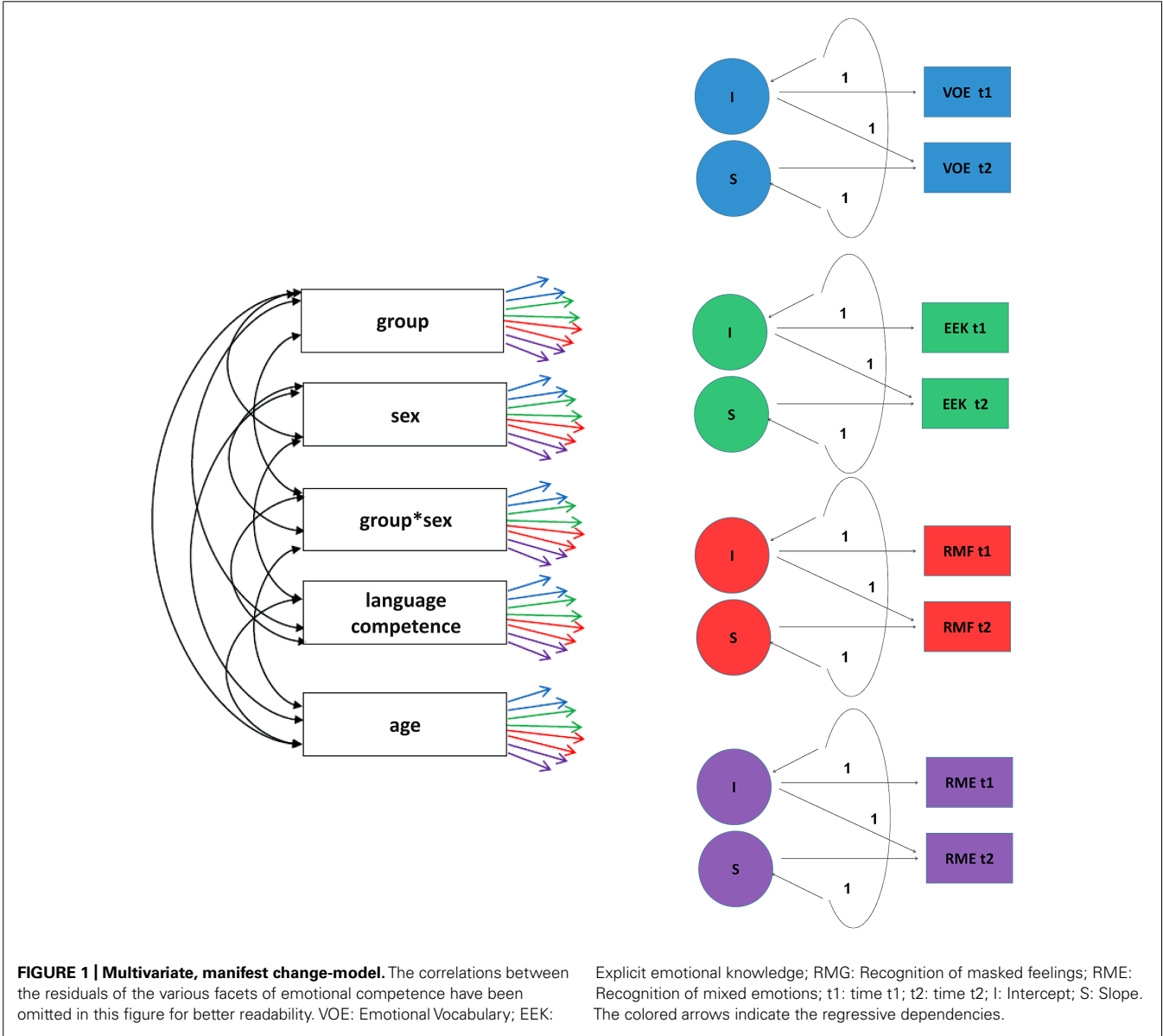

FIGURE 1 | Multivariate, manifest change-model. The correlations between the residuals of the various facets of emotional competence have been omitted in this figure for better readability. VOE: Emotional Vocabulary; EEK: Explicit emotional knowledge; RMG: Recognition of masked feelings; RME: Recognition of mixed emotions; t1: time t1; t2: time t2; I: Intercept; S: Slope. The colored arrows indicate the regressive dependencies.

Table 2 | Correlations between the independent variables and descriptive Statistics.

	1	2	3	4	5
(1) Group	1				
(2) Sex	0.02	1			
(3) Group*Sex	0.67**	0.53**	1		
(4) Language competence	0.08	0.08	0.08	1	
(5) Age	0.02	0.01	−0.04	0.22**	1
M	0.50	0.61	0.31	0.02	−0.00
SD	0.50	0.49	0.46	4.29	0.71

$n = 205$, **$p < 0.01$ (two-tailed).

correlations. In addition, the descriptive statistics showed that the average of language competence (due to the principal component analysis) and age (due to centering) is zero.

EFFECTIVENESS OF THE LITERATURE-BASED INTERVENTION READING AND FEELING

Results of the Change-Model are presented in **Table 3**. The regression weights of intercepts revealed that no significant group differences existed at time t1. Prior to the intervention, the two groups had (in all four dependent variables) equal levels of emotional competence and did not differ by sex, (control or intervention) group and the interaction of both. In addition, we found significant correlations between language competence and each facet of emotional competence ($p < 0.001$) at time t1. Based on these results, we can conclude that the two groups were compatible prior to the intervention. Moreover, it became obvious that children with a higher level of language competence had an initial better test result in emotional competence.

The regression weights of slopes showed that the factor group significantly predicted the improvement in three facets of emotional competence to the benefit of the intervention group. Children in the intervention group reached a significant enhancement in their emotional vocabulary ($B = 1.25$, $p < 0.001$), explicit emotional knowledge ($B = 1.32$, $p < 0.05$) and recognition of masked feelings ($B = 1.05$, $p < 0.001$) compared to the children in the control group. It should be noted that the intervention effect with respect to the recognition of masked feelings was moderated by sex (interaction of sex and group: $B = -1.14$, $p < 0.05$). In terms of this variable, boys profited significantly more than girls. No significant treatment effect was found with respect to recognition of mixed feelings.

GENERAL TEXT ANALYSIS CAPABILITY

We calculated the intraclass correlation coefficient (ICC) to test whether we had to take into account the clustering effect concerning the *Emotion-in-text-task-scale*. With an estimate of 0.001, the ICC was extremely low; therefore, it was not necessary to correct the *SE*s. To investigate if children of both groups differ significantly in their text analysis skills after the intervention, we calculated an ANCOVA with the between-subject factors group and sex, controlling for language competence and age. A partial eta-square of

$\eta^2 = 0.00$ and $F(1, 125) = 0.44$ revealed no difference between the self-reliant text analysis skills of both groups ($p = 0.51$), but there was a gender effect in favor of girls concerning the *emotion-in-text-task* scale with $F(1, 125) = 9.88$, which was significant with a partial eta-square of $\eta^2 = 0.08$ ($p < 0.01$). However, no interaction was found between the factors group and sex [$F(1,125) = 0.69$, $p = 0.42$, $\eta^2 = 0.01$].

DISCUSSION

The results of the current study generally support the assumption that a literature-based intervention increases emotional competences in children. The READING and FEELING program had a particularly beneficial effect on the enhancement of *emotional vocabulary* and *explicit emotional knowledge* of second and third graders. Furthermore, the effects of the program partly varied by gender of child. Thus, especially boys were positively influenced in their capability to *recognize masked feelings*. Overall, the current study confirms our hypothesis that children's literature can be used as a model for analyzing everyday emotional processes and can consequently support emotional development.

Regarding the increase of emotional vocabulary and explicit emotional knowledge, we assume that the active, varied, and exciting approach contributed to the enhancement—particularly the variety of different learning techniques (Beazidou et al., 2012). As can be seen in **Table 1**, participants were engaged in several ways to highlight and discuss the different emotional perceptions of the story's protagonists (e.g., the description of emotional expressions, interactions, related thoughts, and behavior in emotion-laden situations).

The explicit emotional knowledge refers to the ability to understand an emotional experience as a complex occurrence consisting of different components (Scherer, 2001). To ensure the promotion of explicit emotional knowledge, we highlighted, discussed, and experienced the various components during program lessons in manifold ways. For example, children had the opportunity for body experiences: in order to better understand what the verb "trotting" in the story means—the children were supposed to imagine and then to act out what it looks like when the protagonist is trotting through the snow. With the involvement of further instructions such as "*What feeling(s) might be associated with this way of moving?*" and "*Is this a good or a bad feeling?*," children learn (through conscious self-perception during motor actions) that the way of *moving* is directly connected to a feeling. Thus, the intervention promoted children's active attempts to realize and understand the interaction between feeling, thinking, and behavior.

Moreover, the teachers were explicitly trained to act as role models by using elaborated words for feelings and explaining them and by giving information regarding emotions (Weare, 2000; Beazidou et al., 2012). Our intervention instructors were not only trained and encouraged to be role models by verbally expressing their emotions, but were also reminded on a weekly basis to explain feelings precisely. It might be that this verbal behavior of the teacher especially supported the enhancement of emotional vocabulary in children. In future studies, a collection of explained words or concepts for emotions would provide additional useful information.

Table 3 | Parameter estimates, standard errors and beta's for the emotional competence measures.

	Intercept			Slope		
	B	SE	β	*B*	SE	β
Emotional vocabulary						
Group	−0.10	0.43	−0.03	1.25***	0.36	0.28
Sex	−0.08	0.30	−0.02	1.09***	0.26	0.24
Sex*Group	−0.23	0.46	−0.06	−0.92	0.52	−0.19
Language competence	0.13***	0.03	0.30	−0.00	0.03	−0.01
Age	0.21	0.17	0.08	−0.46*	0.24	−0.15
Explicit emotional knowledge						
Group	0.39	0.82	0.05	1.32*	0.74	0.19
Sex	0.34	0.43	0.04	1.11	0.58	0.15
Sex*Group	−0.14	0.89	−0.02	−1.52	0.95	−0.20
Language competence	0.44***	0.06	0.49	−0.11*	0.05	−0.13
Age	0.14	0.43	0.03	1.52	0.39	−0.02
Recognition of masked feelings						
Group	−0.29	0.24	−0.12	1.05***	0.36	0.29
Sex	−0.18	0.21	−0.07	0.59	0.34	0.16
Sex*Group	0.17	0.32	0.07	−1.14*	0.49	−0.29
Language competence	0.07***	0.02	0.25	0.10**	0.03	0.23
Age	−0.25**	0.09	−0.14	−0.35**	0.14	−0.14
Recognition of mixed feelings						
Group	0.09	0.28	0.03	0.25	0.35	0.08
Sex	0.36	0.29	0.11	0.20	0.42	0.06
Sex*Group	−0.00	0.37	−0.00	−0.55	0.48	−0.16
Language competence	0.15***	0.03	0.43	0.03	0.03	0.07
Age	0.20	0.14	0.09	−0.37*	0.17	−0.16

n = 205; control group = 0, intervention group = 1; male = 0, female = 1; *p < 0.05, **p < 0.01, ***p < 0.001.

In addition, results revealed a significant difference between participating and non-participating boys: boys in the treatment group especially improved their ability to recognize masked emotions, compared to the boys who were in the control group. How can we explain that this variable was affected most by the intervention in the group of boys? According to Saarni's (2002) motivational categories, it is suggested that especially for boys in adolescence the ability to mask their feelings is a strategy to protect their self-esteem, to avoid negative consequences, and to manage their emotions according to the scripts of cultural display rules. Boys have to mask their feelings of anger and sadness within the peer group in order to avoid being teased (Zeman and Shipman, 1997). Therefore, it might be that, for boys, the knowledge about masked feelings is of special interest in order to prepare them for future developmental challenges such as adolescence (Brody and Hall, 1993; Zeman and Shipman, 1997). However, for boys, the aim of promoting the understanding and the use of hidden feelings in social interactions with the help of children's literature has been achieved. Furthermore, the significantly higher score in the recognition of masked feelings could be due to the fact that the boys identified themselves more with the figure of the wolf in the book than the girls did.

