Emotion Recognition Ability and Well-Being: An Investigation of the Underlying Mechanisms

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Abstract

The ability to recognize emotions in others through nonverbal cues (emotion recognition ability; ERA) is generally seen as beneficial for psychosocial functioning and well-being. However, research on the direct link between ERA and well-being is limited, and findings suggest the relationship may not always hold. This thesis explores ERA's association with various aspects of well-being, including life satisfaction, affect, social relationship quality, and the absence of psychopathological symptoms. It also examines potential interpersonal and intrapersonal mechanisms connecting ERA and well-being, such as improved social outcomes through better management of social interactions and more affiliative nonverbal behaviors, as well as emotional sensitivity and adaptive emotion regulation. Three studies were conducted: 1) a daily-diary study (N = 437), examining the overall relationship between ERA and well-being, along with underlying mechanisms; 2) a social interaction experiment (N = 152) where participants interacted with either a friendly or unfriendly confederate to assess how interaction valence influences the effects of ERA and emotion regulation on affect, behavior, and social interaction quality; and 3) a longitudinal study of medical students (N = 986) to assess the impact of ERA on stress, mental health, and burnout one year later, and to see whether social support mediates these effects. Additional exploratory analyses investigated further mediators in the data of Studies 1 and 2, as well as affiliative nonverbal behaviors, namely facial mimicry and nonverbal synchrony, in the social interactions in Study 2. The findings showed no direct link between ERA and well-being overall (Studies 1-3). Regarding the investigated mechanisms, ERA was associated with lower psychopathological symptoms through increased social support (Study 3), and individuals with higher ERA exhibited greater nonverbal synchrony in social interactions (exploratory analyses). However, there was no support for heightened emotional sensitivity or more adaptive emotion regulation in ERA; results instead pointed towards slightly less adaptive emotion regulation (Studies 2 and 3). Future research directions include further investigating affiliative nonverbal behaviors such as facial mimicry and nonverbal synchrony in social interactions, as well as automatic processes in ERA, including attention mechanisms and specific biases towards emotions. Overall, the thesis suggests that while ERA may not consistently enhance well-being, it may still play an important role in interpersonal and intrapersonal processes.

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Contents

1 Introduction

> The movements of expression in the face and body … are in themselves of much importance for our welfare. They serve as the first means of communication between the mother and her infant; she smiles approval, and thus encourages her child on the right path, or frowns disapproval. We readily perceive sympathy in others by their expression; our sufferings are thus mitigated and our pleasures increased; and mutual good feeling is thus strengthened (Darwin, 1872, pp. 365–366).

This quote from Charles Darwin's seminal work on emotional expressions in humans and animals nicely represents the idea that expressing one's own emotions and recognizing emotional expressions in others are fundamental processes for people's well-being and psychological functioning. Knowing how other people in one's surroundings are feeling appears central to many aspects of life. As in Darwin's quote, parents try to discern how their baby is feeling in order to fulfill its needs, spouses gauge each other's moods after a long day to decide if the other needs to be cheered up or calmed down, and managers need to take into account their coworkers' emotional expressions in order to resolve an emerging conflict. Hence, being good at recognizing other's emotional states should be good for one's own well-being and the well-being of one's family, friends, colleagues, and even strangers.

Although everybody recognizes and utilizes other's nonverbal behavior to some degree, People differ in their emotion recognition ability (ERA), i.e. the individual ability to accurately recognize nonverbal cues in others to gauge their emotional states. ERA is discussed as a central socio-emotional competence in concepts such as emotional intelligence (a set of emotional competences including emotional knowledge and regulation skills besides ERA; e.g., Mayer et al., 2011) and interpersonal accuracy (the accurate perception of others' states and traits; e.g., Schmid Mast & Hall, 2018). Both conceptions see ERA as central for navigating the social world, interpreting other people's behavior and their emotions or intentions behind it, and enabling the recognizing individual to adapt their behavior to achieve situation-specific goals. In line with these theories, high ERA should be seen as overall beneficial for psychosocial functioning and well-being.

While the beneficial effects of ERA are generally assumed in many scientific texts, they have rarely been questioned or directly studied. While there is some evidence for benefits in social areas, e.g., that individuals with accurate ERA are more effective in negotiations (Elfenbein et al., 2007) and more liked by others (Wang et al., 2019), ERA's relation to well-being and mental health has revealed mixed results. On the one hand, individuals with high ERA generally do not report being more satisfied with their lives than other people (He & Côté, 2023; Schlegel, 2020). On the other hand, patients with various mental disorders score lower on ERA tests, implicating an association between high ERA and good mental health (Cotter et al., 2018). Hence, the question of whether ERA truly benefits well-being remains unresolved.

The aim of this thesis is to shed light on the relationship between ERA and well-being. The overall objective will be to investigate which mechanisms are involved in the associations between ERA and multiple aspects of well-being and how these can be understood in a psychosocial framework. The thesis will a) discuss the relevant concepts, mechanisms, and corresponding previous evidence, b) present three novel studies as well as exploratory statistical analyses and their implications, and c) propose future directions for studying the psychosocial impacts of ERA.

2 Theoretical Background and Empirical Evidence

2.1 Emotion Recognition Ability

2.1.1 Origin and Concept

Research on the expression and recognition of emotions has a long history, with the prominent early example of Charles Darwin's studies, where he documented human and animal expressive behavior and its recognition of various distinct emotions (Darwin, 1872). The studies by Darwin and later Ekman and colleagues (e.g., Ekman & Friesen, 1971) have investigated the expression and recognition of a limited number of distinct emotion categories (such as anger, joy, fear, disgust, surprise, and sadness). These "basic emotions" (Ekman, 1992) are theorized to be associated with specific biologically preset expressions. The emotions themselves, as well as their expression and recognition, supposedly serve evolutionary functions (e.g., expressing fear as a quick communication of imminent danger among group members). Expressed emotions have been shown to be recognized accurately cross-culturally (see the meta-analysis by Elfenbein & Ambady, 2002), corroborating the basic emotions hypothesis that at least some prototypical emotions and emotional expressions are to a certain degree universal in the human species (for an overview see also Elfenbein & Luckman, 2016).

Most research on emotion recognition implements performance tasks where participants see prototypical expressions of emotions on a picture or video clip and are asked to label these with distinct categories of emotions, which aligns closely with basic emotions theory. Due to this largely predominant measurement approach, the other perspectives of emotion theory on emotion recognition are often overlooked (see Bänziger, 2016; Mortillaro & Schlegel, 2023). Aside from basic emotions theory, the content and process of expression and recognition of emotions have also been explained by constructive emotion theories (e.g., Russell, 2003; also Barrett & Russell, 2015) and appraisal theories (e.g., Moors et al., 2013; Scherer, 2009). According to Russell's constructive theory, all emotional states are psychologically constructed by two dimensions he called core affect: valence and arousal. Following this, only core affect (high vs. low pleasure and high vs. low arousal) is expressed and can be recognized in others from their nonverbal behavior, and all other attributions to another person's state are made from other, e.g., verbal or contextual cues and cultural scripts (Bänziger, 2016; Russell, 2003).

Appraisal theories, on the other hand, argue that emotional expressions and other emotional reactions (e.g., physiological) are a consequence of the individual's cognitive appraisal of a given situation (Bänziger, 2016; Scherer, 2009). From the perspective of appraisal theorists,

accurately recognizing emotions in others involves not only understanding the expression itself but also understanding the individual's appraisals of the situation that precedes the emotional expression (Bänziger, 2016). For example, to correctly recognize anger in someone, the perceiver needs to conclude that this person's goals were previously obstructed by someone or something, which led to the expression of anger.

Even though considered to a degree universal (Elfenbein & Ambady, 2002), individual differences in emotion recognition exist. Emotion recognition differs between cultures, such that consistent in-group advantages and differences in recognition of specific emotional expressions can be found (e.g., the high cross-cultural accuracy in recognizing happiness vs. the relatively low accuracy for contempt; Elfenbein & Ambady, 2002). Furthermore, emotion recognition performance appears to differ between genders (e.g., Thompson & Voyer, 2014), age groups (e.g., G. S. Hayes et al., 2020; Ruffman et al., 2008), and clinical vs. non-clinical populations (e.g., Cotter et al., 2018; Krause et al., 2021).

The study of recognizing emotional states in others from their nonverbal behavior has spread from nonverbal communication and emotion theory into many fields of psychology, and about as many different names for it have emerged. Depending on the area of research, emotion recognition is among others named nonverbal decoding, nonverbal sensitivity, or emotion perception, and is subsumed under umbrella terms such as interpersonal sensitivity, (cognitive) empathy, or social cognition. Although also often studied at general and group levels, the focus here is on the individual differences in emotion recognition ability (ERA), i.e., the ability to accurately infer the emotional state of other people based on their nonverbal behavior such as facial expressions, body movements, or voice modulation, that is measured with performance tests (Bänziger, 2016).

2.1.2 ERA in Broader Socio-Emotional Concepts

ERA is an essential aspect of the more broadly conceptualized socio-emotional competences of emotional intelligence and interpersonal accuracy. Furthermore, it has often been related to constructs such as empathic accuracy and empathy. In the following, a brief account of these concepts will be given.

Emotional Intelligence (EI). There are a number of different conceptualizations of EI and sets of EI components. Usually, the conceptualizations of EI can be divided into "ability" EI (encompassing emotional abilities measured with performance tests; e.g., Mayer et al., 2011) and "trait" EI (encompassing self-views of positive socio-emotional abilities measured with self-

reports; e.g., Petrides et al., 2016). The predominant model of ability EI is the model by Mayer and colleagues (Mayer et al., 2011, 2016, 2024; Mayer & Salovey, 1997). Mayer, Caruso, and Salovey define ability EI as "the ability to reason validly with emotions and with emotion-related information and to use emotions to enhance thought" (Mayer et al., 2016, pp. 295–296). Ability EI is construed as a mental ability that is assessed with performance tests and encompasses the four branches perceiving emotions (e.g., ability to correctly identify emotions in others and oneself; this branch represents ERA), facilitating thought using emotions (e.g., ability to generate emotions to aid judgment and problem-solving), understanding emotions (e.g., determine the antecedents, meanings, and consequences of emotions), and managing emotions (e.g., regulate emotions in oneself and others; for an overview see Mayer et al., 2011, 2016). The branches and their exact content have been a matter of debate since the first presentation of the four-branch model and more recent conceptualizations decided to drop the "facilitating" branch (see, e.g., Mayer et al., 2024; Mortillaro & Schlegel, 2023). Furthermore, Mortillaro and Schlegel (2023) argue that emotion management should be split into two separate competences: emotion regulation, which concerns the regulation of one's own emotions, and emotion management, which concerns the regulation of emotions in others.

Of the four branches, the perception branch, or ERA, respectively, has been discussed as the most basic, developmentally preceding the other branches (Mayer et al., 2011) and facilitating them through "a larger base of emotional information" (Joseph & Newman, 2010, p. 57). In their meta-analysis on a cascading model of emotional intelligence, Joseph and Newman (2010) found that emotion perception sequentially predicted the branches of emotion understanding and emotion management, which in turn predicted work performance, while also accounting for Big Five personality traits and cognitive intelligence. Therefore, ERA appears to increase one's base of interpersonal knowledge to enhance the other competences, like regulating one's own and managing others' emotions, which may then improve important life outcomes. Other studies have replicated ERA's link to various performance measures of the other branches of EI (Schlegel et al., 2019). Aside from benefits to job performance (Joseph & Newman, 2010; O'Boyle Jr. et al., 2011), composite ability EI was shown to benefit academic performance (MacCann et al., 2020), social outcomes (for an overview, see Mayer et al., 2008), as well as health and well-being (Martins et al., 2010; Sánchez-Álvarez et al., 2016).

Most studies on ability EI used the measures originally developed by the authors of the four-branch ability EI model, such as the Multifactor Emotional Intelligences Scale (MEIS;

Mayer et al., 1999) and the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT; Mayer et al., 2003). These tests have long dominated ability EI research and still do, but have been criticized for the lack of a background in emotion theory, their factor structure, and scoring techniques; E.g., they use the averaged answers from a test sample as "correct" scores instead of objective criteria (called consensus-scoring). Meanwhile, other tests that use objective scoring criteria and are based on emotion theory have been developed (see, e.g., MacCann & Roberts, 2008; Schlegel & Mortillaro, 2019), and further efforts to strengthen the theoretical basis of EI-tests have been advocated (Mortillaro & Schlegel, 2023).

It is important to note that besides ability EI, other models define EI as a trait that should be assessed with self-reports (the aforementioned "trait" or sometimes "mixed" EI; e.g., Petrides et al., 2016) and there is an ongoing debate on whether and how ability and trait EI should be integrated. Trait EI encompasses various self-views of positive abilities and is strongly related to established personality traits such as the Big Five and general self-efficacy; E.g., high trait EI relates to high extraversion, agreeableness, conscientiousness, openness, and low neuroticism, and may therefore represent a general positive personality trait (Pérez-González & Sanchez-Ruiz, 2014). However, it is only marginally related to ability EI, possibly due to the differences in measurement (self-reports vs. performance tests; Joseph et al., 2015; Joseph & Newman, 2010). Roberts and colleagues (2010) argue that ability EI is a better representative for the term EI, as it is focused on emotional abilities only and is associated with cognitive intelligence, while trait EI is not. For ERA specifically, self-views are only weakly associated with actual performance (Hall, Andrzejewski, et al., 2009; Murphy & Lilienfeld, 2019) and people overestimate their skills in correctly perceiving others (Ames & Kammrath, 2004). Therefore, this thesis lays its focus on ERA measured with performance tests and relates it to ability EI, not trait EI.

Interpersonal Accuracy (IPA). ERA is furthermore an important aspect of IPA, which is defined as the ability to "accurately assess other individuals' emotions, personality, intentions, motives, and thoughts" (Schmid Mast & Hall, 2018, p. 309; see also Hall et al., 2016; Schlegel et al., 2017). Compared to EI, it does not include other emotional abilities aside from ERA but assesses the accurate perception of others' characteristics more broadly, e.g., including personality judgments. However, most studies in the field of IPA have investigated ERA as its operationalization, with fewer studies on the other aspects such as personality judgment (Schmid Mast & Hall, 2018). According to the theory of IPA, a higher ability to correctly infer a social interaction partner's emotions (alongside their intentions, thoughts, and so forth) generates

insights into their expectations of the situation (Palese & Schmid Mast, 2020; Schmid Mast & Hall, 2018). This information will then enable adaptive behavioral reactions that can fulfill these expectations ("behavioral adaptability"), which should benefit interaction outcomes (e.g., finding a compromise; higher perceptions of warmth; etc.) for one or both interaction partners. There has been empirical evidence for this behavioral adaptability model (see Palese & Schmid Mast, 2020; Schmid Mast & Hall, 2018), and empirical evidence on IPA's direct links to improved social outcomes are largely redundant to ERA's and will be described in later sections. In sum, a higher IPA (centrally including ERA) is thought to generate valuable socio-emotional information that lays the foundation for adaptive social behavior.

Empathy and Empathic Accuracy. Another related construct is empathy, which can be loosely defined as taking over the emotions of others, responding empathically (affective empathy), and taking over others' perspectives (cognitive empathy). However, empathy has been defined in multiple ways and a general consensus appears hard to find (for a detailed discussion, see Cuff et al., 2016; Hall & Schwartz, 2019). Depending on the definition, some authors include ERA in cognitive empathy (e.g., Drimalla et al., 2019; Wieck et al., 2022) while others see it as related but do not include it in empathy at all (e.g., Holland et al., 2021; Schurz et al., 2021). Empathy is also measured in multiple different ways but often relies on self-report questionnaires in comparison to performance tests in ERA, and the two appear largely unrelated (Murphy & Lilienfeld, 2019). As an extension of empathy, the concept of empathic accuracy, i.e., the ability to accurately read other people's thoughts and feelings (e.g., Ickes, 2001), seems clearly related to ERA. However, this concept is usually measured differently from ERA, i.e., by letting two people in a dyadic interaction analyze their own and each other's thoughts and feelings from video and assessing congruence (for details on the empathic accuracy paradigm see, e.g., Ickes, 2001; Ickes & Hodges, 2013). This is not a standardized test where all participants see the same stimuli, making it hard to compare between dyads. Furthermore, empathic accuracy has been found to be only marginally related to standardized ERA performance tests (Schlegel et al., 2017).