The findings of the current study are limited in respect to two measured variables: no significant improvement could be detected in the recognition of mixed feelings as well as in the general ability to analyze literary texts. Altogether, it seems possible that second and third graders may simply have been too young to understand the complex concept of mixed feelings. Indeed, developmental research found that the ability to perceive and verbalize ambivalent feelings is only reliably available in later children's development, at the age of 10 − 11 years (Salisch and Kunzmann, 2005). Another explanation for this finding may be that an 8-week literary intervention might be too short to perceptibly improve the ability to recognize and identify mixed feelings. Nevertheless, the program may have triggered important learning processes in terms of this variable with an effect that is detectable only later.

In addition, the results of the emotion-in-text-task indicated that the literature-based intervention did not noticeably increase the ability to deal with a new text excerpt in a text-analytic way. One reason might be that the techniques we used for explaining emotional phenomena during the intervention did not improve

the literary analysis capacity in general. On the other hand, it is also possible that effectiveness with respect to this variable becomes evident only over time. Consequently, in future studies a follow-up assessment could provide insights into long term effects on the recognition of mixed feelings and the ability to analyze a literary text.

FUTURE IMPLICATIONS AND DIRECTIONS

In summary, our findings indicate that our relatively short literary program is a feasible and promising intervention to stimulate greater understanding of emotions and emotion-related phenomena that was successfully implemented in 104 children in after-school care. The implementation of the literature-based intervention has shown that—contrary to behavioral-based approaches used in most interventions—a literary approach can influence children on a cognitive-affective level. This implies as well that the changes are not context specific. Rather, they form the foundations on which this new knowledge can be applied in a variety of different settings. Furthermore, we consider the greatest strengths of the present study to be found in the interdisciplinary approach (combining psychology and comparative literature) and the high degree of standardization of the methods and measures (e.g., the development of a manual with precisely formulated questions or the training and weekly supervision with the intervention instructors).

In conclusion, although further studies are required for analyzing the conditions under which emotional competence is best promoted in children, our present findings can be considered as an appeal for utilizing the multifaceted opportunities children's literature provides in the school environment. Not only are early academic skills promoted by children's literature, going beyond this, it also provides the potential to foster the theoretical education of emotional competence as well as social relationship skills through presentation in an emotion-focused way.

ACKNOWLEDGMENTS

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Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

PERVALE-S: a new cognitive task to assess deaf people's ability to perceive basic and social emotions

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A poorly understood aspect of deaf people (DP) is how their emotional information is processed. Verbal ability is key to improve emotional knowledge in people. Nevertheless, DP are unable to distinguish intonation, intensity, and the rhythm of language due to lack of hearing. Some DP have acquired both lip-reading abilities and sign language, but others have developed only sign language. PERVALE-S was developed to assess the ability of DP to perceive both social and basic emotions. PERVALE-S presents different sets of visual images of a real deaf person expressing both basic and social emotions, according to the normative standard of emotional expressions in Spanish Sign Language. Emotional expression stimuli were presented at two different levels of intensity (1: low; and 2: high) because DP do not distinguish an object in the same way as hearing people (HP) do. Then, participants had to click on the more suitable emotional expression. PERVALE-S contains video instructions (given by a sign language interpreter) to improve DP's understanding about how to use the software. DP had to watch the videos before answering the items. To test PERVALE-S, a sample of 56 individuals was recruited (18 signers, 8 lip-readers, and 30 HP). Participants also performed a personality test (High School Personality Questionnaire adapted) and a fluid intelligence (*Gf*) measure (RAPM). Moreover, all deaf participants were rated by four teachers for the deaf. Results: there were no significant differences between deaf and HP in performance in PERVALE-S. Confusion matrices revealed that embarrassment, envy, and jealousy were worse perceived. Age was just related to social-emotional tasks (but not in basic emotional tasks). Emotional perception ability was related mainly to warmth and consciousness, but negatively related to tension. Meanwhile, *Gf* was related to only social-emotional tasks. There were no gender differences.

Keywords: emotional perception ability, deaf, assessing emotional perception, emotional knowledge in deaf people, emotional perception measure, adaptation criteria in deaf people

Introduction

Perceiving emotions is an important ability to build emotional intelligence (EI). As it was many times stated, the first branch (of 1997 Mayer and Salovey EI model) is clearly defined as perceiving emotions accurately in oneself and others (Mayer et al., 2004). Perception is a cognitive process, which has traditionally been divided into two interdependent directions: top–down and bottom–up (Kosslyn and Smith, 2006). According to Galotti (2008),

data-driven or bottom–up processing occurs when an interpretation emerges from the data. Perceiving emotional expressions "accurately" must thus be largely data-driven because it should reflect precision in the interpersonal relationships where emotions have an important role (Roberts et al., 2006; MacCann and Roberts, 2008; Grunes et al., 2013). In the case of bottom–up processing of emotional stimuli, the interpretation of an emotional expression scene needs to be determined mostly by information from the senses rather than expectations. Nevertheless, in many situations, knowledge or expectations are involved in emotional perception. This process is named schema-driven or top–down processing. Top–down perception processes encompass the mental abilities to drive both the observation and external stimuli into a priori concepts of an understanding exploration (Goldstein, 2008). As Bruner (1973) summarized, people perceive "beyond the information given" constantly in our mental processes, such as learning to add assumptions and supplemental information derived from past experience to the evidence of our senses to understand the emotional world. Likewise, the accurate perception of emotions should encompass both top–down and bottom–up processes.

To understand how deaf people (DP) perceive emotions, it is necessary to develop an instrument that considers how DP process information (input) from the emotional stimuli. While hearing people (HP) perceive emotions through different channels (iconic and echoic sense organs), DP use mostly iconic emotional inputs. Moreover, there are differences in the perception of iconic-emotion inputs between DP and HP. Strong evidence of this difference comes from the activation of the neural circuits for recognizing emotions. Signers (DP) have to identify other factors in facial expressions (other than the emotion) to compensate for the hearing impairment. Indeed, HP activate the right superior temporal sulcus (STS) while DP show bilateral STS activation, during emotional perception tasks (McCullough et al., 2005). This instrument should distinguish both basic and social emotional expressions according to Spanish codes for DP, as we explain in the Section "Materials and Methods."

The distinction between basic and social emotions have been based in the remarkably consistent findings provided by two experienced research teams led by Ekman and Izard about facial expressions and the distinction between basic and social emotions (see Ekman, 2006, for a deeper explanation). According to Ekman (1992), basic emotions have nine characteristics, which distinguishes from the rest of emotions. These well-known characteristics are: distinctive universal signal (1), physiology (2), and universals in antecedents events (3); also have presence in primates (4), coherence among emotional response (5), a quick start (6), a short duration (7), automatic appraisal (8), and, finally, unexpected occurrence (9). However, social emotions are defined as affective states that depend on the social context and arise when people interact each other, and they are related to the self as well (Lamm and Singer, 2010).

As emotion perception in the brain differs between DP and HP, the cognitive process involved (top–down or bottom–up) could differ as well. For example, Rieffe et al. (2003) indicated

that deaf children understand emotional emergence differently from their hearing peers. The authors proposed that hearing children are more interested on why an emotion arose, while deaf children seemed more attentive to the achievement of a desired emotional state, without reasoning much on why that state occurred (Rieffe et al., 2003). Another study investigated how DP process to a particular story. The authors found that DP kept less details than hearing peers, and that DP tended to make interpretations different from those of HP (Cambra et al., 2010). Meanwhile, Dyck and Denver (2003) and Dyck et al. (2004) have found differences between DP and HP in emotional iconic information processing. DP showed deficits in every single scale in comparison with HP, even when compared in the same age intervals (Dyck and Denver, 2003; Dyck et al., 2004). Thus, iconic perception is critical in the understanding of how DP perceive their environments (Ziv et al., 2013). Moreover, social emotion development involved more cognitive effort and time than basic emotions (Arsenio, 2003).

Evidence of how DP and HP differ in the iconic perception of emotions comes from a study of Letourneau and Mitchell (2011). The authors tested 12 HP and 12 DP who were beginners in American Sign Language to examine whether the specialized experience can alter typically observed gaze patterns. Participants had to "judge the emotion and identity of expressive faces (including whole faces, and isolated top and bottom halves), while accuracy and fixations were recorded" (Letourneau and Mitchell, 2011, p. 563). All individuals recognized faces more accurately from top compared to bottom halves, and emotional expressions from bottom compared to top halves. HP paid more attention to the bottom half when they had to evaluate an emotion. In contrast, DP fixated equally on the top and bottom halves regardless of task demands (identity or emotion). The authors suggested that DP could maximize their ability to gather information from expressive faces.

Another important deficit in emotional perception ability (EPA) in DP is prosody or intonation (Most et al., 1999). Important meaningful emotional information is conveyed in prosody, but DP are unable to access it. However, what happens when DP learn to speak? One way could be through cochlear implants. Wiefferink et al. (2013) compared performance in emotion recognition tasks between children with cochlear implants and hearing children. They found that (a) children with cochlear implants were less competent in the emotion recognition tasks than hearing peers, and (b) despite having cochlear implants, these children had some aspects of emotion recognition tasks affected, including their abilities to understand emotions conveyed non-verbally. A possible explanation is that children with cochlear implants may not have effectively developed prosody. However, it was evident that these children were able to understand language, albeit with "metallic" sounds (Kermit, 2009).

Another way for DP to learn to speak is through learning to read lips and spoken language. A few years ago, several European countries (including Spain) promoted various laws for developing language abilities in DP, especially bilingualism (sign language and oral language). An ability to read lips and develop oral language could be learned simultaneously or successively

(Acosta-Rodríguez, 2003). Being able to lip-read could be more advantageous in comparison to only signing. Ludlow et al. (2010) showed that only signing deaf children had problems in identifying emotions, and that this inability affected their social skills negatively. Both the delay in language acquisition and/or absence of oral language lead DP to lack opportunities for talking about their personal experiences, and therefore, fewer chances to develop normal emotional perception. Indeed, earlier acquisition of language in DP (signing and/or lip-reading) improved their scores in Theory of Mind (ToM) tasks (a top–down perception) on interpreting what emotions were experienced by others (Meristo et al., 2007; Glickman, 2009; Morgan et al., 2014). However, other studies did not find differences between DP and HP regarding their emotional, social, and communicative development (Masataka, 1996; Peterson and Slaughter, 2006; Meronen and Ahonen, 2008).

The relationship between EPA and social adaptation has been described many times (see Kumschick et al., 2014, for instance). Hosie et al. (2000) developed a study to examine how hearing and deaf children understand socially displayed rules, and how they express and conceal emotions. Regarding displaying rule knowledge, the authors did not find differences between deaf children and hearing peers. However, deaf children reported having difficulties concealing happiness and anger. The difficulty in concealing these two emotions might be disadvantageous to deaf children in some social situations, where both emotions need to be regulated properly. An interesting study about how deaf and hearing children's parents rated their children's academic and social aspects found that hearing children and their parents rated the children's friendships more positively than did deaf children and their parents. However, the authors found that deaf children and deaf parents rated the children's social skills more positively. The authors suggested that as these children used sign language at home, the social skills learned at home were generalized to the school context (Marschark et al., 2012). Similar findings have been observed in other cultures, such as Argentina (Ipiña et al., 2010) or Brazil (Prietch and Filgueiras, 2013).

The next point to discuss is the theoretical framework to study emotion perception in DP and how to measure it. Many emotional perception measures were developed and validated based on emotional knowledge (EK); especially if this tool is for use on children under social adaptation criteria (Denham, 1986; Morris et al., 2013; Mestre et al., 2014). EK is a theoretical construct which includes mainly: both recognizing and labeling expressions of emotions and understanding their transition from their causes to their consequences (Morgan et al., 2009). However, some revised studies on the perception of emotions in DP (especially with children) used ToM tasks as criteria (as autism studies do), rather than social adaptation criteria. Dyck and Denver (2003) pointed out that children with language impairment have difficulties, among others, in: (a) second-order ToM tasks (understanding false beliefs; do not appear until children are older, at around 3–5 years of age; see Hughes and Leekam, 2004 for a review); (b) recognizing non-verbal emotional expressions; and (c) matching facial expressions (especially with emotional intonation, for hearing impairment).

In contrast, EK includes a set of factors interrelated to emotional perception, such as age, gender, and verbal intelligence, due to the understanding that at certain ages cognitive and emotional development are mutually dependent (Morris et al., 2013). This is precisely the problem in assessing verbal intelligence. Building a tool to assess EPA (or EK) in DP should encompass the entire construct of EK. It is thus necessary to pay attention to the special characteristics discussed above. Most existing instruments assume that DP could understand written language. However, there is in fact a high illiteracy rate among the deaf population (Massone and Baez, 2009). Could a fluid intelligence (Gf) test be used instead of a verbal one? Using a Gf test would also allow us to examine the role of Gf on emotional perception. Another question is the appropriate age at which to administer the tool; for testing our developed tool, we used a sample ranging in age from 12 to 30 years. This is because we are interested in identifying standard performance, instead of how deaf children will score it.

Another factor often ignored in emotional perception among DP is personality. In principle, DP should not have personality traits different from HP. However, HP tend to misunderstand this reality, and tend to assign some traits as stubborn or distrustful to the deaf (Rodríguez-Ortiz, 2005). According with this idea, some studies have pointed out that emotional perception (measured as a part of the MSCEIT, Mayer et al., 2004) had a low-to-moderate relationship with some personality traits, especially Neuroticism (negatively), Openness and Consciousness (both positively; see Mayer et al., 1990; Day and Carroll, 2004; Lopes et al., 2012). However, some studies showed that personality traits and mood states are involved in the emotional perception processing (for instance, Rusting, 1998). Some personality traits stimulate certain mood states that then influence on the emotional perception. As example, Knyazev et al. (2008) found that personality could systematically influence in how people perceive facial expressions of other people. For instance, they pointed out that some traits, both agreeableness and conscientiousness, prepossessed to perceive the faces in a friendly way. However, anxiety and aggressiveness overrate or misunderstand the intentions of other people.

Finally, an emotional perception instrument for DP should consider how emotional stimuli are to be presented. Regarding emotional facial expressions, Fernandez-Dols (2013) strongly recommended to "restore a balance between the top–down and bottom–up strategies" for displaying emotional expression stimuli. An emotional expression "is a continuous flow of muscular movements from bodies moving in a three-dimensional world which produces events with flexible and context-dependent meanings" (Fernandez-Dols, 2013, p. 6). Following this advice (and from others Elfenbein, 2013; Hassin et al., 2013), we included videos of emotional expression. The videos used as emotional stimuli were of a lip-reading DP.

In order to address the issues explained above, we designed a pilot study to assess DP's EPA using a software created for DP. Following the suggestions from Leon et al. (2011) about how to proceed in pilot studies, we prefer to address objectives rather than research questions and hypothesis. There are several purposes of conducting a pilot study: one of them is assessment

procedures. Another relevant question, a "pilot study does not provide a meaningful effect size estimate for planning subsequent studies due to the imprecision inherent in data from small samples" (Leon et al., 2011, p. 626).

The objectives of the pilot study were:

(a) To analyze the emotional perception achievement among groups (signers, lip-reading deaf, and hearing), which involves making a confusion matrix[1] of both basic and social emotions, according to group performance;

(b) To check whether the instrument fits the EK construct (should be related to age and intelligence; gender would be not involved because of sample age); and

(c) Based on EPA and personality studies, we expect to find:

(c.1) Regarding personality: positive relationships of EPA with verbal intelligence and some personality traits (consciousness and warmth). However, it is expected negative relationships between EPA and the next traits: tension, excitability, dominance, apprehension, and self-sufficiency.

(c.2) Regarding adaptation criteria: positive relationships between EPA and all adaptation criteria, excepting unrest, which is expected a negative relationship.

Materials and Methods

Participants

A total of 56 individuals were identified according to the language used (signers, lip-reading DP, and HP). Participants were required to have normal or corrected-to-normal vision, and no learning disabilities (including illiteracy). We decided not to include children with cochlear implants because most of them were under 12 years old. All parents of participants under 18 years old signed a consent form for their children's inclusion in the pilot study. Deaf participants ($n = 26$) were included in the research under the supervision of the director of the *Centro de Educación Especial para Sordos* (Special Education Center for Deaf), Jerez de la Frontera (Southern Spain). Hearing participants were collected from the same geographical area, and had similar characteristics to the deaf sample (age range: 12–30 years, 60% male). We decided not to include two deaf participants because their parents were also deaf. Participants received a brief report about their outcomes. **Table 1** summarizes the demographic characteristic of the participants.

The ethics committee of the deaf school (November 25, 2013) approved the pilot study after we presented the project to them. All participants and parents of under-18 children signed both an agreement of collaboration and a consent to participate in this research (December 30, 2013).

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[1] According to wikipedia, "a confusion matrix, also known as a contingency table or an error matrix, is a specific table layout that allows visualization of the performance of an algorithm, typically a supervised learning one (in unsupervised learning it is usually called a matching matrix). Each column of the matrix represents the instances in a predicted class, while each row represents the instances in an actual class. The name stems from the fact that it makes it easy to see if the system is confusing two classes (i.e., commonly mislabeling one as another)."

TABLE 1 | Frequency, Sex, and Age information by group.

Groups	N	Sex frequency (female/male)	AGE		
			M	SD	Range
Signers	18	7/11	21.06	6.31	12–32
Lip-readers	8	2/6	16.63	5.34	12–29
Hearing people (HP)	30	11/19	23.4	4.48	12–32
Total	56	20/36	21.68	5.65	12–32

Signers are deaf people (DP) without lip-reading abilities who learnt Spanish Sign Language (SSL); Lip-readers are DP who learnt both to speak and read lips, also in SSL; HP have no trouble hearing.

Measures
Emotional Perception

PERVALE-S (*Test de Tareas Cognitivas de Percepción y Valoración de Emociones en sordos,* Test of cognitive tasks for perceiving and valuing emotions in deaf; Herrero et al., 2009).

PERVALE-S is an improved version of a software specially designed to assess both basic and social EPA in DP. The instrument developed both basic and social emotional expressions. Although there is no unanimity, we considered as basic emotions: fear, joy, sadness, disgust, anger, and surprise (especially last one is quite controversial). For our emotional perception instrument, we decided to include anxiety, jealousy, envy, and embarrassment as social emotions. However, it is necessary to explain briefly how jealousy and envy are different (we did not consider to include guilty, so embarrassment should not be confused with guilty), and both emotions have different expressions too in Spanish signal code for DP. According to Salovey and Rodin (1988), jealousy and envy could have quantitative differences besides other semantic considerations. However, other authors have demonstrate that both emotions have qualitative differences. Parrott and Smith (1993) introduced new methodologies in order to clarify how both emotions reveal differences. In their experiments, they pointed out that envy was "characterized by feelings of inferiority, longing, resentment, and disapproval of the emotion." However, jealousy "was characterized by fear of loss, distrust, anxiety, and anger" (Parrott and Smith, 1993, p. 906). The social-emotional expression items of the instrument show different stimuli regarding the Spanish-deaf expression for both emotions.

The answer scale in the first version of the instrument had to be changed from five levels to three (1: a little; 2: a lot; and 3: without emotion), because DP had problems differentiating beyond three levels of intensity of an emotional expression stimulus. In the previous study, we also discovered that DP had difficulties discriminating between close frequency adverbs (e.g., the difference in meaning between "very" and "quite a bit" was not apparent to the deaf sample). Another important difference between PERVALE-S and a regular EK tool is the stimuli presented. To more accurately identify the emotion expressed, DP need to watch the upper body (especially arm movements) rather than just the emotional expression on the face. Thus, the emotional stimuli presented should include "simultaneous or successive facial movements linked to affective reactions"—involving mostly bottom-up perception processes—and "appraisals, social motives, or strategies of regulation, but

also to cognitive processes or cultural conventions"—involving especially top–down perception processes (Fernandez-Dols and Crivelli, 2013, p. 27). Nevertheless, showing just the face might not be enough for DP—emotional expression stimuli for the deaf must show moving arms and faces, all in a videotaped emotional expression (Herrero et al., 2009).

The final version has several inserted videos in the program interface. There are three types of videos (see **Figure 1**): (A) an instruction video at the top left of the interface with simultaneous oral and Spanish Sign Language (SSL) explaining how to use the program. In this video, the instructor asks participants to view all stimuli before starting to answer them, because there are two types of emotion stimuli (with different emotional expression intensity, high and low) for each basic emotion (fear, sad, surprise, anger, joyful, and disgust) and for each social emotion (anxiety, jealousy, envy, and embarrassment). In addition, there was one stimulus without emotional expression for each basic and social emotional test section. The right answer for each item was obtained via consensus among six deaf signal interpreters. The section on basic emotion contains 13 items and that of social emotion contains nine items; (B) a central bigger video

with the stimuli to be answered below; and (C) a smaller video, which is presented when the yellow circle is clicked on. This video consists of an interpreter explaining what the displayed emotion is (using SSL, if the user wanted further information about the emotion label). If the participant's answer matched the emotion and the intensity, then s/he obtains one point; if the answer matched the emotion but not the intensity, then it is scored as 0.5 point. The neutral item was scored 1.0 if the participant gave the correct answer—no emotion shown—and 0.0 for any other answer. Therefore, the possible score that could be obtained in the section on basic emotion ranges from 0 to 13 points, and the social emotion section from zero to nine points. Hence, the maximum total score is 22.0 points. Outcomes are presented in percentages to facilitate interpretation. Finally, the software generates an excel file with the answers given by participants.

The internal consistency obtained was highly moderate (Cronbach's alpha 0.73) for the total scale, 0.69 for the basic emotions scale, 0.68 for the social emotions scale. However, Zumbo et al. (2007) recommended using polychoric correlations by omega coefficients as a better estimator of reliability for
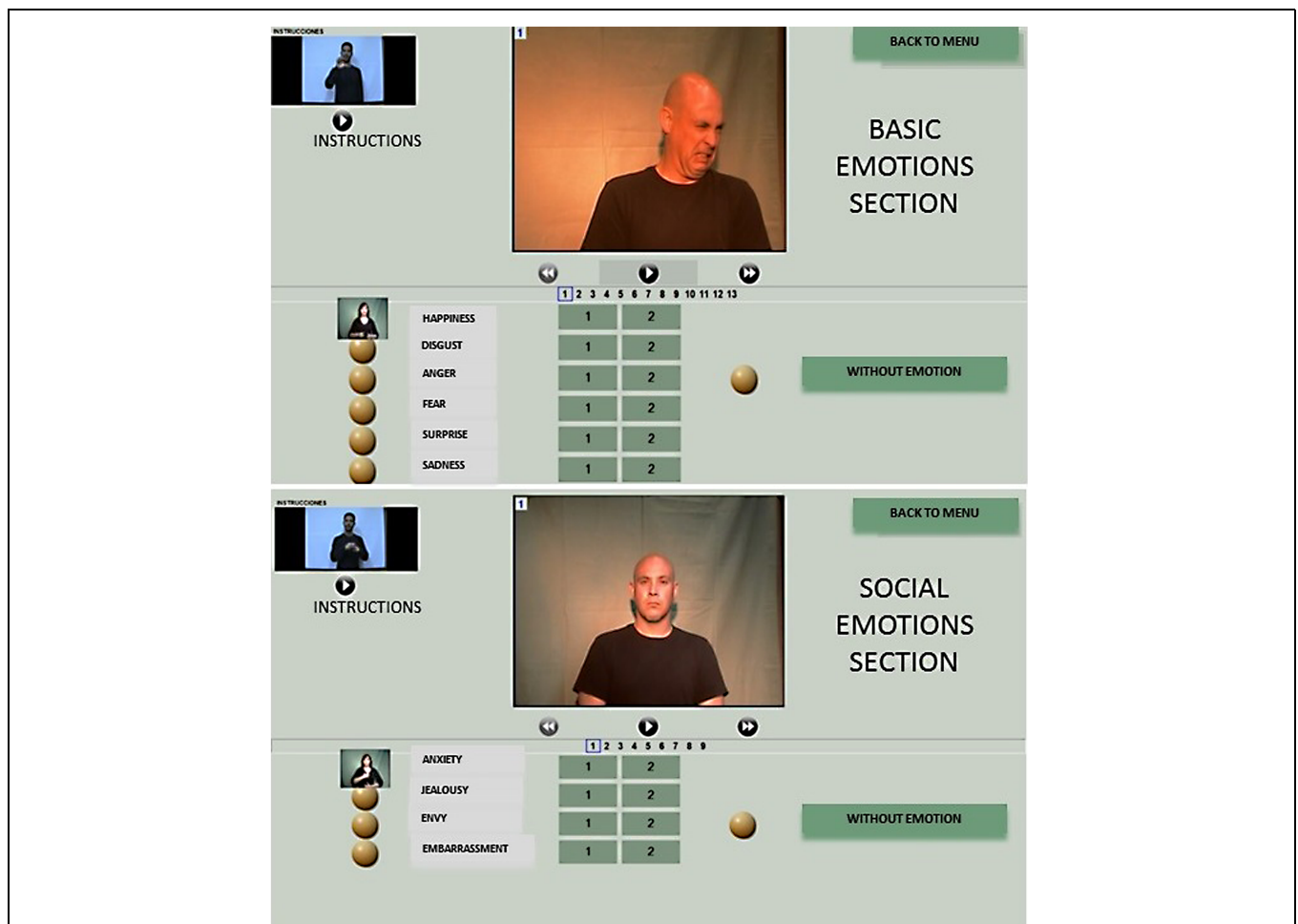