2.1.3 Associated Demographics and Individual Differences

As mentioned above, there exist considerable individual differences in ERA. It has been demonstrated repeatedly that females score higher on emotion recognition tests than men (Hall, 1978; Thompson & Voyer, 2014). These differences are small but appear very consistently, and have been explained by neurological differences (e.g., greater interhemispheric communication in

women that may enhance the integration of emotional experience; Thompson & Voyer, 2014) and social mechanisms like gender stereotypes (e.g., that promote females to be more involved in childcare and to value emotional skills more; Hall, 1978; see also Barrett & Bliss-Moreau, 2009, on emotion stereotypes between genders). There are also differences in ERA between age groups, with older adults scoring lower in ERA tests than younger adults (G. S. Hayes et al., 2020; Ruffman et al., 2008). The authors of these meta-analyses discuss possible explanations, such as positivity bias (overall, age differences seem to be greater for recognizing negative than positive emotions, even when considering methodological bias), overall cognitive decline (such as lower working memory capacity), and neurophysiological changes in the brain due to aging.

Other studies assessed ERA's association with cognitive intelligence. In their meta-analysis, Schlegel and colleagues found small but substantial relations to cognitive intelligence and its different subtypes such as processing speed and verbal knowledge, leading them to categorize ERA as a "sensory-cognitive ability amidst other mental abilities … that are distinct from each other yet may share an elementary cognitive basis" (Schlegel et al., 2020, p. 344). ERA has also been linked to self-reported emotional traits such as lower alexithymia (i.e., deficits in identifying, describing, and attending to one's own emotions; Bagby et al., 1994) but also higher neuroticism, possibly due to a higher sensitivity for one's own and others' emotions (for an overview, see Schlegel et al., 2019).

2.1.4 Measurement

Individual differences in ERA are usually measured with standardized performance tests. Numerous tests have been developed, all of which utilize some form of stimuli featuring nonverbal emotional expressions that participants are required to label or match. Some prominent examples are the Profile of Nonverbal Sensitivity (PONS; Rosenthal et al., 1979, 2013), the Diagnostic Analysis of Nonverbal Accuracy (DANVA; Nowicki & Duke, 1994), or the Japanese and Caucasian Brief Affect Recognition Test (JACBART; Matsumoto et al., 2000). However, ERA tests differ greatly, leading to difficulties in comparing the results across studies (for an overview and further discussion see Bänziger, 2016). The differences include the type of stimuli and their presentation time (static vs. dynamic; age, gender, and ethnic groups of the expressors; presented for some milliseconds up to multiple seconds), the response format (number of emotion labels to choose from vs. degree to which multiple emotions are represented in each stimulus), the nonverbal modality (expressions in the face, voice, gestures/posture, or combinations of these), the scoring method (based on the intention or self-report of the expressor vs. consensus-

/expert scoring vs. theoretical expectations), and the amount of context information (e.g., pictures reduced to only the facial expression vs. naturalistic pictures including social scenes). The differences between these assessments are in part due to the ongoing debate on the content of ERA, e.g., whether it should encompass context information or only "pure" nonverbal signals (e.g., Hess & Kafetsios, 2021) and which emotion theory, if any, it should rely on (Bänziger, 2016; Mortillaro & Schlegel, 2023). These differences are also influenced by the various conceptualizations and research aims in the different fields of psychology that use emotion recognition tests (Mortillaro & Schlegel, 2023).

The studies presented in this thesis implemented the short form of the Geneva Emotion Recognition Test (GERT and GERT-S; Schlegel et al., 2014; Schlegel & Scherer, 2016) for the assessment of ERA. Compared to many previous studies that used tests with static pictures of prototypical emotions and very few emotion labels to choose from, the GERT-S presents participants with 42 (83 for the full GERT) multimodal video stimuli (with facial, vocal, and body cues) with a duration between 1-4 seconds and 14 distinct emotions (joy, amusement, pride, pleasure, relief, interest, anger, fear, despair, irritation, anxiety, sadness, disgust, and surprise) expressed by five male and five female actors. The expressors speak in short pseudo-linguistic sentences to enable vocal cues but prevent verbal information from being incorporated.

The emotions in the GERT were originally selected to equally represent the valence (pleasure vs. displeasure) and arousal (activation vs. deactivation) dimensions in the circumplex model of affect by Russell (1980, 2003). As most other ERA tests, the GERT is therefore based on distinct emotion category labels from basic emotion theory, while representing the whole dimensional range of emotions in the constructivist circumplex model (see Bänziger, 2016; Mortillaro & Schlegel, 2023). The dynamic format and the coverage of multiple different emotions, expressors, and modalities greatly increase the ecological validity compared to static pictures of faces expressing a small number of emotions, while at the same time keeping the content focused on nonverbal cues of only one target person. The GERT showed the highest average reliability and intercorrelations among other ERA tests (Schlegel et al., 2017), appropriate construct validity (e.g., in relation to other socio-emotional skills; Schlegel et al., 2019), and good predictive validity (e.g., predicting outcomes in face-to-face interactions; Schlegel et al., 2018).

2.2 Well-Being

The two theories on EI and IPA imply that ERA is a skill that would benefit people's social interactions and relationships, contributing to overall well-being. However, not all of these presumptions have been clearly confirmed in previous research. While there is some support for ERA being beneficial for social outcomes and social skills (e.g., Hall, Andrzejewski, et al., 2009), results concerning well-being have been mixed (He & Côté, 2023; Krause et al., 2021; Sánchez-Álvarez et al., 2016; e.g., Schlegel, 2020; Schlegel et al., 2021). In the following, some of the major theories of well-being are reviewed and a comprehensive working definition of well-being is developed.

2.2.1 Theories of Well-Being

In past and contemporary psychological research, well-being has usually been conceptualized through one of two main approaches: the hedonic approach or the eudaimonic approach (Ryan & Deci, 2001). From the hedonic view, well-being is defined by high pleasure and happiness. The main representative operationalization of the hedonic view is subjective well-being (SWB), which attempts to measure subjective, positively orientated, and global well-being (Diener, 1984, 2009). SWB is generally measured consisting of the cognitive, evaluative component, i.e., life satisfaction, and two affective components, namely positive and negative affect (Diener, 1984). Commonly used measures include the Satisfaction with Life Scale (SWLS; Diener et al., 1985) and the Positive and Negative Affect Scale (PANAS; Watson et al., 1988).

From the eudaimonic view, well-being is instead defined by meaning in life, optimal psychosocial functioning, and the realization of a person's true potential (Ryan & Deci, 2001). One central representative of eudaimonic well-being concepts is psychological well-being (PWB) by Ryff and Keyes (1995). PWB was construed as positive functioning from a lifetime perspective and as distinct from SWB. It is measured with the six components self-acceptance, personal growth, purpose in life, positive relations with others, environmental mastery (capacity for effective management of one's life and surroundings), and autonomy (Ryff & Keyes, 1995). Ryan and Deci (2000, 2001) complemented the eudaimonic view on well-being with their self-determination theory, which formulates basic psychological needs that need to be fulfilled to at least a sufficient degree to achieve optimal functioning and well-being. They described three such needs: autonomy, competence, and relatedness, which easily fit into the proposed components of PWB (i.e., autonomy, environmental mastery, and positive relations with others). Ryan and Deci (2001) did not oppose SWB and instead saw their basic needs as its foundations. Early on, Ryan

and Deci (2001) recommended the integrative use of the two views as aspects of a broader, multifaceted conception of well-being.

In later years, Su and colleagues (2014) attempted to integrate multiple well-being theories that had been published previously, including the aforementioned works by Diener (1984), Ryan and Deci (2000), and Ryff and Keyes (1995), as well as the PERMA model of flourishing by Seligman (2011) and Scheier and Carver's work on optimism (e.g., Scheier & Carver, 1985). In their integrative conception of well-being (which they called "thriving"), Su and colleagues (2014) conceived SWB as a key dimension of well-being and as the central self-perception of a person of how well the other aspects of (psychological) well-being are fulfilled (as has been previously implied by Ryan & Deci, 2001). This idea was later empirically confirmed by Goodman and colleagues (2018), who demonstrated that SWB acts as the essential representative of well-being, with the PWB domains as its facets.

A related question is whether symptoms of mental disorders are a sign of "ill-being" and should therefore be included in conceptions of (low) well-being. The World Health Organization (WHO) defines mental health in the sense of positive functioning akin to the eudaimonic view and as more than the absence of illness (World Health Organization, 2004). Analogously, positive psychology, i.e. the focus of psychology on positive subjective experience (e.g., happiness, optimism), positive traits (e.g., interpersonal skill), and positive values and strivings at the group level (e.g., responsibility, tolerance), has been the predominant view in psychology in the last decades, instead of a solitary focus on psychopathology (Seligman, 2019; Seligman & Csikszentmihalyi, 2000). However, whereas positive psychologists usually concentrate solely on (positive) well-being, the WHO (2004) and scholars such as Keyes (2002, 2016) and Lent (2004) have argued that comprehensive well-being research should examine both (positive) well-being and (negative) psychopathology as two related but distinct dimensions, as suggested by the two continua model (see Keyes, 2016). This separation could explain why some people are diagnosed with mental illness but still manage to function in their lives (i.e., due to simultaneous high positive functioning in the sense of well-being) and it has been demonstrated empirically (e.g., Lamers et al., 2015).

2.2.2 A Working Definition of Well-Being

As can be seen, the last 40 years of well-being research have produced a large variety of definitions and conceptualizations of well-being, leading to a diverse field that is hard to unify. In this field, choices of specific theoretical assumptions and measures are largely subjective to

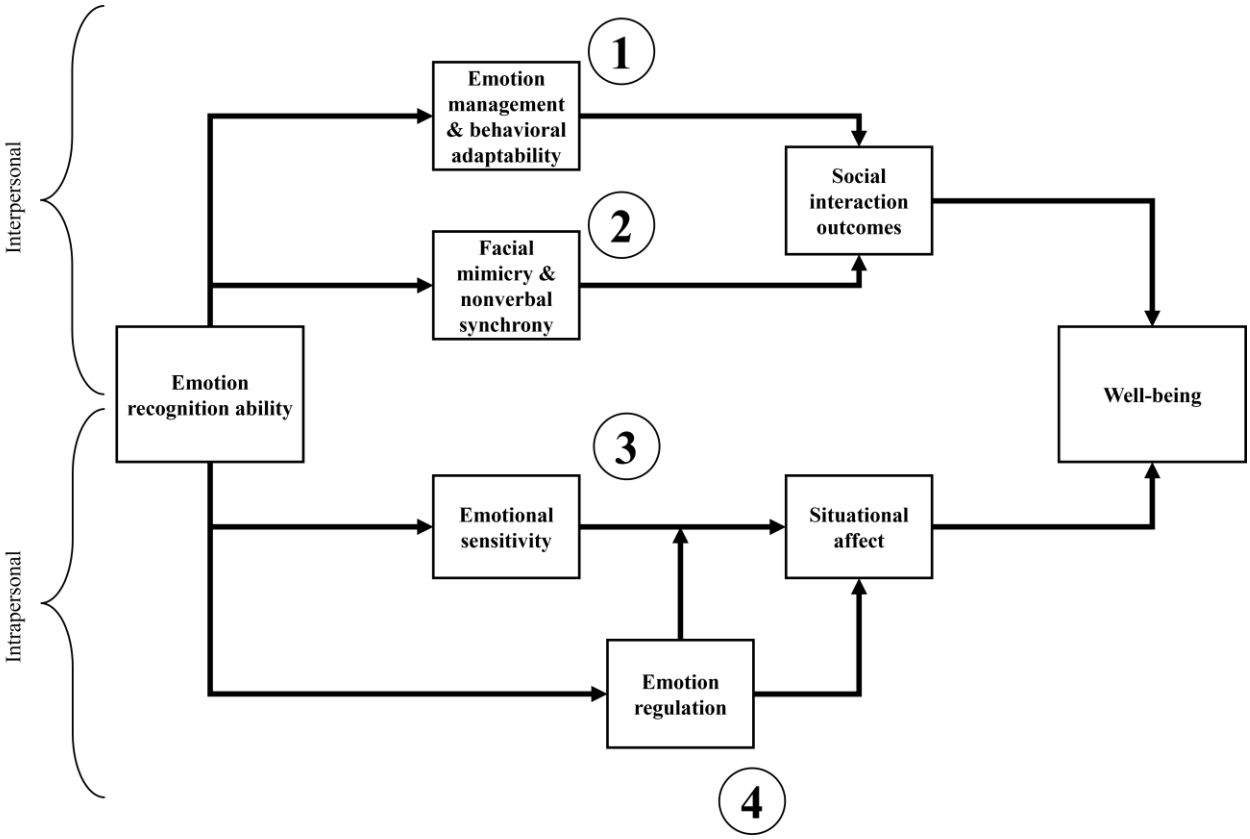
researchers and based on specific research needs (Goodman et al., 2018). Nevertheless, almost all authors and lines of research reviewed above advocate a comprehensive conceptualization of well-being. Therefore, the working definition of well-being in the present thesis on the socio-emotional ability ERA a) includes aspects of both SWB and PWB, b) sees SWB with its affective components as its central representation, but also c) considers especially social aspects of well-being such as the quality of social relationships, and d) incorporates low psychopathological symptoms and stress alongside the other, more positively orientated aspects. With this working definition, it should be possible to study the relationship between ERA and well-being comprehensively.

2.3 Mechanisms Relating ERA and Well-Being

There are several mechanisms that theoretically connect ERA to well-being. ERA has been hypothesized to influence interpersonal processes, such as better social interactions and relationships via (1) better management of social interactions and (2) more affiliative nonverbal behavior including facial mimicry and nonverbal synchrony. ERA has also been linked to intrapersonal processes, such as (3) heightened emotional sensitivity and (4) more adaptive emotion regulation, which should impact positive and negative affect. In the following sections, the most relevant processes are introduced using the framework depicted in Figure 1. The processes are discussed in detail from top (interpersonal mechanisms) to bottom (intrapersonal mechanisms).

Figure 1

Proposed interpersonal and intrapersonal mechanisms linking emotion recognition ability and well-being.



Note. The proposed interpersonal mechanisms linking ERA and well-being are: (1) an improved management of social interactions and (2) increased affiliative nonverbal behaviors (facial mimicry and nonverbal synchrony) leading to better social interaction outcomes. Better social interaction outcomes are expected to increase availability of social support and relationship quality, and subsequently other aspects of well-being. The proposed intrapersonal mechanisms linking ERA and well-being are: (3) a heightened emotional sensitivity that may increase both positive and negative situational affect and (4) more adaptive emotion regulation that may either directly increase positive situational affect or be necessary to adaptively regulate the effects of heightened emotional sensitivity. The cumulation of more positive situational affect is expected to increase other aspects of well-being.

2.3.1 Mechanism 1: Management of Social Interactions

On the interpersonal side, one of the more well-documented links of ERA to well-being is via the enhancement of social interactions and interpersonal relations as a social aspect of well-being (see Figure 1, nr. 1). ERA should benefit the adaptive and goal-oriented management of

social interactions, which then contribute to well-being because of a higher quality of relationships and more social support. However, ERA's effects on overall relationship quality with friends, family, or significant others, have been mixed. In their meta-analysis, Hall and colleagues (2009), only found small and unstable positive correlations with higher relationship quality, while a recent study found small positive correlations in both self- and peer-reports (He & Côté, 2023). This is rather surprising, because the assumed mechanisms linking ERA and social aspects of well-being are well documented.

By definition, ERA is relevant to an individual mainly during social interactions, where a more accurate recognition of others' emotional expressions can provide access to new socio-emotional information. According to the theory of IPA, this should lead to higher behavioral adaptability and thereby enhance social interaction outcomes for oneself or the other person (Palese & Schmid Mast, 2020). Similarly, in EI theory, ERA is expected to enhance emotional understanding and through it regulation of emotions in oneself and management of emotions in others (Joseph & Newman, 2010), increasing the individual's social competence, likability, and the quality of social interactions (see Mayer et al., 2008).

This enhanced management of social interactions could explain why ERA has been consistently linked to multiple aspects of social competence and outcomes of social interactions. In their meta-analysis, Hall, Andrzejewski, and Yopchick (2009) found that individuals with higher ERA were rated by observers (e.g., supervisors, peers, or other observers in experimental studies) as more interpersonally accurate, more socially competent, more effective in clinical counseling (see also Hall et al., 2015; Hall, Roter, et al., 2009), as well as more effective at the workplace (see also Momm et al., 2015). Some self-reports on similar outcome categories also showed significant correlations in the meta-analysis but with lower effect sizes. Other studies have also shown that ERA was related to better teacher-student interactions and learning outcomes (Bernieri, 1991; Kurkul, 2007), better outcomes in negotiation tasks (sales, mutual gains, and ratings of cooperativeness; Elfenbein et al., 2007; Schlegel et al., 2018), more satisfied subordinates and leadership emergence (Schmid Mast et al., 2012; Walter et al., 2012), higher peer status and friendship quality in primary school children (Wang et al., 2019), and ratings of giving more responsive support (Gregory et al., 2020).