FIGURE 1 | A sample item for both basic and social emotional expression. Both examples have been translated into English.

items with a categorical nature, where values can be interpreted similarly to the alpha coefficient. Following the authors' suggestion, the calculated PERVALE-S omega values were 0.78 for the total scale, 0.75 for basic emotion, and 0.73 for social emotion. Intraclass correlation among expert referees ($n = 6$) for the software was 0.89 ($p < 0.001$), indicating a high level of agreement for each instrument item. Lastly, the correlation between sections and total PERVALE-S scores were calculated. The correlations between the basic and social emotion sections and the total scale were, respectively, $r = 0.715$ and $r = 0.88$ (both $p < 0.001$).

Fluid Intelligence (*Gf*)

Raven's Standard Progressive Matrices test (RSPM; Raven et al., 1993) was administered to the participants. RSPM comprises 60 problems, and is divided into five sets (A–E) of increasing difficulty. Each set starts with easy problems and ends with more difficult ones. Each item contains a matrix of geometric design with one cell of the matrix removed, and there are six or eight alternatives given to insert in the place of the missing cell, one of which fits correctly. All participants were tested individually, without time limit, and RSPM instructions were given to DP using SSL by an interpreter. We used the achievement rate [(number of correct answers/60) × 100] as an index. Errors were not discounted, as in other intelligence tests. RSPM obtained good internal consistency in this study (Cronbach's alpha = 0.872).

Personality

Because we sampled participants aged 12 years and older, we decided to administer a Spanish adaptation of the HSPQ (High School Personality Questionnaire; Cattell and Cattell, 1995). This questionnaire also contained videos providing instructions on how to answer the test and explanations of each of the 14 HSPQ scales. All deaf participants were instructed to watch the video before answering the HSPQ. HP received a brief verbal explanation about how to proceed. According to our experience with frequency adverbs, explained above, we used an answer scale with three levels (1: a little; 2: medium; and 3: much). This test assesses 14 personality factors, which are summarized in **Table 2**.

Adaptation School Criteria for Deaf

We designed a questionnaire to administer to the educators at the Special Education Center for the Deaf, which all the DP in our study attended. All of them belonged to this school, or still belong to it. We asked four educators at the school to rate from 1: "nothing related to him/her" to 6: "completely related to him/her." These professionals (teachers and counselors) had known each DP in our study for at least 2 years. We addressed five questions to be answered independently for each professional. These questions were related to: (1) adaptation to school rules; (2) impulsiveness control; (3) academic achievement; (4) peer acceptance; and (5) degree of conflict with others. Intraclass correlation for each question among the educators were 0.92, 0.91, 0.84, 0.87, 0.88, respectively.

TABLE 2 | High School Personality Questionnaire (HSPQ) Factors.

HSPQ factor	Low score = close to 1	Dimension	High score = close to 3
A	Reserved	Warmth	Outgoing
B	Less	Intelligence	More
C	Changeable	Emotional stability	Stable
D	Phlegmatic	Excitability	Excitable
E	Compliant	Dominance	Dominant
F	Sober	Cheerfulness	Enthusiastic
G	Rebellious	Consciousness	Rule-bound
H	Shy	Boldness	Extroverted
I	Realistic	Sensivity	Sensitive
J	Vigorous	Withdrawal	Doubtful
O	Placid	Apprehension	Apprehensive
Q_2	Dependent	Self-sufficiency	resourceful
Q_3	Undisciplined	Self-discipline	Controlled
Q_4	Relaxed	Tension	Tense

Scores on each item range from 1 to 3.

These indices indicated a high degree of agreement among raters.

Procedure

All measures were presented in the following order: HSPQ, RSPM, and PERVALE-S. Signers and lip-reading DP below 17 years old performed all the tests in the Center for Deaf Education (Jerez, Spain). HP and DP 18 years old and above performed the tests at the Emotional Intelligence Lab of the University of Cadiz (Puerto Real, Spain). An interpreter was always present with the deaf sample, even if they did not require her help. All measures were performed individually. HP performed the same version of each measure, except with a prior verbal explanation. Participants received a brief report about their scores on *Gf* and emotional perception.

Results

Emotional Perception Achievement Among Groups

Our primary objective was to investigate whether DP perform worse than HP using an appropriate emotional perception tool developed for DP. **Table 3** shows the scores obtained in each section of the PERVALE-S by linguistic group.

TABLE 3 | Means and *SD* of PERVALE-S scores by linguistic group.

Linguistic code	Total		Basic emotions		Social emotions	
	M	*SD*	*M*	*SD*	*M*	*SD*
Just signer deaf (*n* = 18)	79.13	12.56	84.19	13.12	74.07	16.39
Lip-reading deaf (*n* = 8)	70.30	11.03	83.65	6.74	56.94	21.36
Hearing (*n* = 30)	79.44	11.28	86.28	12.27	72.59	15.84

Numbers represent percentages.

Lip-reading DP performed worse, especially in the social emotion section. **Figure 2** provides extra information about performance by PERVALE-S section and linguistic group.

However, the non-parametric equivalent of the ANOVA, the Kruskall–Wallis test, did not reveal any significant difference between the three groups. The findings were as follows: (a) total score $\chi^2 = 3.81$ ($p = 0.15$); (b) basic emotions section $\chi^2 = 1.09$ ($p = 0.58$); and (c) social emotions section $\chi^2 = 3.56$ ($p = 0.17$). We were also interested in displaying both basic and social confusion matrices by linguistic group. According to the results of the Kruskall–Wallis test, we illustrate both matrices using the entire sample, rather than by linguistic group (see **Tables 4** and **5**).

In order to identify the influences of age and *Gf*, we also analyzed their relationship with PERVALE-S scores. For signers ($n = 18$; mean age $= 21.06$, $SD = 6.31$), the age by task section correlations were $r_{age-basic} = 0.25$ ($p > 0.05$), $r_{age-social} = 0.48$ ($p < 0.01$); and the age with *Gf* ($M = 76.11$, $SD = 20.46$) correlation was $r = 0.69$ ($p < 0.001$). For lip-readers ($n = 8$; mean age $= 16.86$, $SD = 5.73$), the age by task section correlations were $r_{age-basic} = -0.09$ ($p > 0.05$), $r_{age-social} = 0.61$ ($p < 0.001$), and the age-*Gf* correlation was $r = 0.08$ ($p > 0.05$). Finally, for HP ($n = 30$; mean age $= 23.4$, $SD = 4.48$), the age by task section correlations were $r_{age-basic} = 0.01$ ($p > 0.05$), and $r_{age-social} = 0.25$ ($p > 0.05$).
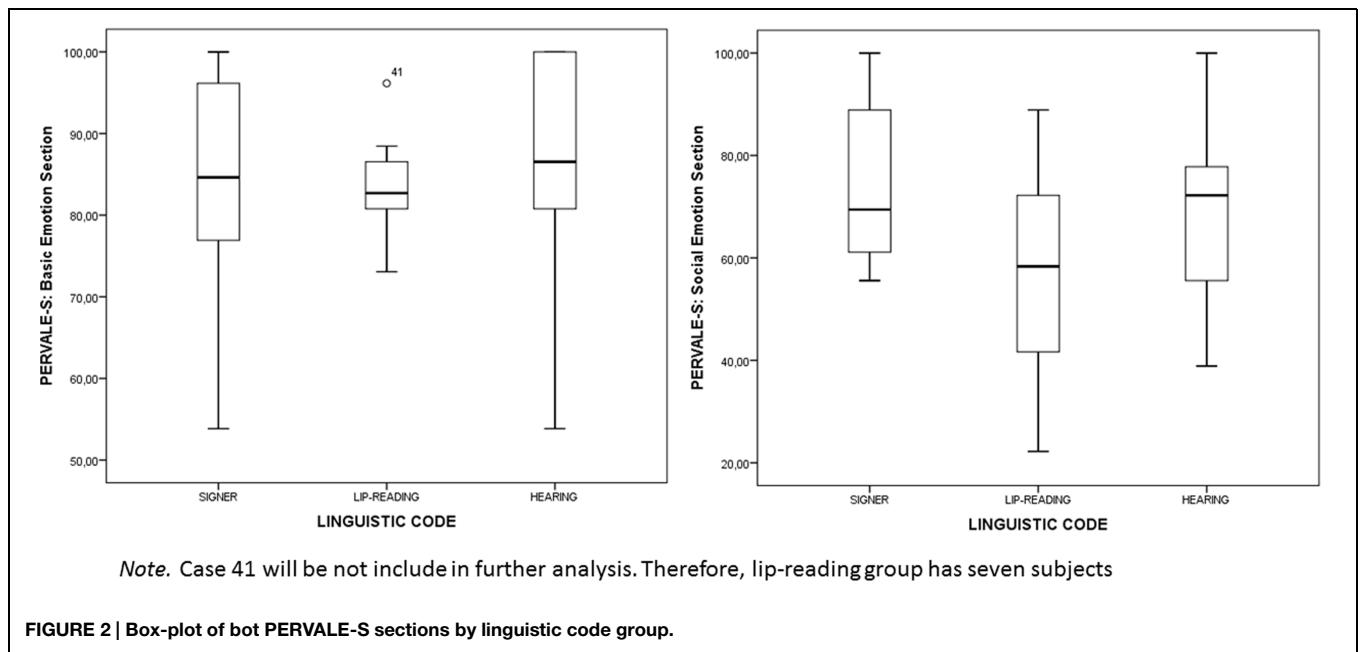

Note. Case 41 will be not include in further analysis. Therefore, lip-reading group has seven subjects

FIGURE 2 | Box-plot of bot PERVALE-S sections by linguistic code group.

TABLE 4 | Confusion matrix for basic emotions (frequency response).

ITEM	1	2	3	4	5	6	7	8	9	10	11	12	13	Success	½ Success	Error
1	**50**	5											1	89.3	8.9	1.8
2	7	**44**	1						1	3				78.6	12.5	9.0
3			**40**	14	2									71.4	25.0	3.6
4			1	**55**										98.2	1.8	0
5					**42**	13							1	75.0	23.2	1.8
6			1	9	**45**	1								80.4	16.1	3.6
7							**32**	4	15	2	2		1	57.1	7.1	35.8
8							7	**49**						87.5	12.5	0
9									**45**	11				80.4	19.6	0
10		6				1			6	**43**				76.8	10.7	12.5
11					2	1	1		1		**41**	9	1	73.2	16.1	10.8
12			5	2		1	1	2			9	**36**		64.3	16.1	19.6
13	3										2		**51**	91.1	—	8.9

Success percentage rate, medium success percentage rate (matching the emotion but not the intensity; ½ success), and error percentage rate. The correct frequencies are displayed in boldface.
Emotion 1 is less intensely expressed than Emotion 2.
1: Happiness 1; 2: Happiness 2; 3: Disgust 1; 4: Disgust 2; 5: Angry 1; 6: Angry 2; 7: Fear 1; 8: Fear 2; 9: Surprise 1; 10: Surprise 2; 11: Sadness 1; 12: Sadness 2; 13: Neutral or no emotion expressed.

TABLE 5 | Confusion matrix for social emotions (frequency response).

Item	1	2	3	4	5	6	7	8	9	Success	½ Success	Error
1	**48**	6				1		1		85.7	10.7	3.6
2	1	**50**	1		1	1		2		89.3	1.8	9.0
3	2	1	**24**	8	14	6			1	42.9	14.3	42.9
4		1	12	**18**	7	18				32.1	21.4	46.4
5	1		16	4	**27**	5	2		1	48.2	8.9	42.9
6	2	2	5	18	13	**15**	1			26.8	23.2	50.0
7		2					**47**	7		83.9	12.5	3.6
8							10	**46**		82.1	17.9	0
9			1	3		2			**50**	89.3	–	10.7

Success percentage rate, medium success percentage rate (matching the emotion but not the intensity; ½ success), and error percentage rate. The correct frequencies are displayed in boldface.
Social Emotion 1 is expressed less intensely than Social Emotion 2.
1: Anxiety 1; 2: Anxiety 2; 3: Jealousy 1; 4: Jealousy 2; 5: Envy 1; 6: Envy 2; 7: Embarrassment 1; 8: Embarrassment 2; 9: Neutral or no emotion expressed.

Regarding main mistakes by language code, we found different percentages in the errors made within the signer group when identifying emotions: joy, fear, surprise, and "no emotion" (22.2% of the signer sample), jealousy and envy (38.9% of sample). Different percentages emerged among lip-readers: joy and surprise (42.9%), fear (57.1%), anxiety (28.6%), envy, jealousy, and embarrassment (57.1%). The percentages among HP were 40% for fear, 16.7% for surprise and sadness, and 46.7% for jealousy and envy. *Post hoc* Kruskall–Wallis analysis confirmed significant differences between groups in according next items: joy−1 ($p = 0.015$), anger−2 ($p = 0.02$), and no emotion in the basic emotion section ($p = 0.03$).

Next, we checked whether both PERVALE-S fits into the EK construct and EPA is related to some personality traits. **Table 6** shows the correlations between PERVALE-S sections and age, sex, *Gf*, and personality traits.

Our last objective was to test the expected relationship between PERVALE-S sections and adaptation school criteria. **Table 7** shows the rho correlations.

The results show that personality and *Gf* do not belong to the EK construct. However, *Gf* was not related to any adaptation criteria. Among personality traits, we found almost significant relationships: adaptation to school rules and impulsiveness control were negatively related to tension (Q_4) $r_{tension\text{-}adaptation} = -0.50$, $r_{tension\text{-}impulsiviness} = 0.62$, $p < 0.05$. Academic achievement was positively related to sensitivity (I) $r = 0.54$, $p < 0.01$; and negatively related to apprehension $r = -0.48$, self-sufficiency $r = -0.50$, and tension (Q_4) $r = -0.43$ (last three $p < 0.05$). Peer acceptation was positively related to sensitivity (I) $r = 0.42$, $p < 0.05$. Unrest was positively related to dominance (E) $r = 0.44$ and tension ($Q4$) $r = 0.51$ (both $p < 0.05$).

However, Mann–Whitney analysis did not show any significant difference between the genders for all ratings.

Discussion

This pilot sudy; only signer DPs are increasingly uncommon now due to the advent of cochlear implantstudy had some difficulties

TABLE 6 | Correlations between PERVALE-S and age, sex, fluid intelligence (*Gf*), and HSPQ measures (*N* = 55, after eliminating case 41).

	M	SD	Total	Basic	Social
Age	21.68	5.65	**0.391****	0.124	**0.447****
Sex (1: male; 2: female)	–	–	0.101	0.132	0.048
Raven's Standard Progressive Matrices test (RSPM) *Gf*	80.71	15.12	**0.288***	0.163	**0.281***
HSPQ A: Warmth	2.27	0.73	0.231	0.233	0.157
HSPQ B: Intelligence	2.43	0.60	0.142	0.229	0.039
HSPQ C: Emotional stability	2.38	0.75	0.087	0.036	0.094
HSPQ D: Excitability	2.14	0.70	−0.066	−0.121	−0.008
HSPQ E: Dominance	1.91	0.61	−0.252	−0.099	**−0.276***
HSPQ F: Cheerfulness	2.14	0.70	0.141	0.040	0.165
HSPQ G: Consciousness	2.43	0.68	0.253	**0.347****	0.110
HSPQ H: Boldness	1.96	0.66	−0.057	−0.096	−0.013
HSPQ I: Sensivity	2.32	0.57	0.131	0.094	0.115
HSPQ J: Withdrawal	1.64	0.70	−0.051	−0.066	−0.025
HSPQ O: Apprehension	1.68	0.66	−0.219	−0.242	−0.135
HSPQ Q2: Self-sufficiency	1.38	0.52	**−0.265***	−0.196	−0.228
HSPQ Q3: Self-discipline	2.21	0.59	0.089	0.180	0.000
HSPQ Q4: Tension	1.71	0.73	−0.237	**−0.303***	−0.118

Significant rho relationships are in boldface.
Correlations were calculated using Spearman's rho. *p < 0.05, **p < 0.01; one tailed.

recruiting lip-readers, because most of them did not belong to the deaf school anymore. In addition, we could recruit only 18 signers for the pilot st and the inclusion of verbal language education in the school curriculum. However, we decided not to include DPs with cochlear implants because most of them were below 12 years old. Finally, we included a sample of HP to compare their performance with the deaf sample.

Testing PERVALE-S among Linguistic Groups

The main goal of the pilot study was to test the new version of PERVALE-S. Generally, participants performed better in the basic emotion section compared to the social one. Emotional

TABLE 7 | Correlations between PERVALE-S and adaptation criteria.

Criteria	M	SD	Basic emotion	Social emotion
Adaptation to school rules	3.78	1.15	0.17	0.21
Impulsiveness control	3.45	1.27	**0.41***	−0.08
Academic achievement	3.26	1.23	0.11	0.16
Peer acceptance	3.33	1.01	0.01	0.06
Unrest	2.15	1.19	**−0.45***	**−0.39***

Significant relationships are in boldface (DP: n = 26).
Correlations were calculated using Spearman's rho. *p < 0.05 one tailed.

development studies have pointed out that social emotion development takes more cognitive effort and time than basic emotions (Arsenio, 2003). Indeed, EPA—the first branch of the EI ability model (Mayer and Salovey, 2007)—forms the basis on which other branches (using, understanding, and managing) grow. The ability to perceive basic emotions (matching the correct emotion) takes about 6–8 years to develop, while social emotions require about 12 years (Zeidner et al., 2003; Mestre et al., 2007). This corroborates with our finding that age is correlated to the social emotion section but not the basic emotion section ($r = 0.447$, $p < 0.01$).

Regarding the first objective of this pilot study, the correct answer rate by section was around 70%, which is an appropriate score for future standards. Except among lip-readers in the social emotion section, who were also younger than the other participants. Even so, the non-parametric ANOVA did not reveal any difference between linguistic groups. However, the analysis of the influence of age by group revealed some relationships, especially among signers. In this case, age was related to both sections. In the lip-reading group, age was related to just the social emotion section. Probably, both age and sample size compromised this finding in the lip-readers group. No age by section relationships were found in the hearing group. Cautiously, our results are comparable to those of previous studies (Dyck and Denver, 2003; González et al., 2011). Thus, DP probably need more time to identify the emotion expressed compared to HP, perhaps due to fewer opportunities to obtain experience in matching emotional expressions (Alegria and Lechat, 2005). Another complementary explanation comes from the lack of abilities for listening. DP need to compensate for their disabilities in hearing to enhance their accuracy in emotional perceptions. For this purpose, they need to spend more time to obtain similar performance standards (Letourneau and Mitchell, 2011). *Gf* could be a mediating variable in this relationship, as catalyst for emotional learning (Farrelly and Austin, 2007; Belke et al., 2008; Ono et al., 2011).

There is an interesting theoretical debate about facial expression of emotion and the meaning of motor expression (Nelson and Russell, 2013). However, it is also necessary to identify the underlying determinants and production mechanisms in order to widely encompass the nature of this process, and choose fundamental assumptions and predictions regarding the patterning of facial expressions for different emotions (Scherer et al., 2013). The PERVALE-S items were based on idiosyncratic emotional expressions for the deaf from the south of Spain. For this purpose, we worked with six expert

deaf interpreters and confirmed that they highly agreed on the right answer for each item (intraclass correlation was 0.89, $p < 0.001$). We also report the advice given by interpreters about this idiosyncratic emotional culture in DP (Lederberg et al., 2013); thus, the PERVALE-S items might not be appropriate for other cultures, however, HP performed similarly to DP.

The confusion matrices showed that many mistakes were made in the social emotion section. In the basic emotion section, the deaf participants had difficulty identifying joyfulness (42.9% for lip-readers and 22.2% for signers) which is unusual. In fact, it is the easiest emotion to identify for children (Mestre et al., 2011). However, it is normal to have difficulty identifying surprise and fear (57.1% for identifying fear and 42.9% for surprise among lip-readers; Ekman, 1999; Jessen et al., 2012). HP erred mainly on fear when it was expressed with low intensity (40%). There were similar mistakes from the three groups in the social emotion section. Jealousy and envy were less likely to be identified correctly (from 36.7 to 57.1%, respectively). This outcome is interesting because it bolsters an idea pointed out by Salovey and Rodin (1988). The authors reported that jealousy seemed more intense than envy; moreover, both emotions seemed to be experienced practically in the same way. Hence, it is more a question of quantitative than qualitative experience (for more information, see Salovey, 1991). In other words, jealousy and envy require considerable cognitive development to be perceived correctly (Oatley and Johnson-Laird, 2014). Indeed, the relationship found between *Gf* and social emotion in this study ($r = 0.28$, $p < 0.05$) hints at a mediating role of intelligence in the perception of social or complex emotion in DP.

Does PERVALE-S Fit into the EK Construct?

Emotional knowledge is a classic topic for emotional perception in children; however, it can also be used for other ages, for instance, sections A and E of MSCEIT (Mayer et al., 2003; for cross-cultural validation see Karim and Weisz, 2010). Critics have recently discussed if it is possible to measure the EI framework entirely (Maul, 2012a,b). PERVALE-S is a special instrument for measuring the first branch (perceiving).

Gender has been reported as an important variable in EI (Castro-Schilo and Kee, 2010), and in emotional perception (Chiaburu and Gray, 2008). In this study, gender was not significant because of the sample age. Future studies should confirm our results of no differences between groups.