Better social interactions with others in turn should benefit well-being. Several studies found that even brief positive social interactions with strangers such as bus drivers or unacquainted peer students enhanced SWB (Gunaydin et al., 2021; Sandstrom & Dunn, 2014).

Furthermore, social connectedness and positive affect increased the most for individuals who interacted in person (vs. online) and with close others (vs. strangers), but also increased overall in all interaction conditions compared to controls (Fritz et al., 2023). The beneficial impacts of positive social interactions on well-being may be explained by two models proposed by Cohen and Wills (1985). Their "main effect model" assumes that (positive) social ties directly increase various positive affective states (e.g., a sense of belonging and self-esteem) and promote healthy behavior, which then increases well-being (the authors focused on mental health, which is included in the definition of well-being in this thesis). Their second model, the "stress-buffering model", posits that social resources and the amount of positive social interactions may reduce the aversive effects of stress and conflict on well-being (S. Cohen & Wills, 1985; Kawachi & Berkman, 2001). According to Cohen and Wills (1985), perceived availability of social resources alone, irrespective of whether support is actually received, may positively influence individuals' appraisals of their coping abilities and their cognitive behavioral responses, which would improve well-being (S. Cohen & Wills, 1985; based on Lazarus' appraisal theory, e.g., Lazarus, 1966). Both models have been supported by their own and subsequent research (S. Cohen & Wills, 1985; for an overview see Lincoln, 2000). Therefore, positive social interactions by themselves should increase positive affect, satisfaction, and social aspects of well-being. Taken together, even though the overall link has been shown to be unstable, ERA should lead to the social aspects of well-being via the adaptive management of social interactions.

2.3.2 Mechanism 2: Mimicry and Nonverbal Synchrony

Another interpersonal mechanism linking ERA and well-being is that higher ERA may lead to higher facial mimicry and nonverbal synchrony, which are both affiliative nonverbal behaviors that should add to the improvement of social interactions (Figure 1, nr. 2). The imitation of others' facial expressions, also called facial mimicry, is thought to be an automatic behavior in social interactions that occurs due to affiliation goals. Facial mimicry has been shown to be an important aspect of positive social interactions. It appears to benefit interpersonal attunement and bonding (e.g., Stel & Vonk, 2010) and increase feelings of liking and prosocial behavior (for an overview, see Chartrand & Lakin, 2013; Duffy & Chartrand, 2015). Furthermore, facial mimicry is thought to be involved in ERA. Based on the facial feedback hypothesis (McIntosh, 1996; Zajonc et al., 1989), it has been suggested that perceiving emotional expressions in others elicit facial mimicry in the perceiver (Niedenthal & Brauer, 2012). This should then lead to emotional contagion (i.e., taking over the emotions of others; Elfenbein,

2014; Hatfield et al., 1993) and afferent feedback that enhances the perceiver's understanding of others' emotions (e.g., Niedenthal, 2007; Niedenthal & Brauer, 2012).

At the same time, it can be assumed that individuals with high ERA may show more facial mimicry in social interactions. ERA has been linked to stronger attention towards emotions: There is evidence that high ERA individuals are better at "tuning in" to nonverbal emotional stimuli (i.e., quickly guiding attention towards facial and vocal emotional stimuli and away from neutral stimuli, e.g., in an emotional Stroop task), but not at "tuning out" (i.e., guiding attention away from emotional stimuli; Elfenbein et al., 2017; Fiori et al., 2022, Study 1; Lea et al., 2023). Therefore, ERA may facilitate facial mimicry, enhancing the automatic affiliative behavior due to increased attention towards the faces and emotions of social interaction partners. Taken together, ERA and facial mimicry may reinforce each other, together contributing to more positive social interaction outcomes.

A related measure of interpersonal nonverbal coordination, called nonverbal synchrony, has not been previously studied in regard to individual differences in ERA. Nonverbal synchrony is the dynamic coordinated movement of the body between two or more individuals, that includes both simultaneous as well as slightly lagged movements (Ramseyer & Tschacher, 2011). It is measured objectively with computer-aided video analysis, using tools such as Motion Energy Analysis (MEA; Ramseyer, 2020; see also Kleinbub & Ramseyer, 2021). Nonverbal synchrony was linked to higher-rated therapist-patient relationship quality and symptom reduction in psychotherapy (Ramseyer & Tschacher, 2008, 2011) and more positive affect in staged dyadic laboratory interactions (Tschacher et al., 2014). Similar to facial mimicry, ERA may be linked to more attunement to the other person's nonverbal behavior, increasing nonverbal synchrony, and thereby benefiting the social interaction.

2.3.3 Mechanism 3: Emotional Sensitivity

On the intrapersonal side, high ERA might lead to a heightened sensitivity to emotions in one's surroundings, which may increase situational positive or negative affect (see Figure 1, nr. 3). As described in the previous section, ERA has been linked to stronger attention towards emotions, emotional attunement, and emotion contagion. Furthermore, individuals with high ERA rated happy facial expressions as more intense and happy as well as angry facial expressions as more arousing, suggesting heightened sensitivity to both positive and negative emotional stimuli (Fiori et al., 2024). Combining increased attention to and contagion of emotions, this can be described as a heightened emotional sensitivity (also called

"hypersensitivity" by some authors; e.g., Fiori & Ortony, 2021; Fiori et al., 2023). Heightened emotional sensitivity in ERA has been discussed to influence well-being in both positive and negative ways, respective to the emotions perceived (Davis & Nichols, 2016; Fiori et al., 2023; Schlegel, 2020). This indicates a higher readiness to focus on emotional content, but not necessarily a higher ability to ignore it when a given task affords it. Taken together, high ERA individuals may be more aware of and be more strongly affected by both positive and negative emotions in their environment, which may have both positive, as well as negative, impacts on their well-being.

Multiple authors have discussed especially detrimental intrapersonal side effects of "too" high ERA on well-being due to emotional sensitivity (Davis & Nichols, 2016; Riggio & Crawley, 2022; Schlegel, 2020). A heightened sensitivity may, through emotional contagion and possibly increased empathic concern (Schlegel et al., 2019), increase specifically negative affect and worry for others. This is reinforced by research indicating that individuals with higher ERA exhibit heightened cortisol responses to social stress (Bechtoldt & Schneider, 2016), greater negative reactions to daily hassles (Ciarrochi et al., 2002), a tendency to appraise negative situations as more negative and harder to cope with (Scherer, 2020), and, in some cases, report higher levels of neuroticism on the Big Five personality traits (e.g., Schlegel et al., 2019).

Related to this, Ickes and Hodges (2013) suggested that there is an optimal level of empathic accuracy (a construct conceptually closely related to ERA; see section 2.1.2), beyond which it may negatively impact social interactions and relationships, e.g., by overvaluing the partner's nonverbal behaviors compared to their verbal statements in a discussion. With a heightened emotional sensitivity, this may also be the case for taking over negative affect. These considerations imply that higher ERA may benefit well-being only up to a certain medium level and that individuals with a skill at recognizing and interpreting others' emotions beyond that level may be prone to misinterpretation and negative affect. Also, it is possible that detrimental effects (e.g., more negative affect) may cancel out beneficial effects (e.g. better social interactions) of ERA, possibly preventing it from being generally psychosocially beneficial and conducive to well-being (Schlegel, 2020).

2.3.4 Mechanism 4: Emotion Regulation

Relatedly, another intrapersonal link to well-being might be ERA's connection to other emotional competences such as adaptive emotion regulation (see Figure 1, nr. 4). The process of emotion regulation is understood as a sub-construct of coping (i.e., all cognitive and behavioral

attempts to deal with internal or external stressors) that specifically focuses on goal-directed monitoring and modification of one's emotional reactions (Marroquín et al., 2017). Emotion regulation has been the focus of an extensive body of emotion and clinical research (for an overview, see Gross, 2015) and is seen as a central psychological mechanism of mental health and psychopathology (Gross et al., 2019; Sheppes et al., 2015). Research on emotion regulation has attempted to discern which emotion regulation strategies are psychosocially adaptive or maladaptive (Aldao et al., 2010; Webb et al., 2012), with some strategies like cognitive reappraisal and acceptance appearing largely adaptive, and rumination or expressive suppression largely maladaptive for well-being (see also Marroquín et al., 2017).

The ability to use adaptive emotion regulation is supposed to benefit well-being through higher levels of positive and lower levels of negative affect (Zeidner et al., 2012). Emotion regulation is a component of EI theory and likely to benefit from high ERA, as greater ERA is thought to enhance socio-emotional information in a given situation, providing the perceiver with more options for effective regulation (Joseph & Newman, 2010; Mayer et al., 2011; see also section 2.1.2 in this thesis). This has been confirmed when using the MSCEIT (Joseph & Newman, 2010; Mayer et al., 2003), and other measures of emotion regulation (Elfenbein & MacCann, 2017). It is important to note that ERA and adaptive emotion regulation are related mainly when performance tests of emotion regulation are used, but not necessarily when using self-report scales (Schlegel & Mortillaro, 2019). This may possibly be because performance tests in emotion regulation measure knowledge about the adaptivity of certain regulation strategies (maximum performance), whereas self-reports measure typical performance (Freudenthaler & Neubauer, 2005, 2007; see also Mortillaro & Schlegel, 2023). Overall, ERA should benefit adaptive emotion regulation, which is considered essential for well-being.

On top of a direct relationship due to both ERA and emotion regulation being part of emotional intelligence, ERA's effect on well-being might depend on one's ability to regulate emotions (Fiori et al., 2023; Schlegel, 2020). As described in the previous section, high ERA individuals may be more sensitive to emotional stimuli and may react more strongly to social stress, and would therefore have a greater need to regulate their emotions adaptively. While this has not been studied focally in previous studies, a study by Schlegel and colleagues (2021) during a COVID-19 lockdown showed that individuals with higher ERA indicated less media consumption on the topic of COVID and less worry about a severe COVID situation in their country, when they reported more adaptive (vs. maladaptive) emotion regulation. Therefore, the

ability to regulate emotions and deal with stressors adaptively may be key for ERA to be beneficial for well-being.

2.3.5 Personality's Influences on the Mechanisms

It should be noted that all proposed mechanisms linking ERA and well-being may be impacted by socio-emotionally relevant personality traits. Prominent examples of such traits are the Big Five dimensions of extraversion, agreeableness, and neuroticism (see, e.g., John, 2021). These traits are characterized, to different extents, by social and emotional factors: positive emotions (or high energy), assertiveness, and sociability in extraversion; compassion, respectfulness, and trust in agreeableness; and anxiety, depression, and emotional instability in neuroticism. According to Dweck (2017), these three traits are closely linked to needs for affiliation, social recognition, self-esteem, and status, but differ in their goal-directed actions to fulfill them. For example, individuals with high extraversion and agreeableness seek out social activities and act trustingly and respectfully to achieve social goals, while individuals high in neuroticism may predominantly worry about loss of social status and prevent such loss by defensive and avoidant actions.

Higher ERA might be very beneficial in achieving some of these trait-specific goals, e.g., by broadening one's base of information on the other person's motives and expectations and thereby improving communication (for extraversion and agreeableness; this refers to IPA theory and behavioral adaptability model, e.g., Palese & Schmid Mast, 2020), to reliably and early recognize signs of threat or conflict to avoid it (for neuroticism; see Denissen & Penke, 2008) or take other measures of prevention (e.g., calming down agitated group members; for agreeableness). A few studies found promising results of ERA interacting with extraversion or agreeableness in predicting social outcomes (Bechtoldt et al., 2013; Schreckenbach et al., 2018; Szczygiel & Mikolajczak, 2018). Neuroticism has not been studied in interaction with ERA so far, but is clearly linked to sensitivity to emotions and to maladaptive emotion regulation (John, 2021), and may therefore strongly influence the emotional sensitivity and emotion regulation mechanisms discussed above.

2.4 A Missing Link? Research Gaps in the Relation Between ERA and Well-Being

As can be seen, most theoretical links support ERA being a beneficial ability for psychosocial functioning. Hence, well-being should generally profit from a more accurate ERA. However, some detrimental mechanisms have also been brought up, making the overall claim more difficult to uphold. In the following, the general findings on the association of ERA and

well-being are laid out and research gaps in the relation between ERA and well-being are identified.

2.4.1 Empirical Evidence for the Overall Association

Measures of ability EI that include ERA are generally associated with higher well-being. Martins et al. (2010) and later Sánchez-Álvarez et al. (2016) conducted meta-analyses on studies that investigated the effects of composite ability EI on mental health and SWB, respectively. Both studies found positive, although small associations of ability EI with well-being overall. In all of the studies included, ability EI was measured with the MSCEIT (see section 2.1.2), and the meta-analyses separately analyzed trait EI, which was included in more studies and was more strongly positively correlated to well-being than ability EI (possibly in part due to common method variance by using self-reports). The meta-analyses and the studies they reviewed did not differentiate branches of ability EI, hence no clear conclusion to ERA's relation to well-being can be taken from these, but a small correlation may be expected due to ERA being part of ability EI.

Very few previous studies have focally investigated ERA's relationship with well-being. In a primary attempt to directly assess the ERA-well-being association, Schlegel (2020) conducted a mini-meta-analysis on 17 datasets of previous studies using the GERT and short SWB scales (e.g., SWLS, WHO-5; for the latter see Topp et al., 2015) and found an overall correlation close to zero. Another study with a large sample (N = 1,126) also found no effects on life satisfaction, but ERA predicted slightly higher self- and other-reported relationship quality (He & Côté, 2023). Similarly, while the meta-analysis by Hall and colleagues (2009) did not investigate SWB, it found that higher ERA was associated with slightly higher relationship quality and slightly lower depressive symptoms. For these outcomes, the meta-analytic procedure also indicated that individual results varied greatly. Matching the effect of lower depressiveness, the COVID-19 study by Schlegel and colleagues (2021) found a small effect (standardized regression coefficient β = -.10) saying that ERA was associated with decreased negative affect and burden during a COVID lockdown. However, another study with a large sample (N = 886) did not find evidence for reduced symptoms of depression, anxiety, or burnout in students with higher ERA (Carrard et al., 2022). Taken together, ERA does not seem directly associated with well-being, except for the small effects of heightened relationship quality and diminished negative affectivity or depressive symptoms in some studies.

2.4.2 Broadening the Scope: ERA and Other Well-Being Measures

As can be seen, ERA might be more strongly related to well-being if additional measures for a broader conceptualization of well-being were used. For example, the aforementioned link to lower depressiveness shows that high ERA may relate to less psychopathological symptoms. When looking at clinical samples, ERA appears reduced in various mental disorders such as major depression, bipolar disorder, schizophrenia, anorexia nervosa, borderline personality disorder, and substance use disorder; developmental disorders such as attention deficit hyperactivity disorder; and neurodegenerative disorders such as Parkinson's disease or multiple sclerosis (see the meta-analyses by Cotter et al., 2018; Dalili et al., 2015; Krause et al., 2021). Major depression is one of the best-studied disorders in regard to ERA deficits (Dalili et al., 2015; Krause et al., 2021), and it has been shown that within major depression and dysthymia, negativity biases in the perception and processing of emotions exist (see, e.g., Griffiths & Ashwin, 2016): For example, patients with major depression or dysthymia falsely identified happy, disgusted, or neutral faces compared to controls, while showing comparable or only slightly reduced performance on angry and sad faces (Krause et al., 2021; Griffiths & Ashwin, 2016).

Clinical research on ERA has not reached a consensus regarding its role in psychopathology yet. Some authors consider ERA deficits to be potentially and partially causal for the onset of disorders – e.g., by conceptualizing low ERA to be a vulnerability for major depression (Nyquist & Luebbe, 2020) or by aiming to train ERA to enhance mood in healthy participants at risk for depression (e.g., Penton-Voak et al., 2021). However, others argue that the relationship is more likely one of mutual influence, i.e., that psychosocial and emotional processing deficits (such as in ERA) increase the likelihood of developing a mental disorder and that having a mental disorder afflicts psychosocial and emotional processing (Krause et al., 2021). Lastly, some authors argue that it is not causal at all, because an atypical social cognition appears to be a general consequence of psychopathology and reduced ERA is not a central symptom in any disorder (Griffiths & Ashwin, 2016). Overall, causality is very hard to ascertain, as few longitudinal studies have included repeated measures of ERA (Cotter et al., 2018), and training studies revealed mixed results (Penton-Voak et al., 2021).