Another question is how other EK measures have been computed. Take, for instance, the EMT (Emotional Match Task, Morgan et al., 2009). This instrument has been validated in Spain (see Alonso-Alberca et al., 2012) with a good reliability and promising validation processes. Nevertheless, some aspects of this task are still under debate. Some EMT items are computed the same way across different population subsets. For example, in the first part of EMT there are two ambiguous items, item number 8 and item number 11, the answers "sad" or "anger" have the same valor (they both are computed as "1"). Both emotions had similar accuracy rates although sadness and anger have different facial expressions (Ekman, 1999). In our opinion, this decision favors the psychometric properties of the instrument. In contrast, we believe that an emotional perception instrument

should encompass different levels of achievement, as in an exam (Seal et al., 2009). Verbal intelligence might be used as a screening factor in future studies on emotion perception in DP, while *Gf* (e.g., Raven's measure) should be tested as a mediating variable in EK score, even among HP. It is too early to recommend PERVALE-S as a tool for assessing emotional perception in DP. As cochlear implants are increasingly prevalent, the next step would be to test the instrument on a sample with cochlear implants. Therefore, prosody is another factor to include in the study of emotional perception or EK.

Age and intelligence were related to PERVALE-S, but social emotion should be redesigned, removing at least the envy items following Salovey and Rodin's (1988) suggestions (quantitative difference). Another topic under debate is whether newborn deaf should be implanted, according to pilot study findings, these results should not be taken as support for the defenders of cochlear implant devices for deaf. However, we assume that technology will improve tremendously in the future, and that "metallic sounds" will be controlled. If DP indeed decode emotions similarly to HP, then another social adaptation barrier will disappear.

The Role of Personality Traits

In fact, our personality test adapted for the deaf might be considered as semantic differential with three levels of agreement (1: "a little", 2: "medium", 3: "much"). We used HSPQ traits and created a pptx file embedded with videos. All participants understood how to fill it. This was another challenge because we did not assume that the deaf participants would understand the 144-item HSPQ.

We founded that participants who scored lower in the social emotion section perceived themselves as more dominant ($r = -0.276$, $p < 0.05$). Dominance and EPA are included in the hypothesis of subordination (Snodgrass, 1992), which states that the increased capacity of women (and compliant people) to perceive emotions is due to traditional social subordination which they have been or are being subjected to (for further reading see Elfenbein et al., 2002). The key idea of this hypothesis is that it is more important for subordinates to understand the emotions of those whom they are subordinated to (Keltner et al., 2003).

Regarding the basic emotion section, this subscale was positively related to consciousness ($r = 0.347$, $p > 0.01$) and negatively related to tension ($r = -0.265$, $p < 0.05$). Consciousness (and unconsciousness emotion processes) is attracting interest from emotional perception researchers (see Barret et al., 2005). People who pay attention to their tasks (as PERVALE-S) tend to score higher in this performance test as well (Matsumoto et al., 2000; Barret et al., 2005; Matsumoto, 2006). In contrast, neuroticism or tension predicts lower performance in emotional perception tasks (Matsumoto et al., 2000). Finally, the HSPQ trait of self-sufficiency was negatively related to overall PERVALE-S performance ($r = -0.265$, $p < 0.05$). Participants who prefers to work in groups, instead of alone, obtained better scores in the instrument. EI abilities are related to social interactions (Lopes et al., 2004, 2011; Grant et al., 2014). This is consistent with the relationship found in the present study.

This may be because individuals who perceive themselves as easy-going are more interested in developing their social competence (Gross, 1998).

Adaptation Criteria

In order to determine the predictive validity of the instrument, we asked four teachers who were familiar with the deaf participants to rate them along five social adaptation criteria. This strategy was used successfully to determine the predictive validity of EI (Mestre et al., 2006; Lopes et al., 2011, 2012). The level of agreement for each criterion was appropriate. Hearing participants were excluded from posterior multiple regression analysis. The final sample for this part of the study was 26 deaf participants. Stepwise multiple regression analysis revealed that both basic emotion section scores and age were related to impulsiveness control and to unrest. Traditionally, impulsiveness has been related to being able to regulate one's emotions in school (Gross and Thompson, 2007). The consulted teachers agreed to consider this point of view. The deaf participants who were rated as being able to control their impulse better also scored higher in the basic emotion section. Unrest or conflict was also related negatively to basic emotions and age after regression analysis. This relation between emotional competence and unrest has been described previously, especially among males (Mestre et al., 2006; Lopes et al., 2012). Thus, the finding of this relationship in our study might be due to more than half the sample being male (68%). However, the Mann–Whitney analysis did not reveal this gender influence.

Despite these findings, we recommend prudence in the interpretation of the current results. PERVALE-S is still under review and predictive validity investigations are necessary. Currently, the instrument is being used to train emotional competence among DP.

Conclusion

Limitations and Strengths

The sample size and the lack of similar studies using an emotional perception instrument adapted for DP is a strong limitation. The research design did not allow the making of causal inferences, despite the multiple regression analysis used. Nevertheless, this was a pilot study whose main objective was to test the new instrument and derive standard scores for future investigations with DP. To develop an instrument for the deaf was a challenge, as well as adapting the HSPQ.

Removing verbal intelligence influences from the pilot study and developing an emotional perception instrument for DP minimized traditional differences in the emotional perception assessment between DP and HP. This pilot study provides an interesting contribution to the literature on emotional perception and deaf. In addition, it is a first step to assess EI in DP. The main problem in assessing EI is verbal intelligence (especially in the third branch: understanding emotions, see Beck et al., 2012), and verbal intelligence is a measure of crystallized intelligence (Mackintosh, 2003). Because of these influences, some emotionally competent people obtained low scores in some

EI performance test as MSCEIT (Amitay and Mongrain, 2007; Nafukho, 2010). Therefore, the development of instruments such as PERVALE-S allows the separation of the influence of verbal ability on non-linguistic EI studies.

Emotional knowledge and many emotional perception tests have not included social emotion stimuli. This might be due to problems with using static stimuli to simulate existential emotional states, such as anxiety, jealousy, and embarrassment (Krumhuber et al., 2013). Some social emotions are existential, for instance anxiety, jealousy, embarrassment, or envy (Lazarus and Lazarus, 1996). Indeed, participants often committed high error percentages (Lazarus and Lazarus, 1996). Avoiding social emotion stimuli does not encompass the whole emotional sphere and how to face it (Summerfeldt et al., 2006). Moreover, the relationship between Gf and social emotion should be explored with a bigger sample. Previous studies have suggested the role of non-linguistic abilities in the EI (see Albanese et al., 2010). Another strength is that PERVALE-S fits in the current perception theories (top–down versus bottom–up).

Generalizability and Heuristics

It was difficult to recruit the deaf sample, due to the changing situation regarding DP. For example, Spanish deaf students are receiving an inclusive education instead of in a special school (Kelman and Branco, 2009). Furthermore, there is ongoing debate about whether cochlear implants should be given to all newborn deaf (Kermit, 2009). Some Spanish deaf communities are awaiting studies that support their point of view against cochlear implantation (Herrero et al., 2009), but this pilot study is not an answer for or against of the cochlear implant. Our point of view is that the deaf community claims for a major interest on their issues from HP rather than vice-versa. Moreover, DP should not perceive the cochlear implant as a menace for their own culture or way of life (Wang et al., 2011). However, this research itself might help to change some HP stereotypes about the affectivity of DP, due to their emotional performances were similar to HP.

Finally, we considered cognitive information processing in DP (just iconic inputs) when the new version of PERVALE-s was developed (i.e., reducing the levels of the answer scale from 5 to 3); however, we are unsure if this software could be generalized to another deaf community due to the special dialect for Southern SSL. However, hearing participants seemed to understand most of the basic emotions and committed the same errors as the deaf in the social emotion section (envy and jealousy). This software is easily translatable for any researcher interested in the software. In addition, the videos could be replaced.

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Implicit theories and ability emotional intelligence

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Previous research has shown that people differ in their implicit theories about the essential characteristics of intelligence and emotions. Some people believe these characteristics to be predetermined and immutable (entity theorists), whereas others believe that these characteristics can be changed through learning and behavior training (incremental theorists). The present study provides evidence that in healthy adults ($N = 688$), implicit beliefs about emotions and emotional intelligence (EI) may influence performance on the ability-based Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT). Adults in our sample with incremental theories about emotions and EI scored higher on the MSCEIT than entity theorists, with implicit theories about EI showing a stronger relationship to scores than theories about emotions. Although our participants perceived both emotion and EI as malleable, they viewed emotions as more malleable than EI. Women and young adults in general were more likely to be incremental theorists than men and older adults. Furthermore, we found that emotion and EI theories mediated the relationship of gender and age with ability EI. Our findings suggest that people's implicit theories about EI may influence their emotional abilities, which may have important consequences for personal and professional EI training.

Keywords: emotional intelligence, MSCEIT, implicit theories, gender, age, mediation

Introduction

Individuals can differ substantially in how much they believe that essential human characteristics such as intelligence and emotions are malleable. Those termed "entity theorists" regard such attributes as relatively fixed and difficult to change; others, termed "incremental theorists," view the same attributes as malleable and changeable with effort and time (Dweck and Leggett, 1988). Being an incremental theorist has been associated with different positive outcomes such as better academic and professional achievement, and better mental health and well-being (Dweck, 2012), yet we are unaware of studies that have analyzed how an individual's implicit theories of emotions and emotional intelligence (EI) influence his or her EI. The present study therefore sought to examine how such implicit theories relate to ability EI.

Emotional Intelligence

In the quarter-century since Salovey and Mayer (1990) published the concept of EI, various theoretical models and instruments have been developed. The most widely applied theoretical models are mixed models and the ability model (Mayer et al., 2008). Mixed models conceptualize EI as a conglomeration of characteristics, including empathy, motivation, persistence, optimism, and social skills. Mixed EI is typically measured through self-report instruments, and it overlaps extensively with personality traits and measures of emotional/psychological well-being

(Oconnor and Little, 2003; Grubb and McDaniel, 2007; Webb et al., 2013). The ability model, in contrast, defines EI as the integration of several capacities: "the ability to perceive accurately, appraise, and express emotion; the ability to access and/or generate feelings when they facilitate thought; the ability to understand emotion and emotional knowledge; and the ability to regulate emotions to promote emotional and intellectual growth" (Mayer and Salovey, 1997). Ability EI is assessed in adults using the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT; Mayer et al., 2002), which assesses each of the four abilities ("branches") of perceiving, facilitating, understanding, and managing emotions (Mayer et al., 2003). MSCEIT scores show a positive relationship with various domains of daily life, including mental and physical health, social functioning, and academic and workplace performance (e.g., Ashkanasy and Daus, 2005; Daus and Ashkanasy, 2005; Mayer et al., 2008; Brackett et al., 2011; O'Boyle et al., 2011).

Ability EI appears to vary significantly with gender. While numerous studies of ability EI using such instruments as the MSCEIT have reported women to perform significantly better than men (e.g., Mayer et al., 1999; Ciarrochi et al., 2000; Brackett and Mayer, 2003; Palmer et al., 2005; Extremera et al., 2006; Goldenberg et al., 2006; Farrelly and Austin, 2007; McIntyre, 2010), the effect size of gender varies substantially. Some studies have reported small gender differences (e.g., Lumley et al., 2005; Fernández-Berrocal et al., 2012), while others have reported medium differences (e.g., Palmer et al., 2005; Farrelly and Austin, 2007). A meta-analysis of ability EI concluded the effect size to be 0.47 (Joseph and Newman, 2010).

Ability EI may also vary with age, but here the literature is less clear. While some studies reported significantly higher ability EI in older adults (Mayer et al., 1999), other studies have found no significant association between age and ability EI (Farrelly and Austin, 2007; Webb et al., 2013). Part of this discrepancy may arise from the fact that most studies on this question examine a relatively narrow age range in university populations, with all participants younger than 30 years. One study examining subjects ranging from 18 to 76 years old reported a small negative association between age and ability IE (Cabello et al., 2014).

Implicit Theories

Implicit theories function like knowledge structures (Chiu et al., 1997; Plaks et al., 2009), through which people interpret themselves and others; individuals generally act in accordance with these theories (Dweck, 2012; Leith et al., 2014). Thus, implicit theories profoundly affect human behavior, and understanding natural variation in those theories may help predict how people will respond to particular stimuli, psychotherapy, or behavioral training. For example, individuals can hold different implicit theories about the malleability of various cognitive, emotional, and behavioral domains of human nature (Dweck et al., 1995a). These domains include intelligence, emotion, social skills, relationships, management skills, social judgment, and stereotyping (for a review, see Dweck, 2012). So-called entity theorists consider these domains as relatively fixed and difficult to change. In contrast, incremental theorists view these same attributes as malleable and changeable with effort and time (Dweck and Leggett, 1988).

Implicit theories of intelligence appear to be significant determinants of human psychology and behavior. Studies indicate that individuals with incremental theories of intelligence regard effort as positive and necessary for improving ability (Dweck and Leggett, 1988; Blackwell et al., 2007), and such people tend to set themselves learning goals aimed at enhancing their malleable traits (Dweck and Leggett, 1988; Robins and Pals, 2002; Mangels et al., 2006). They tend to be more persistent and strategic than those with entity theories of intelligence (Robins and Pals, 2002; Blackwell et al., 2007; Nussbaum and Dweck, 2008), and they are more likely to cultivate mastery-oriented strategies to overcome developmental challenges such as the start of adolescence and the transition from primary school to secondary school (Blackwell et al., 2007).

Implicit theories of emotions also strongly affect human psychology and behavior. Several studies with university students or adults have shown that compared to those holding entity theories about the malleability of emotions, those holding incremental theories more frequently use cognitive reappraisal as an emotional regulation strategy, experience more positive and fewer negative emotions, receive greater social support, are more likely to use mastery-oriented strategies rather than helpless strategies, and harbor higher expectations of success (Tamir et al., 2007; Burnette et al., 2013; De Castella et al., 2013).

Schumann et al. (2014) reported that people's beliefs about empathy are positively associated with empathic concern (Study 1, $r = 0.21$), based on a measure of dispositional tendencies to feel empathy for others in everyday life. In fact, data from that study suggest that empathic behavior is more strongly associated with people's beliefs about empathy than with their self-reported levels of empathy. This suggests that implicit theories of empathy and self-reported levels of empathy are related but distinct, which coincides with a meta-analysis of self-report studies (Burnette et al., 2013), indicating only a small to moderate relationship between implicit theories and self-regulatory processes (range, 0.15–0.24). Thus, the available evidence suggests that people's theories about whether or not emotional abilities can change and be developed does not overlap with—and can be separated from—what people self-report about their emotional abilities.

Similarly, implicit theories of intelligence and emotions are related but distinct; some academic and emotional outcomes are affected by both theories, while others are affected only by one or the other (Romero et al., 2014). In addition, several studies with university students suggest that they view emotions as more malleable than intelligence (Tamir et al., 2007).

Whether age and gender affect implicit theories about intelligence and emotions is unclear. Some studies have failed to show significant differences between men and women (Dweck et al., 1995a; Tamir et al., 2007; Doron et al., 2009), and a meta-analysis found the available evidence to be inconclusive (Burnette et al., 2013). Similarly, while some studies have found no significant association between age and implicit theories (Dweck et al., 1995a), others have reported that people differentiate into incremental and entity theorists around 13 years of age (Diseth et al., 2014), and that older adults (ranging from 18 to 70 years) are more likely to hold entity theories (Spinath et al., 2003).

The Present Study

Although implicit theories have been linked with numerous domains of human nature, we are unaware of studies exploring possible relationships of theories about emotions or EI with ability EI. This led to the present study with the following objectives (O) and hypotheses (H):

O1. Examine how implicit theories of emotions and EI are related and how much individuals perceive these domains to be malleable. We hypothesized that emotions would be perceived as more malleable than EI (H1), based on previous work (Tamir et al., 2007).

O2. Examine whether and how implicit theories of emotion and EI are associated with ability EI. Because implicit theories have domain-specific implications (Dweck et al., 1995a; Romero et al., 2014), we expected implicit theories of EI to be more linked to ability EI and more predictive of ability EI than implicit theories of emotion (H2).

O3. Examine possible effects of gender and age on implicit theories about emotions and EI.

O4. Determine whether implicit theories about emotions and EI mediate the relationship of gender or age with ability EI.

Materials and Methods

Participants and Procedure

The sample comprised 688 healthy adults (37% men) ranging in age from 18 to 73 years ($M = 36.02$, SD = 14.9). Participants were recruited via posters on the local university campus, at retirement homes and in local newspapers. They received no financial compensation or incentive in exchange for participation in the study. Participants were accepted into the study to ensure a broad, balanced distribution of gender, age, and socio-economic status. Volunteers were not accepted into the study if they were younger than 18 years or if they had any physical or psychological disability that would compromise their ability to fill out the MSCEIT. Participants completed the questionnaires themselves at home. Data were collected over two consecutive years with the help of a team of research assistants. The study was carried out in accordance with the Declaration of Helsinki. Ethics approval was obtained from the Research Ethics Committee, University of Málaga.

Instruments

Mayer-Salovey-Caruso Emotional Intelligence Test (Version 2.0; Mayer et al., 2002; Extremera and Fernández-Berrocal, 2009). Ability EI was measured using a Spanish translation of the MSCEIT, which shows similar psychometric properties as the original instrument (Extremera et al., 2006); this test has been validated for adults aged 17 and older. The MSCEIT uses two tasks to measure each of the four branches of EI (perceiving, facilitating, understanding, and managing emotions), comprising a total of eight tasks. The instrument provides separate scores for each branch as well as an overall score for total EI. Scores can be calculated based on expert or consensus norms, which correlate strongly with each other ($r > 0.90$; Mayer et al., 2003). In the present study, we used only total EI score, which we calculated using consensus norms. Scores computed by the test publishers are standardized ($M = 100$, SD = 15), and the reliability of the two halves is 0.93 based on the consensus criterion. The test-retest reliability of the global MSCEIT is 0.86 after 3 weeks (Brackett and Mayer, 2003).

Implicit Theories of Emotion (Tamir et al., 2007). We evaluated implicit theories about the malleability of emotions using the scale adapted by Tamir et al. (2007) from the scale originally created by Dweck (1999) to evaluate implicit theories about intelligence. The scale consists of four items, two assessing *incremental theories* ("Everyone can learn to control their emotions"; "If they want to, people can change the emotions that they have") and two assessing *entity theories* ("No matter how hard they try, people can't really change the emotions that they have"; "The truth is, people have very little control over their emotions"). The participants were asked to report their agreement on a 7-point Likert scale. Entity statements were reverse-scored such that higher scores reflected a more incremental theory of emotions. The Spanish translation of the *Implicit Theories of Emotion* instrument was created using a back-translation procedure involving two independent translators, both of whom have PhDs in psychology and who are experts in the topic. In the present sample, the Cronbach alpha was 0.75.

Implicit Theories of EI. Implicit theories about the malleability of EI were evaluated using a scale adapted by us from the scale originally developed by Dweck (1999) to evaluate implicit theories about intelligence. The scale comprises two statements assessing *incremental theories* ("No matter how much emotional intelligence you have, you can always change it quite a bit"; "You can always significantly change how emotionally intelligent you are") and two assessing *entity theories* ("You can learn new things, but you can't really change your basic emotional intelligence"; "Your emotional intelligence is something about you that you can't change very much"). Participants were asked to report their agreement on a 7-point Likert scale. Entity statements were reverse-scored such that higher scores reflected a more incremental theory of emotions. The Spanish translation of the *Implicit Theories of Emotional Intelligence* instrument was created using a back-translation procedure involving two independent translators, both of whom have PhDs in psychology and who are experts in the topic. In the present sample, the Cronbach alpha was 0.74.

Statistical Analysis

All statistical analyses were carried out using SPSS 20.0 (IBM, USA). Preliminary analyses were carried out to compute descriptive statistics, as well as to detect relationships among age, gender, implicit theories about emotions or EI, and total ability EI scores. To examine whether theories about emotions or about EI explained a greater proportion of the observed variance in ability EI, we conducted two analyses of two-step hierarchical regression in which the predictor variables were implicit theories of emotions or EI, while the criterion variable was total ability EI score. To determine whether gender and age were related to ability EI through implicit theories about emotions or EI, we used a parallel mediation model in the PROCESS algorithm (Hayes, 2013). PROCESS is a conditional process modeling program for

use with SPSS that utilizes an ordinary least squares- or logistic-based path analytical framework to test for both direct and indirect effects (Hayes, 2013). To test the significance of a mediation effect, PROCESS generates the Sobel test value and percentile-based bias-corrected bootstrap confidence intervals (CIs) for each indirect effect; the indirect effect is judged significant when the CI does not contain 0 ($p < 0.05$).

Results

Preliminary Analyses

Means, standard deviations, and correlations for all variables are shown in **Table 1**. Our sample tended to view as malleable both emotions ($M = 19.69$) and EI ($M = 18.92$; **Table 1**). This is consistent with previous studies on implicit theories of emotions (Tamir et al., 2007) and intelligence (Dweck et al., 1995a). In addition, our subjects viewed emotions as more malleable than EI based on a paired-samples t test [$t(687) = 4.20$, $p < 0.0001$]. This supports our hypothesis H1 and is consistent with previous studies on implicit theories of emotions (Tamir et al., 2007) and intelligence (Dweck et al., 1995a).

Implicit theories of emotions and EI significantly and positively correlated with each other with a medium effect size ($r = 0.43$, $p < 0.01$). Thus, both types of theory were related but distinct and separable in our study. We performed all subsequent analyses using both implicit theories.

Implicit Theories of Emotions and Total Ability EI

Implicit theories of both emotion and EI correlated significantly with ability EI scores on the MSCEIT. Incremental theories were associated with higher ability EI. To determine whether theories of emotions or EI explained a greater proportion of the observed variance in ability EI, we conducted two analyses of two-step hierarchical regression to isolate the variance explained by each scale. The predictor variables were implicit theories of emotions or EI, while the criterion variable was total ability EI score. In the *first model*, we performed regression by adding implicit theories of emotions to the model, followed by implicit theories of EI. In the *second model*, the order of addition of the implicit theories to the model was reversed to control for the variance explained by implicit theories of EI. Both types of implicit theories explained a relatively small proportion of the variance in total ability EI. Higher scores in either type of implicit theory predicted higher total ability EI. In the *second model*, when implicit theories of EI were added first to the model, a larger proportion of variance was explained ($R^2 = 0.07$; **Table 2**). In other words, theories of EI explained a larger proportion of the total variance.

Gender and Age Differences in Implicit Theories of Emotion or EI

In order to investigate O3, we analyzed whether gender and age were related to implicit theories of emotions and EI. Women held significantly more incremental theories of emotions than men [$t(432) = -4.99$, $p < 0.0001$, $d = 0.36$] with a small effect size, and significantly more incremental theories of EI [$t(432) = -5.91$, $p < 0.0001$, $d = 0.50$] with a medium effect

TABLE 1 | Descriptive statistics and correlations.

	M	SD	1	2	3	4	5
1. Gender	0.63	0.48	–				
2. Age	36.02	14.87	−0.23**	–			
3. Theories of EI	18.92	4.33	0.22**	-0.35**	–		
4. Theories of emotions	19.69	4.61	0.19**	-0.27**	0.43**	–	
5. Ability EI	102.62	12.63	0.19**	-0.30**	0.26**	0.21**	–

*$p < 0.05$; **$p < 0.01$.

TABLE 2 | Regression to predict total ability EI from implicit theories of either emotion or EI.

Criterion variable	β	
	Step	**Final**
Ability EI		
Model 1		
Theories of emotions	0.21**	0.12*
Theories of EI		0.21**
R^2	0.04**	0.08**
R^2 change		0.04**
Model 2		
Theories of EI	0.26**	0.21**
Theories of emotions		0.12*
R^2	0.07**	0.08**
R^2 change		0.01*

*$p < 0.05$; **$p < 0.01$.

size. At the same time, women showed significantly higher total ability EI [$t(432) = -4.88$, $p < 0.0001$, $d = 0.35$] with a small effect size. Incremental theories of emotions and EI correlated negatively with age: older adults were less likely than younger ones to hold incremental theories. Age, in turn, correlated negatively with ability EI: older people scored lower for total ability EI than younger adults.