As in non-clinical psychological research, clinical research on ERA suffers from methodological variations in ERA measures. There is a lot of variance in stimuli type, presentation time, and response formats that make the comparability of studies and interventions

difficult (see, e.g., Griffiths & Ashwin, 2016; Krause et al., 2021). Most studies only employ pictures of facial expressions and assess only very few basic emotions (Krause et al., 2021), for example using the Reading the Mind in the Eyes Test (Baron-Cohen et al., 2001), which leads to ceiling effects and increases chance levels of scoring high (Griffiths & Ashwin, 2016). While results consistently indicate that ERA is reduced in psychopathology overall, such deficits have not been extensively studied in non-clinical samples and the implemented ERA tests may limit the interpretability of previous findings.

Aside from psychopathology, social aspects of well-being such as the quality of social relationships should be more thoroughly studied in relation to ERA. As discussed above, ERA should benefit social interactions and well-being concerning social relations, which would then also increase overall well-being. While there is some evidence for higher relationship quality when ERA is higher (Hall, Andrzejewski, et al., 2009; He & Côté, 2023), this association has been found small and unstable. One reason could be the different measures used to assess both ERA and relationship quality in previous studies, which vary greatly (see Hall, Andrzejewski, et al., 2009). There is not enough evidence to assume a stable relationship between ERA and quality of social relationships yet, and further studies are needed that utilize valid measures of ERA and relationship quality.

2.4.3 Investigating the Proposed Mechanisms

While some of the mechanisms relating ERA to well-being discussed above have been hypothesized before, few of them have been empirically studied. Regarding Mechanisms 1 and 2 (see Figure 1), very few studies have attempted to link ERA to any aspects of well-being via social interactions, relationship quality, and social support, although it was often implied as a probable process (e.g., Hall, Andrzejewski, et al., 2009; Palese & Schmid Mast, 2020; Schlegel, 2020). Only one known previous study found that the positive effect of ability EI measured with the MSCEIT (see section 2.1.2) on better mental health was fully mediated by social support (Zeidner & Matthews, 2016). However, this study did not examine the role of ERA specifically. This gap needs to be filled with studies specifically examining the mediation effects of ERA on well-being via social interactions, relationship quality, or availability of social support.

ERA has been connected to facial mimicry and contagion in past research (Mechanism 2). However, almost all of the research on ERA and mimicry has been done by measuring facial muscle activity in response to looking at positive and negative facial expression stimuli (e.g., happy vs. angry faces) using EMG in a laboratory (Holland et al., 2021). Although using EMG to

measure mimicry is a very precise method, the setup with electrodes in combination with reacting to prototypical stimuli on a screen as opposed to real individuals also creates very artificial situations, which limits its ecological validity. More recently, it has become possible to measure facial expressions by applying deep learning algorithms on video data (Hsu & Sato, 2023; Westermann et al., 2024). Such algorithms usually recognize facial expressions using the Facial Action Coding System (Ekman et al., 2002; Ekman, 1978). Therefore, the study of facial mimicry in video-recorded naturalistic situations is possible, although less precise than using EMG; for example working better for smiling (representing joy/friendliness) than for frowning (anger/irritation), and having inferior time resolution to EMG (Hsu & Sato, 2023; Westermann et al., 2024). Furthermore, nonverbal synchrony has never been investigated together with ERA, although it is conceptually related to facial mimicry and represents nonverbal attunement to a social interaction partner.

Furthermore, while there is some support for emotional sensitivity in ERA (Mechanism 3; e.g., Elfenbein et al., 2017; Fiori et al., 2024), few previous studies have directly investigated whether such sensitivity would also translate into outcomes such as situational affect or overall well-being. For example, Ciarrochi et al. (2002) found that individuals with high ERA retroactively reported more depressiveness and hopelessness when also reporting more experienced daily hassles, and Bechtold and Schneider (2016) found stronger stress reactions in individuals with high ERA during a social stress task. More research is needed to explore these interactions, ideally with less reliance on retrospective reporting. Studies should not only focus on stress but also consider outcomes like situational positive and negative affect, social behavior, and the quality of social interactions in daily life. Experimental studies with randomized positive and negative emotion induction could also provide valuable insights.

Additionally, ERA should be investigated in conjunction with emotion regulation (Mechanism 4) and personality traits to predict well-being. Adaptive emotion regulation may either function as a mediator between ERA and multiple aspects of well-being or may be necessary to deal with the higher emotional sensitivity in ERA. While there is some evidence that adaptive emotion regulation and emotion management may mediate ERA's effect on job performance (Joseph & Newman, 2010), this is solely based on the ability EI measure MSCEIT, and no such mediation studies are known to have examined effects on situational affect, relationship quality, or other aspects of well-being. Furthermore, aside from Schlegel et al.'s (2021) cross-correlational study during COVID-19, interactions between ERA and emotion

regulation strategies have not been examined thus far. Likewise, few studies have studied interactions between ERA and personality traits like extraversion, agreeableness, or neuroticism in predicting social interaction outcomes and well-being.

2.4.4 Methodological Considerations

There are methodological considerations that need to be taken into account when investigating well-being, especially when trying to ascertain its links to a socio-emotional skill like ERA. Firstly, well-being measures should go beyond short and conceptually broad one-time questionnaires (e.g., the five-item SWLS). While these are easy to employ and give a good overview of people's self-judgments of their mental states, they have some limitations. For one, general one-time evaluations of well-being may miss important changes between situations or varying levels of well-being in different domains (e.g., affect vs. quality of social relationships). To tackle this, it seems appropriate to measure multiple well-being domains, as has been discussed earlier (see section 2.2.2). For another, they can be biased by mood during questionnaire responding, memory (e.g., by retrospective responding across a timeframe of multiple weeks), or even social desirability (including self-deception; e.g., Heintzelman et al., 2015). Current mood and memory influences can be reduced by applying well-being assessments at multiple time points, such as in daily-diary or experience sampling methods (Myin-Germeys & Kuppens, 2021), or by investigating situational well-being in experimental settings by focusing on current affect assessments. Furthermore, most previous studies investigated the ERA-well-being association and its mechanisms with cross-sectional designs. Traditional longitudinal designs and intensive longitudinal designs like daily-diary studies would help to examine causality in the mechanisms discussed above and investigate the mid-term and long-term effects of ERA on well-being.

Secondly and relatedly, the investigation of ERA's link to well-being should include measures of well-being variability. Especially in intensive longitudinal assessments such as daily diary and experience sampling designs, it is possible to assess well-being across different time points and situations (Myin-Germeys & Kuppens, 2021). With such an intensive repeated measurement it is possible to assess measures for individual variability and instability in, e.g., affect (Houben et al., 2015). Previous studies showed that especially variability in affect is able to explain variance in well-being measures in addition to the average level (Dawel et al., 2023; Dejonckheere et al., 2019; Houben et al., 2015). Individual variability in affect presents an

interesting opportunity to measure a person's reactivity to contextual influences, which in relation to ERA may represent emotional sensitivity (as described in section 2.3.3).

3 Research Objectives

The aim of the present thesis is to thoroughly investigate whether and how ERA may influence well-being. According to the considerations above, ERA as a socio-emotional ability should have beneficial effects on multiple psychosocial processes, but may also have some detrimental effects and may depend on other skills such as adaptive emotion regulation to enhance well-being. In the following, the specific objectives are described and linked to the three studies conducted as part of this thesis (described in section 4), as well as to additional exploratory analyses (described in section 5).

Firstly, this thesis will examine ERA's relationship to multiple aspects of well-being, including whether a) previously found null results for associations of ERA and broad one-time measurements of well-being (SWB and PWB) are replicated (Study 1), b) whether ERA predicts social aspects of well-being (Studies 1-3), c) whether ERA predicts symptoms of psychopathology (Study 3), d) whether ERA predicts situational affect in social interactions (Study 2), and e) whether ERA predicts well-being in everyday life (Study 1).

Secondly, this thesis will investigate the proposed mechanisms theorized as ERA's links to well-being (see Figure 1 for a reference), including a) whether ERA may predict well-being via an explanatory path of social support, facial mimicry, and nonverbal synchrony (Mechanisms 1 and 2; Study 3 and exploratory analyses), b) whether higher ERA predicts stronger reactions contingent to life events and social interactions, a higher variability of well-being over time, and whether it may become detrimental to well-being above a certain ability level due to emotional sensitivity (Mechanism 3; Studies 1 and 2), and d) whether ERA interacts with adaptive vs. maladaptive emotion regulation (Mechanism 4) and socially relevant personality traits in predicting well-being (Studies 1 and 2).

Thirdly, the investigations will use a multimodal ERA test with stimuli including facial, vocal, and body cues as well as a large number of positive and negative emotions to recognize (all studies) and multiple study designs, including a) an intensive longitudinal assessment in the form of a daily-diary design (Study 1), b) a social interaction experiment including interaction partners displaying positive and negative affect (Study 2), and c) a longitudinal investigation of possible mediators between ERA and well-being (Study 3).

4 Summary of Studies

In the following, the three studies conducted as part of this thesis are briefly summarized. The full manuscripts of the published or submitted articles can be found in Appendix A.

4.1 Study 1

Sommer, N. R., & Schlegel, K. (2024). Beyond mean levels and linear relationships: The complex association between emotion recognition ability and well-being. *Journal of Research in Personality, 109*, 104467. https://doi.org/10.1016/j.jrp.2024.104467

The goal of Study 1 was to examine in depth the association between ERA and well-being. To achieve this, a daily diary study was conducted, where 437 participants (315 female; M_{age} = 25.66, SD_{age} = 10.83) completed the GERT and broad one-time measures of well-being and relationship quality at baseline and reported their emotional experiences, well-being, social interaction quality, and affect daily across two weeks. It was expected that ERA does not directly relate to well-being measured with broad one-time questionnaires. Furthermore, multiple mechanisms for explaining the missing link were investigated. Namely, Study 1 examined whether ERA may (a) be related specifically to the social aspects of well-being, (b) show effects of emotional sensitivity and its impact on situational affect, (c) impact well-being in a curvilinear way such that higher ERA is only beneficial up to a certain level, and (d) relates to well-being more or less strongly depending on personality traits and habitual cognitive emotion regulation strategies.

Results showed that, indeed, ERA was virtually unrelated to broad one-time measures of well-being, but also to measures of relationship and social interaction quality and daily measures of affect across two weeks. Furthermore, participants with higher ERA demonstrated lower emotional reactivity (reactions to emotional events and affect variability), contradicting the idea of emotional sensitivity. Participants with low and high ERA (compared to medium) reported the highest well-being, therefore it is unlikely that ERA led to negative outcomes when it was “too high”. Lastly, higher ERA appeared more beneficial for well-being when neuroticism and maladaptive cognitive emotion regulation were more pronounced.

The results of this study confirm previous findings that question the link between ERA and well-being (e.g., Schlegel, 2020), showing no significant relationship, regardless of whether broad one-time or detailed daily measures of well-being were used. There was no evidence of

higher emotional sensitivity (Mechanism 3); if anything, the opposite trend emerged. Although the effects were generally small and inconsistent, individuals with higher ERA showed less affect variability, and the negative impact of high neuroticism and maladaptive cognitive emotion regulation was slightly mitigated (Mechanism 4), indicating a conditional effect of ERA on well-being. Furthermore, a "rose-colored glasses" effect was observed in individuals with very low ERA, who reported the highest well-being, particularly when they also had low neuroticism. Despite being limited by its purely observational design and small effect sizes, the study clarifies that ERA is not consistently linked to well-being, and further research is needed to explore the underlying psychosocial mechanisms.

4.2 Study 2

Sommer, Nils R., & Schlegel, Katja (2024). Navigating social waters: Exploring the impacts of trait cognitive emotion regulation and emotion recognition ability in naturalistic social situations. [Manuscript submitted for publication]. Institute of Psychology, University of Bern.

The goal of Study 2 was to investigate the impact of habitual cognitive emotion regulation strategies on participants' reported situational affect and their observed behavior during a naturalistic social interaction. Furthermore, the moderating impacts of the interactions' valence, i.e. the positive vs. negative behavior of the interaction partner, and the participants' ERA were examined. Previous studies typically did not examine actual face-to-face social interactions (instead social stress was induced by having the participant give a presentation before an audience; e.g., Fiol-Veny et al., 2019) or used paradigms where participants were instructed to use specific regulation strategies without considering individual differences or habitual emotion regulation patterns (e.g., Butler et al., 2003; Deits-Lebehn et al., 2023). Moreover, these studies typically focused on eliciting negative emotions before the social interaction (e.g., with a sad video clip), but did not manipulate the valence of the interaction itself. Therefore, in Study 2 152 participants (93 female; $M_{\text{age}} = 22.28$, $SD_{age} = 3.58$) filled in a questionnaire of habitual cognitive emotion regulation and the GERT-S and interacted with a friendly or unfriendly confederate in a laboratory setting. The interaction included a 5-minute conversation to get to know each other, a cooperative building task, and a feedback task. Afterward, their reflections on the interaction and observer ratings on their behavior based on video recordings were collected.

It was anticipated that more adaptive cognitive emotion regulation strategies (such as positive reappraisal, in contrast to typically maladaptive strategies like rumination) would result in increased positive situational affect, improved self-perception, and more positive social behavior during the interaction. These beneficial effects were expected to be more prominent in negative social interactions compared to positive ones, given the greater need for adaptive regulation in such contexts. Additionally, individuals with ERA were predicted to benefit more from adaptive cognitive regulation strategies, particularly in negative conditions, due to their greater emotional sensitivity.

Results showed that more adaptive cognitive emotion regulation clearly predicted more positive interaction outcomes (self-reports and observer ratings), but the effects did not differ between conditions. ERA did not predict any outcomes on its own and the effects of ERA were also not moderated by condition (these interaction coefficients were not presented in the manuscript for the sake of concision, but are depicted in Table A1 in Appendix A, Section 9.2.2). ERA only moderated the effects of cognitive emotion regulation on situational affect and social interaction quality in specific combinations with social interaction valence: Participants with higher ERA apparently "suffered" more from maladaptive cognitive emotion regulation in the positive social interaction and benefitted less from adaptive cognitive emotion regulation in the negative social interaction, compared to participants with lower ERA.

With respect to ERA, these results corroborate the findings in Study 1 that ERA is not directly linked to well-being, as it did not influence situational affect. There was also some evidence for a negative emotional sensitivity, indicating that ERA may amplify only the negative effects of maladaptive cognitive emotion regulation (Mechanisms 3 and 4). This contrasts with the findings from Study 1, where ERA seemed to mitigate the negative impacts of maladaptive emotion regulation. So far, evidence for emotional sensitivity in ERA and a possible influence of adaptive emotion regulation is mixed.

4.3 Study 3

Sommer, N. R., Carrard, V., Bourquin, C., Berney, A., & Schlegel, K. (2024). Social support and avoidance explain positive and negative effects of emotion recognition ability on mental health in medical students. [Manuscript submitted for publication]. Institute of Psychology, University of Bern, and Psychiatric Liaison Service, Lausanne University Hospital (CHUV).

Study 3 aimed to investigate whether medical students with a higher ERA reported lower stress, fewer mental health issues, and burnout and whether this can be explained by higher perceived social support. For this, the data of a large longitudinal study with 986 medical students (670 female; M_{age} = 21.69, range 16-49) was re-analyzed (Berney et al., 2021). Although no direct beneficial link between ERA and mental health issues and burnout one year later could be found, perceived social support showed a mediation effect on mental health issues and burnout. After accounting for this mediation, a higher ERA actually predicted higher burnout one year later, indicating a suppression effect. Exploratory analyses revealed that individuals with high ERA may show a tendency to react to stressful situations with avoidance (e.g., withdrawal), which mediated ERA's link to mental health issues and burnout alongside perceived social support.

The findings of this study once again demonstrate that ERA is not directly associated with well-being, but that it may influence it through contrasting interpersonal and intrapersonal pathways: specifically, the perceived availability of social support when needed, and the tendency to respond to negative events with avoidant behavior. The positive path via social support speaks for the proposed mechanism linking ERA and well-being via better social interactions and relationships (Mechanisms 1 and 2), and the negative path via avoidant coping speaks for a mechanism of less adaptive emotion regulation (Mechanism 4). This for the first time supports previous suggestions of positive and negative effects of ERA canceling each other out (e.g., Schlegel, 2020).