Mediation by Implicit Theories of the Association of Age or Gender with Total Ability EI

We used a parallel mediation model to explore whether gender and age were related to total ability EI via implicit theories of emotions and EI (O4). We used PROCESS Model 4 for parallel mediation, and all indirect effects were subjected to follow-up bootstrap analyses with 10,000 bootstrap samples and 95% bias-corrected CI. In this way, predictor variables (gender and age), the criterion variable (ability EI) and mediators (implicit theories of emotions and EI) were tested in a single model.

In **Table 3**, column *a* shows the effect of gender or age on the mediators (implicit theories of emotions and EI); column *b*, the effect of implicit theories on the criterion variable (ability EI); column *c*, the total effect (direct and indirect) of gender or age on total ability EI; and column *c′*, the direct effect of gender or age on total ability EI while controlling implicit theories. The results show that both types of implicit theories mediated the relationship of gender and age with total ability EI (**Figure 1**). The bootstrapped 95% CI confirmed that both types of implicit theories exerted significant indirect effects on the relationship of gender or age

Predictor	Criterion	Mediator	a	b	c	c′	Sobel z	95% CI
Gender	Ability EI	Theories of emotions	1.804** (0.357)	0.285* (0.111)	4.895** (0.979)	3.293** (0.981)	2.257*	[0.146, 1.043]
		Theories of EI	1.997** (0.333)	0.544** (0.119)	4.895** (0.979)	3.293** (0.981)	3.602**	[0.577, 1.770]
Age	Ability EI	Theories of emotions	−0.083** (0.011)	0.238* (0.110)	−0.254** (0.031)	−0.191* (0.033)	2.056*	[−0.034, −0.003]
		Theories of EI	−0.102** (0.010)	0.418** (0.120)	−0.254** (0.031)	−0.191* (0.033)	−3.264**	[−0.070, −0.019]

Standard errors are presented in parentheses below the non-standardized B coefficients. Column a shows the coefficient of gender or age in the regression to predict the mediator; column b, the coefficient of the mediator in the regression to predict the criterion variable; column c, the coefficient of gender or age in the regression to predict the criterion variable; and column c′, the coefficient of gender or age in the regression to predict the criterion variable while controlling the mediator. *p < 0.05; **p < 0.01.
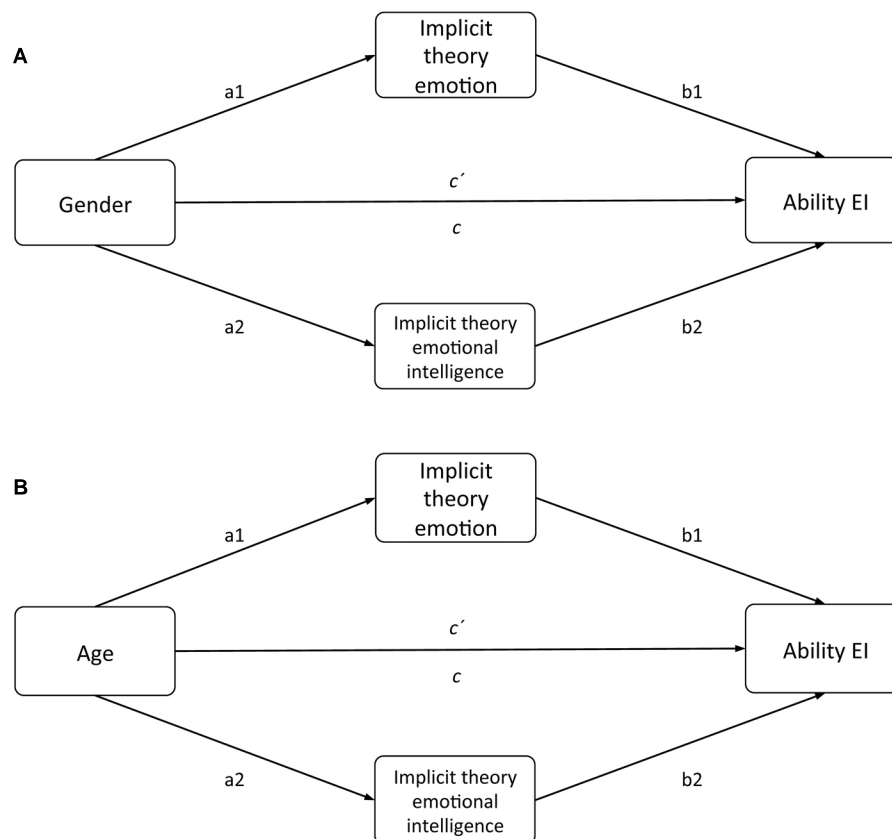
FIGURE 1 | Hypothesized parallel mediation model.

with total ability EI. When the combination of gender and both types of implicit theories was examined, gender accounted for 3.4% of the observed variance in total ability EI; both types of implicit theories accounted for 6% (overall $R^2 = 0.094$). When the combination of age and both types of implicit theories was examined, age accounted for 9% of the observed variance in total ability EI; both types of implicit theories accounted for 3% (overall $R^2 = 0.12$).

Discussion

This study is the first to our knowledge that provides evidence that implicit theories of emotion and EI influence total ability EI on the MSCEIT, such that incremental theorists show higher ability EI.

This finding is consistent with hypothesis H2 and with previous studies showing that those who believe they can change their emotions use effective strategies such as cognitive reappraisal and mastery-oriented strategies more frequently than individuals who hold entity theories, and that incremental theorists experience fewer negative emotions (Tamir et al., 2007; Burnette et al., 2013). Our finding is also consistent with studies showing that university students holding incremental theories about intelligence adopt mastery-oriented strategies to face developmental challenges such as the start of adolescence and the change from primary school to high school (Blackwell et al., 2007; Cury et al., 2008).

Our participants perceived implicit theories about both emotion and EI as malleable, and they viewed theories about emotions as more malleable, consistent with our hypothesis H1. This result

suggests that people tend to think of emotions as less stable than EI, consistent with previous work on implicit theories of emotions and intelligence (Tamir et al., 2007), as well as with widespread notions of the stability of intelligence (Spinath et al., 2003).

Our data further indicate that implicit theories about emotions and EI, while related, do not overlap and can be separated from each other. A similar relationship has been reported for implicit theories of emotion and intelligence (Tamir et al., 2007), such as when predicting academic and emotional functioning in adolescents (Romero et al., 2014). Our data suggest that one key difference between theories of emotions and of EI is that they appear to influence total ability EI to different extents. We found that theories of EI explained more of the observed variance in ability EI than theories of emotions, consistent with our hypothesis H2.

Motivated in part by the lack of clear evidence for or against an association of gender or age with implicit theories of emotions or intelligence, we wanted to examine whether either sociodemographic variable was associated with incremental or entity theories in our sample (O3). We found that women had more incremental theories of emotions and EI than men, in accordance with findings from Spinath et al. (2003), but in contrast to several studies reporting no significant difference between genders (Dweck et al., 1995a; Tamir et al., 2007; Doron et al., 2009). This discrepancy may reflect the fact that many previous studies used relatively young, university-based samples that may not be representative of the general adult population. In the present study, we analyzed a sample of 688 adults with ages ranging from 18 to 73 years; therefore, our results may provide a more valid point of reference than previous studies. We found that young adults were more likely than older ones to have incremental theories, which is consistent with previous work (Spinath et al., 2003). These findings suggest that women and young adults are more likely to hold incremental theories than men and older adults.

We found another significant effect of gender and age: women and young adults in our sample showed higher total ability EI than men or older individuals. Similar results have been reported in previous work (Joseph and Newman, 2010; Fernández-Berrocal et al., 2012; Cabello et al., 2014). This result, together with our finding that gender and age influence implicit theories of emotions and EI, led us to identify both types of theories as mediators of the relationship of gender and age with total ability EI (O4). This suggests that implicit theories may help to explain the observed influence of gender and age on ability EI. Even so, implicit theories explained only 6% of the observed variance in ability EI, while gender explained only 3.4%. The fact that most variance was not explained by the factors we examined indicates the existence of other, more important factors, which should be examined in future studies. Our findings serve as a cautionary tale against simplistic interpretations of emotion or EI as being determined primarily by gender or age.

Our results associating incremental theories about EI with higher total ability EI extends previous studies linking incremental theories with better academic achievement, more effective decision-making, and more effortful behavior (Dweck, 1999; Blackwell et al., 2007). This raises the question of how implicit theories of EI may influence ability EI. It stands to reason, based on Dweck's early research on implicit theories, that people who believe that EI can be cultivated will be more willing to make efforts to do so through hard work, appropriate strategies and seeking help from others. Such individuals may be more likely to view an emotionally or socially challenging situation not as a potential danger but as an opportunity for emotional learning and progress. Future studies should examine whether and how implicit theories of EI and ability EI are associated with such real-life consequences.

These findings may have important implications for interventions with adults. For example, it may be advisable to complement EI interventions with guided reflection or writing tasks about the malleability of emotions and EI. This may help ensure that the subsequent EI intervention has a profound and long-lasting effect. Previous work has shown that direct and indirect interventions in adolescents and adults can increase incremental beliefs about intelligence, leading to long-lasting effects (Aronson et al., 2002; Blackwell et al., 2007). Indeed, training in the malleability of several human domains, such as emotions, has been shown to be useful not only for improving academic and professional performance but also for learning and developing (Dweck et al., 1995b; Dweck, 2012; Burnette et al., 2013). Our data suggest that men and older people may benefit in particular from interventions that target implicit theories of emotions and EI, since these individuals are more likely to hold entity theories about these domains. Developing their incremental beliefs may facilitate improvement in ability EI. It may be more efficient to target implicit theories of EI than theories of emotions, since most individuals in our sample considered EI to be less malleable. Future studies should explore effective methods for integrating interventions to increase incremental beliefs about EI into training programs. For example, studies should examine whether interventions to consolidate and support EI change are more effective when conducted at the beginning or end of EI-based training.

Limitations and Future Directions

While this study does provide the first evidence linking implicit theories of emotions and EI with ability EI, its conclusions are limited in several ways. Its cross-sectional nature and reliance on a single instrument to assess ability EI preclude inferences about causality in the relationship between implicit theories and EI. Our research was inspired by Dweck's implicit theory and previous findings suggesting that implicit theories predict distinct emotional abilities (Burnette et al., 2013; Schumann et al., 2014). However, our cross-sectional design prevents us from excluding the possibility of causality in the opposite direction: people with high EI may gradually develop more incremental theories than people with low EI. Prospective studies are needed to verify our mediation results suggesting that incremental theories lead to higher ability EI. It would be quite interesting to ask, for example, whether manipulating implicit theories of emotions or EI durably increases EI functioning. Longitudinal interventional studies should also test whether training that addresses implicit theories of EI can lead to better mental and social functioning than EI training alone. Another limitation of our study is that we examined only implicit theories of emotions and EI but not several other variables, such as implicit theories of intelligence, that may

also contribute to the observed variance in total ability EI. Indeed, the variables in our model explain only a small proportion of the variance, suggesting the existence of unidentified factors.

Future work along these lines may provide more insight into how the association between implicit theories and EI evolves over a lifetime. Evidence suggests that training in social and emotional competencies is crucial and should begin in early years and continue throughout one's lifetime (Ruiz-Aranda et al., 2012; Rivers et al., 2013; Kumschick et al., 2014). Future studies should also examine the relationships between implicit theories of EI and self-report measures of EI to examine whether they are related to each other similarly or differently to how they are related to ability EI.

In summary, our findings contribute to the growing literature on implicit theories and emotional functioning, which affects quality of life, social adjustment, and professional performance. Incremental theories about intelligence and emotions have already been shown to contribute to an orientation toward learning and development (Dweck, 2012; Yeager and Dweck, 2012). Here we illustrate how implicit theories about emotions and EI are associated with ability EI, softening the impact that socio-demographic factors such as gender and age may have. This suggests that manipulating those theories may be useful in EI training.

Acknowledgments

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