4.4. Contributions of the Thesis Author

The author of this thesis made major contributions to the studies presented here. Together with his supervisor PD Dr. Katja Schlegel, he conceptualized the aims of Studies 1 and 2, and with Dr. Schlegel and Dr. Valérie Carrard the secondary analysis of the longitudinal ETMED-L data (see Berney et al., 2021) for Study 3. For studies 1 and 2, he was primarily responsible for preparing and conducting the data collection as well as curating and analyzing the data. He furthermore wrote the first drafts of all three study manuscripts, edited them together with Dr. Schlegel and all other co-authors, and finalized the manuscripts for submission.

5 Exploratory Analyses

In addition to the presented manuscripts that are already published or submitted for publication, this thesis presents exploratory analyses based on the data of the three conducted studies. In the first step, the data from Studies 1 and 2 were re-analyzed to find possible mediation effects akin to the ones found in Study 3. In a second step, the videotapes collected in Study 2 were analyzed with computerized tools to examine facial mimicry and nonverbal synchrony in social interactions (Mechanism 2).

5.1 Extended Mediation Analyses

The results of study 3 revealed that ERA may be associated with interpersonal (perceived availability of social support) and intrapersonal processes (avoidant coping) that impact well-being in opposing ways. In Studies 1 and 2, such opposite processes were not investigated, but mediation effects via quality of social interactions and emotion regulation might retrospectively explain why ERA was not linked to well-being. Therefore, in the following, interpersonal and intrapersonal mediation effects with data from studies 1 and 2 were analyzed exploratively to see whether the findings of Study 3 could be replicated.

To do so, the explorative mediation analysis proposed by Serang et al. (2017) was performed. Serang and colleagues argued that using classical confirmatory testing for the selection of influential mediators is problematic due to reliance on *p*-values and that such analyses may additionally be biased if models with multiple mediators are tested. Their approach instead uses a least absolute shrinkage and selection operator (lasso) within structural equation modeling (more specifically, path analysis). This procedure includes all considered mediators and applies penalties to them (also called regularization), selecting only non-zero effects and dropping the rest (for a detailed description see Serang et al., 2017). With this analysis, relevant mediators are selected from a larger set of potential mediators, and standardized regression coefficients are calculated while controlling for the other relevant mediators. The analysis can conveniently be conducted using the xmed function in the R package RegSEM (Jacobucci et al., 2016, 2023).

5.1.1 Results for Study 1 Data

For the daily diary data in Study 1, ERA (measured by the GERT-S) was included as the predictor variable and life satisfaction (using the SWLS), broad well-being (using the Warwick-Edinburgh Mental Well-Being Scale; WEMWBS; Tennant et al., 2007), and positive relations (subscale of PWB; Ryff & Keyes, 1995), as well as daily measures of well-being (short version

of the WEMWBS), positive and negative emotions (Newbold et al., 2020), and quality of social interactions (Sommer & Schlegel, 2024) as outcomes. As potential mediators were included: a) the separate habitual cognitive emotion regulation strategies (short version of the Cognitive Emotion Regulation Questionnaire; CERQ; Garnefski & Kraaij, 2006) including five adaptive (positive reappraisal, positive refocusing, refocus on planning, acceptance, and putting into perspective) and four maladaptive strategies (self-blame, other-blame, catastrophizing, and rumination), b) positive relations (in all models except predicting positive relations), c) daily interaction quality (in all models predicting daily measures except interaction quality), and d) appraisals of the reported daily events (relevance of the event, valence of the event, the event's impact on participants' mood, and perceived ability to cope with the event; only for daily measures) were included as potential mediators. Daily measures were aggregated across all diary entries per participant. All effects were controlled for the participant's gender, age, and experience with the GERT. See the manuscript of Study 1 for the complete descriptions of the measures.

Results are presented in Table 1. As can be seen, although selected by the algorithm, all of the relevant indirect effects appeared negligible, and all direct paths between ERA, mediators, and outcomes showed small or very small standardized regression coefficients. Furthermore, the direct effects of ERA predicting each outcome after controlling for the relevant mediator effects remained very similar to the total effects in Study 1 (see Study 1, Table 6). Therefore, no noteworthy mediation effects could be found exploratively and the results of Study 3 could not be replicated in the daily diary data of Study 1.

Table 1

Exploratory mediation effects of ERA predicting well-being with data from Study 1.

Outcome (O)	Relevant mediators (M) chosen by the regularization algorithm	Direct Effect ERA → O	ERA → M	M → O	Indirect Effect ERA → M → O
Satisfaction with Life Scale	Acceptance	.023	-.041	.046	-.002
Warwick-Edinburgh Mental Well-Being Scale	Rumination	-.013	.011	-.118	-.001
	Otherblame		-.051	.064	-.003
	Acceptance		-.041	.102	-.004
	Positive reappraisal		-.070	.099	-.007
Positive Relations	Positive reappraisal	.010	-.070	.054	-.004
Daily well-being (aggregated)	Otherblame	-.023	-.051	.069	-.004
	Acceptance		-.041	.029	-.001
	Positive reappraisal		-.070	.112	-.008
Daily positive affect (aggregated)	Event impact appraisal (aggregated)	.021	-.102	.049	-.005
Daily negative Affect (aggregated)	Rumination	.090	.011	.111	.001
	Otherblame		-.051	.021	-.001
	Positive reappraisal		-.070	-.096	.007
	Event relevance appraisal (aggregated)		-.042	.099	-.004
	Event impact appraisal (aggregated)		-.102	.042	-.004
Daily social interaction quality (aggregated)	Otherblame	-.015	-.051	-.053	.003
	Event relevance appraisal (aggregated)		-.042	.111	-.005
	Event impact appraisal (aggregated)		-.102	.043	-.004

Note. Controlled for Age, gender, and GERT experience. Values are standardized regression coefficients.

5.1.2 Results for Study 2 Data

The same procedure was applied to the experimental social interaction data from Study 2. ERA (GERT-S) was again the predictor, and positive and negative affect (PANAS; Watson et al., 1988), self-reported social competence and interaction quality, as well as the positivity and distress behavior scores created from observer ratings, were considered as outcomes. As moderators, again the cognitive emotion regulation strategies and the positivity and distress

behavior scores (except for predicting positivity and distress behavior) were considered (see the manuscript of Study 2 for a detailed description of all measures). Due to limitations in the R function xmed, the experimental condition (social interaction valence induced by the confederate, see Study 2) could not be introduced as a moderator of the effects. It was however included as a control variable in all models, along with the participant's gender and age. Results in Study 2 indicated clear main effects but barely any moderating effects of the condition; the inclusion of the condition as a mere control variable was therefore deemed sufficient.

Results are presented in Table 2. Again, all mediators selected by the algorithm showed negligible indirect effects, and all paths had small or very small standardized regression coefficients. There were also no noteworthy differences between the direct effects reported here and the total effects reported in Study 2 (see the manuscript of Study 2, Table 5). Therefore, there was also no mediation via intrapersonal and interpersonal processes to be found in the experimental data of Study 2.

Table 2

Exploratory mediation effects of ERA predicting social interaction outcomes with data from Study 2.

Outcome (O)	Mediators (M) chosen by the regularization algorithm	Direct Effect ERA → O	ERA → M	M → O	Indirect Effect ERA → M → O
Positive affect	Positive refocusing	-.046	-.073	.166	-.012
	Refocusing on planning		-.109	.033	-.004
Negative affect	Refocusing on planning	-.019	-.109	-.022	.002
Social competence	Positive refocusing	.042	-.073	.173	-.013
	Refocusing on planning		-.109	.116	-.013
Interaction quality	Positive refocusing	-.015	-.073	.051	-.004
Positive behavior (observed)	Refocusing on planning	-.029	-.109	.028	-.003
	Positive reappraisal		-.072	.109	-.008
Distress behavior (observed)	-				

Note. Controlled for Age, gender, and valence condition. Values are standardized regression coefficients.

The explorative mediation analyses of the data of Study 1 and 2 did not replicate the findings in Study 3, where opposing interpersonal and intrapersonal mediation effects could be found. None of the included potential mediators (social interaction and relationship quality, observed behavior in social interactions, and habitual cognitive emotion regulation strategies)

showed any noteworthy mediation effects on any aspect of well-being or social interaction outcomes. The different results across the different datasets may be explained by the available variables, which differed conceptually. For the interpersonal path, Study 3 included the perceived availability of social support, while for the other studies either broad quality judgments or observed behavior were available. Similarly, for the intrapersonal path, Study 3 included habitual reactions to negative events taken from a broad coping inventory, while the other studies specifically focused on cognitive emotion regulation. Overall, however, these exploratory analyses do not further corroborate simultaneous opposing mediation effects.

5.2 Facial Mimicry and Nonverbal Synchrony

Facial mimicry and nonverbal synchrony were not examined in the presented studies included in this thesis. Therefore, using the videotapes recorded to create observer ratings in the social interactions in Study 2, both computer-assisted facial mimicry and nonverbal synchrony measurements were explored as another link of ERA to quality of social interactions (Mechanism 2). More specifically, higher ERA was expected to relate to more facial mimicry and nonverbal synchrony in these interactions, and differences between experimental conditions (interaction valence induced by confederates), as well as possible mediation effects in predicting social interaction outcomes, were examined. Both analysis techniques required stable video conditions, which is why only the conversation section of the videotapes was analyzed, where both the participant and the confederate sat at a table talking.

Scores for mimicry of specific facial expressions were created from the videotapes with the open-source facial behavior analysis toolkit OpenFace 2.0 (Baltrusaitis et al., 2018) by measuring and correlating the participants' and confederates' facial action unit activity (Ekman et al., 2002). For nonverbal synchrony scores, the MEA software (Ramseyer, 2020) was used, and both types of raw data were preprocessed with the R package rMEA created for nonverbal synchrony analysis (Kleinbub & Ramseyer, 2022, 2021). Details on the preprocessing of the data are described in Appendix B. There were a total of six scores for facial mimicry and nonverbal synchrony, each a windowed and time-lagged cross-correlation of the two people's simultaneous or closely consecutive facial and body movements: four specific facial expression mimicry scores (named Smile, Tight-Lips, Brows-Up, Tight-Eyes), one overall expressiveness mimicry score ("mimicry" of unspecific facial movements), and one score for nonverbal synchrony (full body movements). All of these scores were further divided into three subscores based on different movement sequences between the two people: one score for synchronized/mimicked movement

where the participant moved first and the confederate "mimicked" (participant leading), one score for movement where the confederate moved first and the participant "mimicked" (confederate leading), and one average score for mutual dyadic mimicry (average mimicry / nonverbal synchrony).

5.2.1 ERA Predicting Facial Mimicry and Nonverbal Synchrony

To examine whether ERA predicted mimicry and nonverbal synchrony and whether such effects depended on the experimental condition (social interaction valence), multiple linear regression analyses were conducted. Welch's analysis of variance showed that there were significant differences in average scores between confederates for Smile mimicry, $F = 17.30$, $p < .001$, Tight-Lips mimicry, $F = 3.27$, $p = .026$, as well as for nonverbal synchrony, $F = 5.42$, $p = .002$, but not for Brows-Up, $F = 0.20$, $p = .895$, Tight-Eyes, $F = 0.86$, $p = .466$, or expressiveness mimicry, $F = 2.00$, $p = .121$, therefore confederate identity was controlled in all analyses.

Results for the multiple regression models are presented in Table 3. In the first step, condition, confederate identity, gender, age, and ERA were included as predictors. In the second step, the interaction effect between ERA and condition was added. All predictors were standardized. Coefficients for the main effects only differed marginally between Steps 1 and 2 and none of the interaction coefficients were significant, therefore only the main effect coefficients of step 1 are presented. Smile mimicry and nonverbal synchrony were significantly higher in the friendly condition, but higher ERA only predicted more nonverbal synchrony. Although there was also a significant effect of ERA predicting Brows-Up mimicry, the regression model F-test was not significant and the model was therefore not interpreted (this was also the case for Tight-Lips, Tight-Eyes, and expressiveness mimicry regression models).

Table 3

Standardized regression coefficients of ERA and condition (social interaction valence) predicting average mimicry and nonverbal synchrony scores.

Outcome Variables	Step 1					Step 2		
	Main Effect Condition		Main Effect ERA		*Adj.* R^2	Interaction ERA * Condition		*Adj.* R^2
	β	*p*	β	*p*		β	*p*	
Smile mimicry	**-0.30**	**<.001**	-0.01	.920	.35	0.09	.193	.35
Tight-Lips mimicry	0.02	.856	-0.05	.552	.01 [b]	0.09	.300	.01 [b]
Brows-Up mimicry	0.05	.561	**-0.19**	**.023**	.01 [b]	0.03	.728	.00 [b]
Tight-Eyes mimicry	-0.04	.670	-0.09	.300	.00 [b]	0.09	.300	.00 [b]
Expressiveness mimicry	0.03	.690	-0.03	.739	.03 [b]	0.04	.615	.02 [b]
Nonverbal Synchrony	**-0.22**	**.006**	**0.17**	**.040**	.11	-0.09	.261	.11

Note. N = 150. ERA = Emotion recognition ability; Condition = friendly (0) vs. unfriendly (1). Significant coefficients are displayed in bold.

[a] n = 150.

[b] Regression model F-test not significant.

As a follow-up, ERA's effect in predicting participant-leading and confederate-leading nonverbal synchrony was examined to better understand the nature of the significant effect on average nonverbal synchrony. Two additional regression models with the same control variables were conducted. ERA significantly predicted participant leading, β = .16, p = .046, but not confederate leading, β = .11, p = .187. This indicates that participants with higher ERA initiated more synchronous movements in the dyad but did not react more synchronously to movements of the confederate. It is important to note that leading in nonverbal synchrony is a purely descriptive measure, is assumed to happen unconsciously, and that its interpretation is not very simple (Ramseyer & Tschacher, 2008). Here, one could speculate that individuals with higher ERA set the pace in the interactions more often than individuals with lower ERA. This suggests that they may unconsciously create movements that are easier for the other person to synchronize with, likely due to a heightened attunement to the dynamics of the social interaction.

5.2.2 Nonverbal Synchrony as a Mediator

To further explore how nonverbal synchrony and ERA are related and whether they may together predict social interaction outcomes in study 2, a series of mediation analyses with

bootstrapping (1000 drawn samples) were conducted using the R function PROCESS in the package bruceR (Bao, 2024; based on mediation models by A. F. Hayes, 2017). Results are presented in Table 4. Evidently, nonverbal synchrony (with the participant leading) only mediated the relationship between ERA and the participant's positive behavior as observed by raters, while all other effects were minimal.

Table 4

Exploratory mediation effects of ERA predicting social interaction outcomes via nonverbal synchrony (participant leading; S).

Outcome (O)	Direct Effect ERA → O	ERA → S	S → O	Indirect Effect ERA → S → O	
	β	β	β	β	95%-CI (bootstrap)
Positive affect	-.056	.172	-.055	-.009	[-0.041, 0.015]
Negative affect	-.033	.172	.031	.005	[-0.025, 0.038]
Social competence	-.000	.172	.017	.003	[-0.020, 0.032]
Interaction quality	-.014	.172	-.021	-.004	[-0.032, 0.021]
Observed positivity	-.083	.172	.223	.038	[0.004, 0.093]
Observed distress	.025	.172	-.015	-.003	[-0.030, 0.024]

Note. N = 150. Controlled for Age, gender, and condition. Standardized regression coefficients are presented. Bootstrapped 95%-CI's with 1000 samples.

The exploratory analyses on facial mimicry and nonverbal synchrony reported here show that overall, participants with higher ERA did not show more facial mimicry. In theory, accurate emotion recognition has often been associated with mimicry (e.g., Niedenthal, 2007; Sato et al., 2013), but empirical evidence on the ERA-mimicry link is mixed (Holland et al., 2021). This was the first known attempt to assess whether ERA is associated with mimicry in naturalistic situations measured with the help of automatized facial expression recognition. While this procedure enables mimicry assessment in naturalistic dyadic interactions, it is less precise (e.g., time resolution) and has been found to work well mainly for positive affective expressions (Hsu & Sato, 2023; Westermann et al., 2024). The analyses presented here might have suffered from similar problems, as only smiling mimicry was predicted well by our regression models. Also, the videotapes analyzed here showed both individuals in the dyad from an approximately 45-degree angle, which according to Baltrusaitis et al. (2018) should be handled well by OpenFace 2.0, but

may still make mimicry measures less reliable. Future research should improve the procedure of measuring mimicry in dyadic interactions (e.g., with multiple cameras to catch frontal videotapes) to examine its relationship with ERA.

This was also the first attempt to link ERA and nonverbal synchrony, showing a promising pathway by which ERA may have beneficial outcomes in social interactions. Individuals with higher ERA showed more nonverbal synchrony on average, but also specifically more initiation of synchronous movements in the dyad. Higher nonverbal synchrony in turn appeared beneficial for observers' ratings of participant's positive social behavior. However, nonverbal synchrony did not act as a mediator for any of the other outcomes. It might be that heightened nonverbal synchrony mainly affects how lively and positive a social interaction appears outwardly, but not necessarily how the participants rate their own behavior and affect. The results of this analysis are difficult to compare to other studies, e.g., on nonverbal synchrony in therapeutic settings, due to the manipulation of the interaction valence via the confederate. However, considering the promising findings of improved therapeutic rapport, stronger relationships, and even symptom reduction when higher synchrony was observed (Ramseyer & Tschacher, 2008, 2011; Tschacher et al., 2014), it may play a significant role in the connection between ERA and well-being.

6 Discussion

The studies presented in this thesis investigated the relation between ERA and well-being extensively. ERA apparently is not directly related to well-being, and the proposed mechanisms could also not unequivocally be confirmed. The multitude of detailed findings on the overall ERA-well-being association and the proposed mechanisms will be gathered and discussed in the following. Moreover, promising leads for future research are pointed out.

6.1 Overall Association

The reported studies confirmed that there is no direct relationship between ERA and well-being. No matter whether well-being was measured with broad one-time questionnaires, daily reports, quality of social relationships (Study 1), situational affect in the laboratory (Study 2), or with questionnaires of psychopathological symptoms (Study 3), it was not directly predicted by ERA. This aligns with previous research showing no association between ERA and life satisfaction (He & Côté, 2023; Schlegel, 2020).

It furthermore expands the evidence that ERA is not consistently linked to social aspects of well-being: It was not related to higher relationship quality or social interaction quality but to more perceived availability of social support. This might partially be because all of these outcome variables consisted of self-reports, and previous research has found that ERA more consistently predicted social interaction outcomes when performance measures or observer ratings were used (Gregory et al., 2020; Hall, Andrzejewski, et al., 2009; Hall et al., 2015; Momm et al., 2015; Schmid Mast et al., 2012; Wang et al., 2019). Therefore, a high ERA may enable individuals to appear more likable and achieve certain goals in social interactions (such as possibly receiving social support when needed), but may not necessarily lead to greater satisfaction with these interactions or relationships.

That ERA did not directly relate to lower symptoms of depression, anxiety, and burnout one year later in Study 3 was surprising only at first glance. While having a mental disorder is consistently related to ERA deficits (e.g., Cotter et al., 2018), it has been shown in the past to relate only weakly and inconsistently to less depressive symptoms in non-clinical samples (Hall, Andrzejewski, et al., 2009). Overall, the findings presented here suggest that differences in well-being cannot be directly linked to ERA and that its contribution to well-being may occur through more complex mechanisms.

All studies in this thesis implemented designs that went beyond cross-sectional test batteries and that used a valid ERA test. While being purely observational, Study 1 increased the

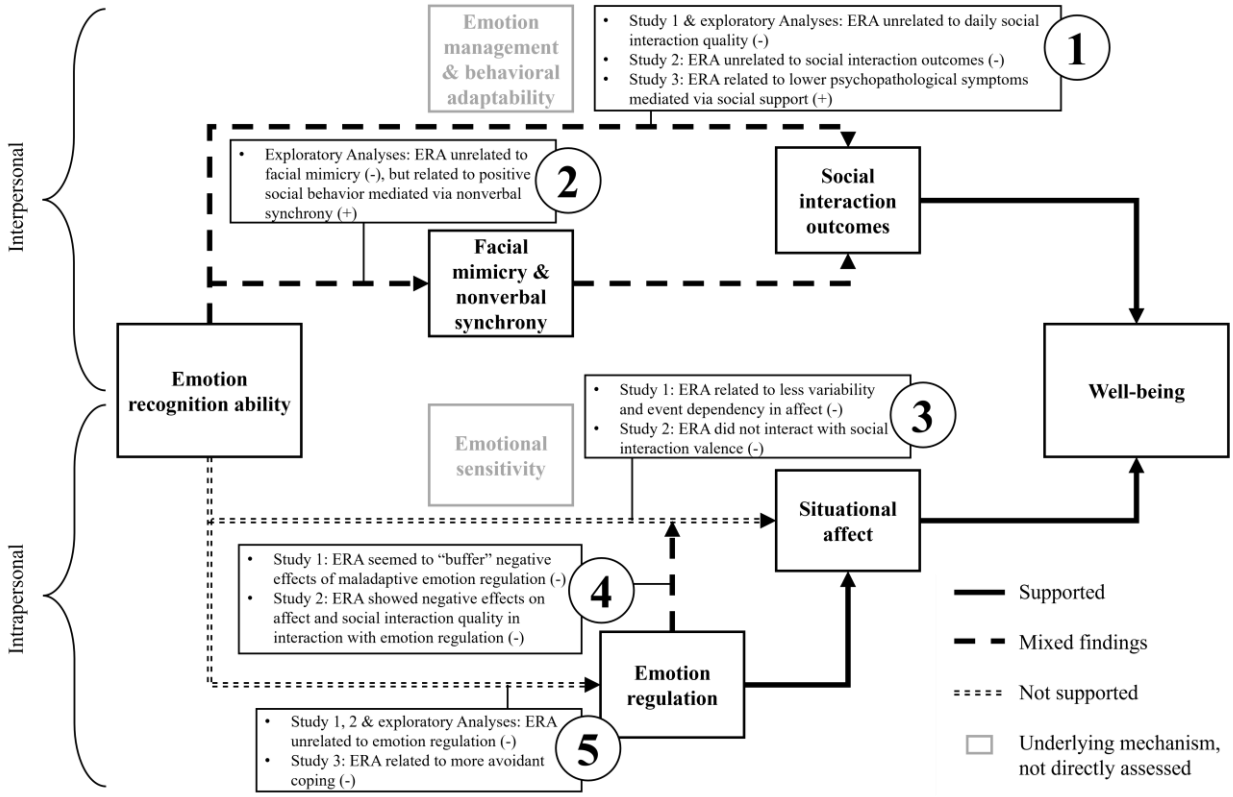
validity of the findings by asking about the participant's well-being multiple times across two weeks, making it possible to assess changes and variability of well-being. The also observational but longitudinal Study 3 allowed for the investigation of ERA's effects over time. Study 2 introduced the induction of positive and negative valence in social interaction through a confederate, making it possible to investigate the effects of situation valence on interaction outcomes. And finally, the GERT-S used in all studies represents a major improvement to many ERA tests used previously, by using multimodal stimuli and a broader and theory-based range of positive and negative emotions (Bänziger, 2016; Mortillaro & Schlegel, 2023). The use of these methodologies lends further validity to the results reported here.

6.2 Mechanisms

The presented studies found only mixed evidence for the proposed mechanisms linking ERA and well-being. For an overview of the evidence regarding the mechanisms, see Figure 2. In support of the hypothesized mechanisms linking ERA and well-being via better social interactions and relationships (Mechanisms 1 and 2), the studies presented in this thesis could for the first time establish that ERA can lead to lower psychopathological symptoms via higher availability of social support (Study 3). However, ERA was not related to daily social interaction quality (Study 1) or social interaction outcomes (Study 2). As briefly mentioned above, ERA might not be linked to self-report judgments of interaction or relationship quality but to more objective measures or the expectation to receive social support if needed. These results only delivered inconsistent evidence for the beneficial effects of emotion management from EI theory (Mayer et al., 2008; Mortillaro & Schlegel, 2023) or behavioral adaptability in social interactions from theory on IPA (Palese & Schmid Mast, 2020), that supposedly connect ERA and well-being. However, the specific processes, e.g. that socio-emotional information gained by higher ERA would lead to behavior better adapted to the specific situation and interaction partner (e.g., Palese & Schmid Mast, 2020), were not directly investigated in the presented studies. Therefore, more research is needed that investigates ERA's impact on processes of behavioral adaptability and emotion management in social interactions to explain the conflicting findings.

Figure 2

Results of the presented studies regarding the proposed interpersonal and intrapersonal processes linking emotion recognition ability and well-being.



Note. The evidence of the presented studies was integrated to indicate the empirical support for the proposed mechanisms linking ERA and well-being. Interpersonal mechanisms included: (1) an improved management of social interactions and (2) increased affiliative nonverbal behaviors (facial mimicry and nonverbal synchrony) leading to better social interaction outcomes. Better social interaction outcomes were expected to increase availability of social support and relationship quality, and subsequently other aspects of well-being. Intrapersonal mechanisms included: (3) a heightened emotional sensitivity that was expected to increase both positive and negative situational affect and more adaptive emotion regulation that was expected to either (4) directly increase positive situational affect or (5) be necessary to adaptively regulate the effects heightened emotional sensitivity. The cumulation of more positive situational affect was expected to increase other aspects of well-being. Specific supporting evidence is noted with (+), non-supporting evidence with (-).

Considering the mechanism via facial mimicry and nonverbal synchrony (Mechanism 2; see Figure 2, nr. 2), the presented exploratory analyses found a link of ERA to more nonverbal synchrony initiation, which also mediated ERA's impact on positive social behavior in the data of Study 2. Initiating more nonverbal synchrony, i.e., prompting an interaction partner to react

synchronously to one's movements, may represent a strong attunement to the interaction partner in social interaction and lead to more affiliative behaviors. The resulting improved social interactions may increase well-being over time (e.g., Fritz et al., 2023; Sandstrom & Dunn, 2014). Moreover, it is interesting that only observed, but not subjective, social interaction outcomes could be explained by ERA and nonverbal synchrony. This fits well with a number of studies linking ERA predominantly to objective or peer-reported social outcomes (e.g., Hall, Andrzejewski, et al., 2009). However, it was not possible to replicate the mediation with facial mimicry. That ERA was not linked to facial mimicry does not support the facial feedback hypothesis (e.g., Niedenthal & Brauer, 2012) and fits with the null findings of a meta-analysis on facial mimicry in ERA (Holland et al., 2021). However, the exploratory results presented here may be affected by the new methodology used, as it was the first known attempt to measure mimicry using automatic facial action detection between two people in an actual social interaction (see also section 5.2). Based on these findings, nonverbal synchrony appeared as an interesting link between ERA and social interaction outcomes, but more research is needed to assess the role of facial mimicry in actual social interactions.

The studies presented here revealed no direct support for the effects of emotional sensitivity in ERA (Mechanism 3; see Figure 2, nr. 3). In Study 1, ERA was linked to a lower, not higher, variability and event dependency in well-being and affect across two weeks. Also, individuals with medium ERA reported the lowest well-being levels, lower than those that might have a "too high" skill (e.g., Ickes & Hodges, 2013). Furthermore, the effect of ERA did not depend on social interaction valence in Study 2, therefore this manipulation did not reveal any congruent emotional sensitivity effects. Hence, even though many authors imply an emotional sensitivity in ERA (Davis & Nichols, 2016; Fiori et al., 2023; Schlegel et al., 2020), no effects of a heightened emotional sensitivity on affect could be found. Most previous studies that have found emotional sensitivity effects in ERA investigated attention and reactions to emotional stimuli in more abstract tasks (Elfenbein et al., 2017; Fiori et al., 2022, 2024; Lea et al., 2023; Scherer, 2020). Since these processes were not studied explicitly here, the presented studies cannot rule out that there exists an increased attention to emotions or more contagion in ERA. However, if there is a heightened emotional sensitivity ERA, the current findings imply that it does not directly influence the investigated outcomes in social interactions or daily life.

In regard to emotion regulation (Mechanism 4), findings are again mixed. For one, ERA was mostly unrelated to emotion regulation in the studies of this thesis (see Figure 2, nr. 5). In

Study 3, high ERA individuals reported more often reacting to negative events with withdrawal and avoidance, mediating the negative effect of ERA on psychopathological symptoms and burnout. However, in the data of Studies 1 and 2, no explanatory links for the ERA-well-being link via habitual emotion regulation could be found (exploratory analyses). Therefore, the idea that a higher ERA would contribute to better emotional understanding and so improve one's emotion regulation (Elfenbein & MacCann, 2017; Joseph & Newman, 2010; Mayer et al., 2011) could not be confirmed by the evidence presented here. The results even indicate that ERA leads to less adaptive emotion regulation, if at all. The measures used here were all self-reported questionnaires and previous evidence showed that ERA and emotion regulation mainly related when performance measures were used for both (Elfenbein & MacCann, 2017; Joseph & Newman, 2010; Schlegel & Mortillaro, 2019). Therefore, ERA may predict higher knowledge about the adaptive regulation of emotions, but apparently not self-reported actual use of such adaptive strategies.

Although the two constructs were largely not directly related, emotion regulation was shown to interact with ERA in predicting outcomes (see Figure 2, nr. 4). However, these results differed greatly between studies. In Study 1, ERA was shown to be more beneficial to life satisfaction when maladaptive emotion regulation was more prominent. This directly contradicted the idea that adaptive emotion regulation would buffer the negative effects of emotional sensitivity in ERA (Fiori et al., 2023; Schlegel, 2020). In Study 2, high ERA individuals suffered from maladaptive emotion regulation in positive social interactions and did not profit from adaptive emotion regulation in negative interactions. This suggests that ERA may be linked to a solely negative bias on some outcomes, which becomes more harmful when coupled with maladaptive regulation strategies. However, it does not imply that more adaptive emotion regulation buffered a heightened emotional sensitivity. All of these effects were rather small and inconsistent across outcomes, hence these results should be interpreted with care. Nevertheless, the idea that adaptive emotion regulation buffers emotional sensitivity in ERA was not supported.

Taken together, the results in this thesis posit that ERA should not be viewed as an unequivocally positive ability in regard to well-being. None of the proposed mechanisms could consistently be confirmed. Nevertheless, Study 3 in this thesis was the first to provide evidence that ERA can simultaneously have positive interpersonal and negative intrapersonal influences on well-being which cancel each other out, which has been suggested before (e.g., Schlegel, 2020). The integrated evidence implies possible positive effects via social support and nonverbal

synchrony, as well as slightly negative effects via less adaptive emotion regulation. Derived from this gathered evidence, the following section discusses promising leads for future research.

6.3 Promising Leads

6.3.1 Facial Mimicry and Nonverbal Synchrony

One of the most promising leads is ERA's link to affiliative nonverbal behaviors in social interactions, i.e. facial mimicry and nonverbal synchrony. In the present thesis, explorative analyses based on videotapes were conducted with the help of computerized recognition of movement and facial expressions. That ERA may impact observed positive social behavior via more nonverbal synchrony has been found here for the first time. This finding needs to be replicated in new studies focally examining ERA's impact on nonverbal synchrony and may be extended by examining other movements of the body (e.g., with the computerized recognition of body pose using the openpose software; Cao et al., 2019; Nakano et al., 2020).

Furthermore, the detection of facial mimicry in social interactions should be investigated more thoroughly in future research. The exploratory analyses on computerized mimicry measurement presented here were not conclusive and may have been affected by methodology (e.g., camera set-up; see section 5.2.1). Nevertheless, once the proper setup and data analysis pipeline are worked out, the study of computer-assisted mimicry measurement in actual social interaction is crucial, as it may show differences from the more artificial mimicry measured in laboratory tasks (Seibt et al., 2015). Not only mimicry but also non-congruent facial expression reactions should be further studied. For example, with the goal of affiliation, mimicking an angry expression in actual social interactions may not make much sense, and complementary behaviors could instead be beneficial (see Seibt et al., 2015). One possible methodology to take into consideration is also the use of virtual reality, as realistic motion avatars have been shown to simulate social interaction very well (Rogers et al., 2022). With this method, it is possible to represent two people with avatars and measure their gaze, body movements, and facial expressions during a social interaction in a virtual reality. Taken together, affiliative nonverbal behaviors in social interactions should be studied in relation to ERA in the future, using computerized assessment.

6.3.2 Automatic Processes: Attention and Bias Towards Specific Emotions

Another promising lead for future research is the extended study of attention and possible bias towards certain emotions in ERA. ERA did not seem to influence well-being in the sense of an emotional sensitivity in the studies presented in this thesis. However, the presented studies did

not examine automatic processes to investigate emotional sensitivity. Other studies have shown that ERA is linked to automatic processes such as guiding attention towards emotional stimuli, measured, e.g., with emotional Stroop tasks (Elfenbein et al., 2017; Fiori et al., 2022). Also, individuals with higher ERA rated perceived emotions as more intense and arousing (Fiori et al., 2024). In line with this, Fiori and colleagues (2022, 2023) have advocated for the intensified study of automatic processes in ERA and EI.

Such automatic processes may be key to understand ERA's link to a possible emotional sensitivity and biases towards negative emotions, e.g., in individuals with major depression (e.g., Griffiths & Ashwin, 2016; Krause et al., 2021). Individuals with major depression show attentional bias towards sad faces (e.g., Gotlib et al., 2004) and deficits in accurately recognizing neutral and happy emotional stimuli, but almost no deficit in recognizing sad or angry stimuli (Krause et al., 2021). These effects have been described as mood-congruent negative biases in depression (e.g., Beck & Alford, 2009; LeMoult & Gotlib, 2019). According to LeMoult and Gotlib (2019), depressive mood negatively biases attention, memory, interpretation of socio-emotional stimuli, and emotion regulation, which in turn contribute to and reinforce depressive symptoms (see also Aaron T. Beck's proposition of mood-congruent negative cognitive bias in depression; e.g., Beck & Alford, 2009). Mood-congruent biases in ERA have been shown also in non-clinical samples (e.g., Schmid & Schmid Mast, 2010). Such negative biases in attention to emotion and in ERA, e.g., due to current negative mood or maladaptive emotion regulation habits in some individuals, might explain why the idea of an emotional sensitivity was not supported in the studies presented here.

Multiple authors have argued that emotion recognition involves both automatic and deliberate processes (e.g., Bänziger, 2016; van Kleef & Côté, 2022). Mostly deliberate emotion recognition has been studied, even though automatic processes may be central to social functioning. For example, in an actual social situation, it may not be necessary to deliberately label an angry expression as "angry" to react appropriately, but many individuals simply "know what to do", i.e., react intuitively. Therefore, new tasks could measure quick discrimination of emotions, possibly using appraisal descriptions instead of discrete emotion labels, which has been suggested by Mortillaro and Schlegel (2023). For example, a task could be created in which participants need to quickly decide whether a person displaying anger in a brief video had previously experienced goal obstruction or not (an appraisal typical for anger; see, e.g., Shuman et al., 2017). Solving this correctly under time pressure may reveal the participant's intuitive

ability to recognize anger without inducing the discrete emotion concept of anger (which can strongly influence emotion recognition; e.g., Nook et al., 2015). Moreover, such quick reactions to emotional expression stimuli might reveal specific biases, such as the negative biases in depression (Krause et al., 2021). Overall, the study of automatic processes and bias in ERA appears important to gauge ERA's impacts on social interactions and affect.

6.4 Overall Limitations

There are some limitations to the presented findings in this thesis. Firstly, the reported studies used samples largely consisting of undergraduate students living in Switzerland. Therefore, the results are only generalizable to other western, educated, industrialized, rich, and democratic (WEIRD) populations (Henrich et al., 2010), and not to other cultures or even populations with, e.g., lower socioeconomic status. For example, populations with lower socioeconomic status have been shown to report lower well-being (Tan et al., 2020) and to have a higher risk of being diagnosed with major depression (Lorant et al., 2003). This implies that for such populations, the mechanisms leading to comprehensive well-being might differ, possibly due to different kinds of stressors such as financial instability or social discrimination, and that impacts of socio-emotional competences like ERA may be either more or less important. Future research in this area should aim to include more non-WEIRD samples.

Relatedly, results may differ greatly when the described mechanisms of the ERA-well-being association are studied in clinical or subclinical populations or with populations at risk of having mental disorders. While studying large non-clinical samples can also be a strength when studying symptoms of psychopathology (e.g., in Study 3), it is important to systematically study the differences in the impacts of ERA and other socio-emotional competences on emotional processes between clinical and non-clinical populations. Clinical studies may furthermore benefit from the implementation of more ecologically valid multimodal ERA tests, as there are methodological problems such as ceiling effects for positive emotion recognition in many popular ERA tests (e.g., Bänziger, 2016; Krause et al., 2021).

Another potential limitation might be that in the reported studies, confounding effects of individual cognitive intelligence were not investigated. ERA has been shown to be associated with cognitive intelligence (Schlegel et al., 2020), and some of the outcomes discussed here may be partially explained by purely cognitive processes in addition to emotional processes. For some outcomes, such as in the prediction of psychopathy in prisoners, cognitive intelligence has been shown to be more important (Olderbak et al., 2018), but not necessarily for others, such as

outcomes in dyadic negotiations (Schlegel et al., 2018). As Schlegel et al. (2020) pointed out, controlling for cognitive intelligence has not been done systematically when studying ERA in the past, but some work groups now do (e.g., Gillioz et al., 2023; Nicolet-dit-Félix et al., 2023). Future studies should more systematically rule out the possibility of cognitive intelligence as a confounder by including corresponding measures.

One possible limitation of the studies reported here is that many of the effect sizes are small. However, this is typical in ERA research (e.g., Hall, Andrzejewski, et al., 2009) and psychological research overall (Funder & Ozer, 2019). Especially in the investigation of individual differences, the commonly applied thresholds of $r = .10$, $r = .30$, and $r = .50$ for small, medium, and large effects suggested by Jacob Cohen (1988) may be set too high. Gignac and Szodorai (2016) synthesized over 700 meta-analyses of correlations between individual differences variables and suggested new thresholds: $r = .10$, $r = .20$, and $r = .30$ for small, medium, and large effects in this field. Funder and Ozer (2019) argued further that even very small effects (e.g., $r = .05$) can reasonably be important for individual differences in predicting behavioral outcomes in the long run, because they may cumulate over time. Also, Götz and colleagues (2022) argued that most psychological phenomena are determined by multiple sources and that individual effects should be expected to be small. This also requires planning for large sample sizes to find small but meaningful effects (Funder & Ozer, 2019). The samples in the presented studies were sufficiently large to find small effects and even allow arguing for the absence of a direct ERA-well-being link (see Study 1).

Although a soundly developed multimodal ERA test with many emotions as response options (the GERT-S) was used in the reported studies, this test as well all other ERA and most ability EI tests suffer from the fact that they measure maximum performance in processing emotional information under very controlled conditions, and may not directly transfer to the typical performance in daily life (for a detailed discussion of this topic, see Freudenthaler & Neubauer, 2005, 2007). Furthermore, although participants were asked about their habitual, i.e., typical use of emotion regulation strategies, they were not asked about the emotion regulation strategies they actually used and were not instructed to regulate their emotions in a certain way (for such studies see, e.g., Butler et al., 2003, 2006). Therefore, the actual cognitive processes and behaviors in the situations of central interest had to be extrapolated from the tests used. Future studies may aim to assess concrete behavior in a more detailed way, such as with experience sampling or more meticulous assessment during social interaction experiments.

7 Conclusion

In conclusion, this thesis has provided a broad investigation into the potential contributions of ERA to well-being. While ERA is frequently viewed as a socio-emotional competence expected to enhance psychosocial functioning, the findings here challenge this assumption. Higher ERA does not consistently correlate with increased well-being, casting doubt on the commonly held belief that this socio-emotional skill is inherently beneficial, even though it is a central component of emotional intelligence (EI; Mayer et al., 2008) and interpersonal accuracy (IPA; Palese & Schmid Mast, 2020). This more nuanced understanding offers a new perspective on these competencies.

Nevertheless, ERA remains a significant factor in shaping psychosocial interactions. The exploration of various mechanisms highlights ERA's influence on nonverbal behaviors and emotion regulation, indicating its ongoing role in how we interact with others and navigate emotional experiences. Again, as Darwin stated, "We readily perceive sympathy in others by their expression; our sufferings are thus mitigated and our pleasures increased; and mutual good feeling is thus strengthened" (Darwin, 1872, pp. 365–366). Darwin's observation remains valid, even if ERA's contribution to individual well-being is more complex than previously assumed. Further research into nonverbal behavior, automatic processes, and biases in ERA is essential to fully understand its intricate role in social and emotional life.

8 References

Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clinical Psychology Review*, *30*(2), 217–237. https://doi.org/10.1016/j.cpr.2009.11.004

Ames, D. R., & Kammrath, L. K. (2004). Mind-reading and metacognition: Narcissism, not actual competence, predicts self-estimated ability. *Journal of Nonverbal Behavior*, *28*(3), 187–209. https://doi.org/10.1023/B:JONB.0000039649.20015.0e

Bagby, R. M., Parker, J. D. A., & Taylor, G. J. (1994). The twenty-item Toronto Alexithymia Scale—I. Item selection and cross-validation of the factor structure. *Journal of Psychosomatic Research*, *38*(1), 23–32. https://doi.org/10.1016/0022-3999(94)90005-1

Baltrusaitis, T., Zadeh, A., Lim, Y. C., & Morency, L.-P. (2018). OpenFace 2.0: Facial behavior analysis toolkit. *2018 13th IEEE International Conference on Automatic Face & Gesture Recognition (FG 2018)*, 59–66. https://doi.org/10.1109/FG.2018.00019

Bänziger, T. (2016). Accuracy of judging emotions. In J. A. Hall, M. Schmid Mast, & T. V. West (Eds.), *The social psychology of perceiving others accurately* (pp. 23–51). Cambridge University Press. https://doi.org/10.1017/CBO9781316181959.002

Bao, H.-W.-S. (2024). *bruceR: Broadly useful convenient and efficient R functions* (Version 2024.6) [Computer software]. https://cran.r-project.org/web/packages/bruceR/index.html

Baron-Cohen, S., Wheelwright, S., Hill, J., Raste, Y., & Plumb, I. (2001). The "Reading the Mind in the Eyes" Test revised version: A study with normal adults, and adults with Asperger syndrome or high-functioning autism. *Journal of Child Psychology and Psychiatry*, *42*(2), 241–251. https://doi.org/10.1111/1469-7610.00715

Barrett, L. F., & Bliss-Moreau, E. (2009). She's emotional. He's having a bad day: Attributional explanations for emotion stereotypes. *Emotion*, *9*(5), 649–658. https://doi.org/10.1037/a0016821

Barrett, L. F., & Russell, J. A. (Eds.). (2015). *The psychological construction of emotion* (pp. xiii, 479). The Guilford Press.

Bartlett, M. S. (1937). Properties of sufficiency and statistical tests. *Proceedings of the Royal Society of London. Series A - Mathematical and Physical Sciences*, *160*(901), 268–282. https://doi.org/10.1098/rspa.1937.0109

Bechtoldt, M. N., Beersma, B., Rohrmann, S., & Sanchez-Burks, J. (2013). A gift that takes its toll: Emotion recognition and conflict appraisal. *European Journal of Work and*

Organizational Psychology, *22*(1), 56–66. https://doi.org/10.1080/1359432X.2011.614726

Bechtoldt, M. N., & Schneider, V. K. (2016). Predicting stress from the ability to eavesdrop on feelings: Emotional intelligence and testosterone jointly predict cortisol reactivity. *Emotion*, *16*(6), 815–825. https://doi.org/10.1037/emo0000134

Beck, A. T., & Alford, B. A. (2009). *Depression: Causes and treatment* (Second Edition). University of Pennsylvania Press. https://doi.org/10.9783/9780812290882

Berney, A., Carrard, V., Berney, S., Schlegel, K., Gaume, J., Gholam, M., Bart, P.-A., Preisig, M., Wac, K., Mast, M. S., & Bourquin, C. (2021). Study protocol for the ETMED-L project: Longitudinal study of mental health and interpersonal competence of medical students in a Swiss university using a comprehensive framework of empathy. *BMJ Open*, *11*(12), e053070. https://doi.org/10.1136/bmjopen-2021-053070

Bernieri, F. J. (1991). Interpersonal sensitivity in teaching interactions. *Personality and Social Psychology Bulletin*, *17*(1), 98–103. https://doi.org/10.1177/0146167291171015

Boker, S. M., Rotondo, J. L., Xu, M., & King, K. (2002). Windowed cross-correlation and peak picking for the analysis of variability in the association between behavioral time series. *Psychological Methods*, *7*(3), 338–355. https://doi.org/10.1037/1082-989X.7.3.338

Butler, E. A., Egloff, B., Wilhelm, F. H., Smith, N. C., Erickson, E. A., & Gross, J. J. (2003). The social consequences of expressive suppression. *Emotion*, *3*(1), 48–67. https://doi.org/10.1037/1528-3542.3.1.48

Butler, E. A., Wilhelm, F. H., & Gross, J. J. (2006). Respiratory sinus arrhythmia, emotion, and emotion regulation during social interaction. *Psychophysiology*, *43*(6), 612–622. https://doi.org/10.1111/j.1469-8986.2006.00467.x

Cao, Z., Hidalgo, G., Simon, T., Wei, S.-E., & Sheikh, Y. (2019). *OpenPose: Realtime multi-person 2D pose estimation using part affinity fields* (arXiv:1812.08008). arXiv. http://arxiv.org/abs/1812.08008

Carrard, V., Bourquin, C., Berney, S., Schlegel, K., Gaume, J., Bart, P.-A., Preisig, M., Schmid Mast, M., & Berney, A. (2022). The relationship between medical students' empathy, mental health, and burnout: A cross-sectional study. *Medical Teacher*, *44*(12), 1392–1399. https://doi.org/10.1080/0142159X.2022.2098708

Chartrand, T. L., & Lakin, J. L. (2013). The antecedents and consequences of human behavioral mimicry. *Annual Review of Psychology*, *64*(1), 285–308. https://doi.org/10.1146/annurev-psych-113011-143754

Ciarrochi, J., Deane, F. P., & Anderson, S. (2002). Emotional intelligence moderates the relationship between stress and mental health. *Personality and Individual Differences*, *32*(2), 197–209. https://doi.org/10.1016/S0191-8869(01)00012-5

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

Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin*, *98*, 310–357. https://doi.org/10.1037/0033-2909.98.2.310

Cotter, J., Granger, K., Backx, R., Hobbs, M., Looi, C. Y., & Barnett, J. H. (2018). Social cognitive dysfunction as a clinical marker: A systematic review of meta-analyses across 30 clinical conditions. *Neuroscience & Biobehavioral Reviews*, *84*, 92–99. https://doi.org/10.1016/j.neubiorev.2017.11.014

Cuff, B. M. P., Brown, S. J., Taylor, L., & Howat, D. J. (2016). Empathy: A review of the concept. *Emotion Review*, *8*(2), 144–153. https://doi.org/10.1177/1754073914558466

Dalili, M. N., Penton-Voak, I. S., Harmer, C. J., & Munafò, M. R. (2015). Meta-analysis of emotion recognition deficits in major depressive disorder. *Psychological Medicine*, *45*(6), 1135–1144. https://doi.org/10.1017/S0033291714002591

Darwin, C. (1872). *The expression of the emotions in man and animals.* (1st edition.). John Murray.

Davis, S. K., & Nichols, R. (2016). Does emotional intelligence have a “dark” side? A review of the literature. *Frontiers in Psychology*. https://www.frontiersin.org/article/10.3389/fpsyg.2016.01316

Dawel, A., Gulliver, A., Farrer, L. M., Kalokerinos, E. K., Cherbuin, N., Calear, A. L., McCallum, S., Morse, A. R., & Monaghan, C. (2023). Do emotion intensity, variability, differentiation, co-occurrence, and positive–negative ratios make unique contributions to predicting longitudinal change in psychological distress and well-being? *Emotion*, *23*(7), 1945–1959. https://doi.org/10.1037/emo0001204

Deits-Lebehn, C., Smith, T. W., Williams, P. G., & Uchino, B. N. (2023). Heart rate variability during social interaction: Effects of valence and emotion regulation. *International Journal of Psychophysiology*, *190*, 20–29. https://doi.org/10.1016/j.ijpsycho.2023.06.004

Dejonckheere, E., Mestdagh, M., Houben, M., Rutten, I., Sels, L., Kuppens, P., & Tuerlinckx, F. (2019). Complex affect dynamics add limited information to the prediction of psychological well-being. *Nature Human Behaviour*, *3*(5), Article 5. https://doi.org/10.1038/s41562-019-0555-0

Denissen, J. J. A., & Penke, L. (2008). Neuroticism predicts reactions to cues of social inclusion. *European Journal of Personality*, *22*(6), 497–517. https://doi.org/10.1002/per.682

Diener, E. (1984). Subjective well-being. *Psychological Bulletin*, *95*(3), 542–575.

Diener, E. (2009). Subjective well-being. In E. Diener (Ed.), *The Science of Well-Being: The Collected Works of Ed Diener* (pp. 11–58). Springer Netherlands. https://doi.org/10.1007/978-90-481-2350-6_2

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment*, *49*(1), 71–75. https://doi.org/10.1207/s15327752jpa4901_13

Drimalla, H., Landwehr, N., Hess, U., & Dziobek, I. (2019). From face to face: The contribution of facial mimicry to cognitive and emotional empathy. *Cognition and Emotion*, *33*(8), 1672–1686. https://doi.org/10.1080/02699931.2019.1596068

Duffy, K. A., & Chartrand, T. L. (2015). Mimicry: Causes and consequences. *Current Opinion in Behavioral Sciences*, *3*, 112–116. https://doi.org/10.1016/j.cobeha.2015.03.002

Dweck, C. S. (2017). From needs to goals and representations: Foundations for a unified theory of motivation, personality, and development. *Psychological Review*, *124*(6), 689–719. https://doi.org/10.1037/rev0000082

Ekman, P. (1992). An argument for basic emotions. *Cognition and Emotion*, *6*(3–4), 169–200. https://doi.org/10.1080/02699939208411068

Ekman, P., & Friesen, W. V. (1971). Constants across cultures in the face and emotion. *Journal of Personality and Social Psychology*, *17*(2), 124–129. https://doi.org/10.1037/h0030377

Ekman, P. (with Friesen, W. V.). (1978). *Facial action coding system*. Consulting Psychologists Press.

Ekman, P., Friesen, W. V., & Hager, J. C. (2002). *Facial action coding system*. A Human Face.

Elfenbein, H. A. (2014). The many faces of emotional contagion: An affective process theory of affective linkage. *Organizational Psychology Review*, *4*(4), 326–362. https://doi.org/10.1177/2041386614542889

Elfenbein, H. A., & Ambady, N. (2002). On the universality and cultural specificity of emotion recognition: A meta-analysis. *Psychological Bulletin*, *128*(2), 203–235. https://doi.org/10.1037/0033-2909.128.2.203

Elfenbein, H. A., Foo, M. D., White, J., Tan, H. H., & Aik, V. C. (2007). Reading your counterpart: The benefit of emotion recognition accuracy for effectiveness in negotiation. *Journal of Nonverbal Behavior*, *31*(4), 205–223. https://doi.org/10.1007/s10919-007-0033-7

Elfenbein, H. A., Jang, D., Sharma, S., & Sanchez-Burks, J. (2017). Validating emotional attention regulation as a component of emotional intelligence: A Stroop approach to individual differences in tuning in to and out of nonverbal cues. *Emotion*, *17*(2), 348–358. https://doi.org/10.1037/emo0000145

Elfenbein, H. A., & Luckman, E. A. (2016). Interpersonal accuracy in relation to culture and ethnicity. In J. A. Hall, M. Schmid Mast, & T. V. West (Eds.), *The social psychology of perceiving others accurately* (pp. 328–349). Cambridge University Press. https://doi.org/10.1017/CBO9781316181959.016

Elfenbein, H. A., & MacCann, C. (2017). A closer look at ability emotional intelligence (EI): What are its component parts, and how do they relate to each other? *Social and Personality Psychology Compass*, *11*(7), e12324. https://doi.org/10.1111/spc3.12324

Fiol-Veny, A., Balle, M., De la Torre-Luque, A., & Bornas, X. (2019). Negative cognitive emotion regulation as a predictor of adolescent heart rate variability and entropy under social stress. *Anxiety, Stress, & Coping*, *32*(6), 641–653. https://doi.org/10.1080/10615806.2019.1641199

Fiori, M., Gillioz, C., & Nicolet-dit-Félix, M. (2024). Emotional intelligence and emotional reactivity: Understanding the hypersensitivity hypothesis. *Personality and Individual Differences*, *230*, 112792. https://doi.org/10.1016/j.paid.2024.112792

Fiori, M., & Ortony, A. (2021). Initial evidence for the hypersensitivity hypothesis: Emotional intelligence as a magnifier of emotional experience. *Journal of Intelligence*, *9*(2), Article 2. https://doi.org/10.3390/jintelligence9020024

Fiori, M., Udayar, S., & Vesely Maillefer, A. (2022). Emotion information processing as a new component of emotional intelligence: Theoretical framework and empirical evidence. *European Journal of Personality*, *36*(2), 245–264. https://doi.org/10.1177/08902070211007672

Fiori, M., Vesely-Maillefer, A. K., Nicolet-Dit-Félix, M., & Gillioz, C. (2023). With great sensitivity comes great management: How emotional hypersensitivity can be the superpower of emotional intelligence. *Journal of Intelligence*, *11*(10), 198. https://doi.org/10.3390/jintelligence11100198

Freudenthaler, H. H., & Neubauer, A. C. (2005). Emotional intelligence: The convergent and discriminant validities of intra- and interpersonal emotional abilities. *Personality and Individual Differences*, *39*(3), 569–579. https://doi.org/10.1016/j.paid.2005.02.004

Freudenthaler, H. H., & Neubauer, A. C. (2007). Measuring emotional management abilities: Further evidence of the importance to distinguish between typical and maximum performance. *Personality and Individual Differences*, *42*(8), 1561–1572. https://doi.org/10.1016/j.paid.2006.10.031

Fritz, M. M., Margolis, S., Radošić, N., Revord, J. C., Rosen Kellerman, G., Nieminen, L. R. G., Reece, A., & Lyubomirsky, S. (2023). Examining the social in the prosocial: Episode-level features of social interactions and kind acts predict social connection and well-being. *Emotion*, *23*(8), 2270–2285. https://doi.org/10.1037/emo0001232

Funder, D. C., & Ozer, D. J. (2019). Evaluating effect size in psychological research: Sense and nonsense. *Advances in Methods and Practices in Psychological Science*, *2*(2), 156–168. https://doi.org/10.1177/2515245919847202

Garnefski, N., & Kraaij, V. (2006). Cognitive Emotion Regulation Questionnaire – Development of a short 18-item version (CERQ-short). *Personality and Individual Differences*, *41*(6), 1045–1053. https://doi.org/10.1016/j.paid.2006.04.010

Gignac, G. E., & Szodorai, E. T. (2016). Effect size guidelines for individual differences researchers. *Personality and Individual Differences*, *102*, 74–78. https://doi.org/10.1016/j.paid.2016.06.069

Gillioz, C., Nicolet-dit-Félix, M., Wilhelm, O., & Fiori, M. (2023). Emotional intelligence and emotion information processing: Proof of concept of a test measuring accuracy in discriminating emotions. *Frontiers in Psychology*, *14*, 1085971. https://doi.org/10.3389/fpsyg.2023.1085971

Goodman, F. R., Disabato, D. J., Kashdan, T. B., & Kauffman, S. B. (2018). Measuring well-being: A comparison of subjective well-being and PERMA. *The Journal of Positive Psychology*, *13*(4), 321–332. https://doi.org/10.1080/17439760.2017.1388434

Gotlib, I. H., Krasnoperova, E., Yue, D. N., & Joormann, J. (2004). Attentional biases for negative interpersonal stimuli in clinical pepression. *Journal of Abnormal Psychology*, *113*(1), 127–135. https://doi.org/10.1037/0021-843X.113.1.121

Götz, F. M., Gosling, S. D., & Rentfrow, P. J. (2022). Small effects: The indispensable foundation for a cumulative psychological science. *Perspectives on Psychological Science*, *17*(1), 205–215. https://doi.org/10.1177/1745691620984483

Gregory, A. J. P., Anderson, J. F., & Gable, S. L. (2020). You don't know how it feels: Accuracy in emotion perception predicts responsiveness of support. *Emotion*, *20*(3), 343–352. https://doi.org/10.1037/emo0000608

Griffiths, P., & Ashwin, C. (2016). Accuracy in perceiving facial expressions of emotion in psychopathology. In J. A. Hall, M. Schmid Mast, & T. V. West (Eds.), *The social psychology of perceiving others accurately* (pp. 185–205). Cambridge University Press. https://doi.org/10.1017/CBO9781316181959.009

Gross, J. J. (2015). Emotion regulation: Current status and future prospects. *Psychological Inquiry*, *26*(1), 1–26. https://doi.org/10.1080/1047840X.2014.940781

Gross, J. J., Uusberg, H., & Uusberg, A. (2019). Mental illness and well-being: An affect regulation perspective. *World Psychiatry*, *18*(2), 130–139. https://doi.org/10.1002/wps.20618

Gunaydin, G., Oztekin, H., Karabulut, D. H., & Salman-Engin, S. (2021). Minimal social interactions with strangers predict greater subjective well-being. *Journal of Happiness Studies*, *22*(4), 1839–1853. https://doi.org/10.1007/s10902-020-00298-6

Hall, J. A. (1978). Gender effects in decoding nonverbal cues. *Psychological Bulletin*, *85*(4), 845–857. https://doi.org/10.1037/0033-2909.85.4.845

Hall, J. A., Andrzejewski, S. A., & Yopchick, J. E. (2009). Psychosocial correlates of interpersonal sensitivity: A meta-analysis. *Journal of Nonverbal Behavior*, *33*(3), 149–180. https://doi.org/10.1007/s10919-009-0070-5

Hall, J. A., Mast, M. S., & West, T. V. (2016). Accurate interpersonal perception: Many traditions, one topic. In J. A. Hall, M. Schmid Mast, & T. V. West (Eds.), *The social psychology of perceiving others accurately* (pp. 3–22). Cambridge University Press. https://doi.org/10.1017/CBO9781316181959.001

Hall, J. A., Roter, D. L., Blanch, D. C., & Frankel, R. M. (2009). Nonverbal sensitivity in medical students: Implications for clinical interactions. *Journal of General Internal Medicine*, *24*(11), 1217–1222. https://doi.org/10.1007/s11606-009-1107-5

Hall, J. A., & Schwartz, R. (2019). Empathy present and future. *The Journal of Social Psychology*, *159*(3), 225–243. https://doi.org/10.1080/00224545.2018.1477442

Hall, J. A., Ship, A. N., Ruben, M. A., Curtin, E. M., Roter, D. L., Clever, S. L., Smith, C. C., & Pounds, K. (2015). Clinically relevant correlates of accurate perception of patients' thoughts and feelings. *Health Communication*, *30*(5), 423–429. https://doi.org/10.1080/10410236.2013.865507

Hatfield, E., Cacioppo, J. T., & Rapson, R. L. (1993). Emotional contagion. *Current Directions in Psychological Science*, *2*(3), 96–100. https://doi.org/10.1111/1467-8721.ep10770953

Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis, second edition: A regression-based approach*. Guilford Publications. http://ebookcentral.proquest.com/lib/unibern/detail.action?docID=5109647

Hayes, G. S., McLennan, S. N., Henry, J. D., Phillips, L. H., Terrett, G., Rendell, P. G., Pelly, R. M., & Labuschagne, I. (2020). Task characteristics influence facial emotion recognition age-effects: A meta-analytic review. *Psychology and Aging*, *35*(2), 295–315. https://doi.org/10.1037/pag0000441

He, J. C., & Côté, S. (2023). Are empathic people better adjusted? A test of competing models of empathic accuracy and intrapersonal and interpersonal facets of adjustment using self- and peer reports. *Psychological Science*, *34*(9), 955–967. https://doi.org/10.1177/09567976231185127

Heintzelman, S. J., Trent, J., & King, L. A. (2015). Revisiting desirable response bias in well-being reports. *The Journal of Positive Psychology*, *10*(2), 167–178. https://doi.org/10.1080/17439760.2014.927903

Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *Behavioral and Brain Sciences*, *33*(2–3), 61–83. https://doi.org/10.1017/S0140525X0999152X

Hess, U., & Kafetsios, K. (2021). Infusing context into emotion perception impacts emotion decoding accuracy. *Experimental Psychology*, *68*(6), 285–294. https://doi.org/10.1027/1618-3169/a000531

Holland, A. C., O'Connell, G., & Dziobek, I. (2021). Facial mimicry, empathy, and emotion recognition: A meta-analysis of correlations. *Cognition and Emotion*, *35*(1), 150–168. https://doi.org/10.1080/02699931.2020.1815655

Houben, M., Van Den Noortgate, W., & Kuppens, P. (2015). The relation between short-term emotion dynamics and psychological well-being: A meta-analysis. *Psychological Bulletin*, *141*(4), 901–930. https://doi.org/10.1037/a0038822

Hsu, C.-T., & Sato, W. (2023). Electromyographic validation of spontaneous facial mimicry detection using automated facial action coding. *Sensors*, *23*(22), Article 22. https://doi.org/10.3390/s23229076

Ickes, W. (2001). Measuring empathic accuracy. In *Interpersonal sensitivity*. Psychology Press.

Ickes, W., & Hodges, S. D. (2013). Empathic accuracy in close relationships. In J. A. Simpson & L. Campbell (Eds.), *The Oxford handbook of close relationships*. Oxford University Press. https://doi.org/10.1093/oxfordhb/9780195398694.013.0016

Jacobucci, R., Grimm, K., Brandmaier, A., Serang, S., Kievit, R., Scharf, F., Li, X., & Ye, A. (2023). *regsem: Regularized structural equation modeling* (Version 1.9.5) [Computer software]. https://cran.r-project.org/web/packages/regsem/index.html

Jacobucci, R., Grimm, K. J., & McArdle, J. J. (2016). Regularized structural equation modeling. *Structural Equation Modeling: A Multidisciplinary Journal*, *23*(4), 555–566. https://doi.org/10.1080/10705511.2016.1154793

John, O. P. (2021). History, measurement, and conceptual elaboration of the Big-Five trait taxonomy: The paradigm matures. In O. P. John & R. W. Robins (Eds.), *Handbook of personality: Theory and research, 4th ed* (pp. 35–82). The Guilford Press.

Joseph, D. L., Jin, J., Newman, D. A., & O'Boyle, E. H. (2015). Why does self-reported emotional intelligence predict job performance? A meta-analytic investigation of mixed EI. *Journal of Applied Psychology*, *100*(2), 298–342. https://doi.org/10.1037/a0037681

Joseph, D. L., & Newman, D. A. (2010). Emotional intelligence: An integrative meta-analysis and cascading model. *Journal of Applied Psychology*, *95*(1), 54–78. https://doi.org/10.1037/a0017286

Kawachi, I., & Berkman, L. F. (2001). Social ties and mental health. *Journal of Urban Health*, *78*(3), 458–467. https://doi.org/10.1093/jurban/78.3.458

Keyes, C. L. M. (2002). The mental health continuum: From languishing to flourishing in life. *Journal of Health and Social Behavior*, *43*(2), 207–222. https://doi.org/10.2307/3090197

Keyes, C. L. M. (2016). Why flourishing? In D. W. Harward (Ed.), *Well-being and higher education* (pp. 99–107). Bringing Theory to Practice.

Kleinbub, J. R., & Ramseyer, F. (2022). *rMEA: Synchrony in Motion Energy Analysis (MEA) time-series* (Version 1.2.2) [Computer software]. https://cran.r-project.org/web/packages/rMEA/index.html

Kleinbub, J. R., & Ramseyer, F. T. (2021). rMEA: An R package to assess nonverbal synchronization in motion energy analysis time-series. *Psychotherapy Research*, *31*(6), 817–830. https://doi.org/10.1080/10503307.2020.1844334

Krause, F. C., Linardatos, E., Fresco, D. M., & Moore, M. T. (2021). Facial emotion recognition in major depressive disorder: A meta-analytic review. *Journal of Affective Disorders*, *293*, 320–328. https://doi.org/10.1016/j.jad.2021.06.053

Kurkul, W. W. (2007). Nonverbal communication in one-to-one music performance instruction. *Psychology of Music*, *35*(2), 327–362. https://doi.org/10.1177/0305735607070385

Lamers, S. M. A., Westerhof, G. J., Glas, C. A. W., & Bohlmeijer, E. T. (2015). The bidirectional relation between positive mental health and psychopathology in a longitudinal representative panel study. *The Journal of Positive Psychology*, *10*(6), 553–560. https://doi.org/10.1080/17439760.2015.1015156

Lazarus, R. S. (1966). *Psychological stress and the coping process*. McGraw-Hill.

Lea, R. G., Davis, S. K., Mahoney, B., & Qualter, P. (2023). Do emotionally intelligent adolescents flourish or flounder under pressure? Linking emotional intelligence to stress regulation mechanisms. *Personality and Individual Differences*, *201*, 111943. https://doi.org/10.1016/j.paid.2022.111943

LeMoult, J., & Gotlib, I. H. (2019). Depression: A cognitive perspective. *Clinical Psychology Review*, *69*, 51–66. https://doi.org/10.1016/j.cpr.2018.06.008

Lent, R. W. (2004). Toward a unifying theoretical and practical perspective on well-being and psychosocial adjustment. *Journal of Counseling Psychology*, *51*(4), 482–509. https://doi.org/10.1037/0022-0167.51.4.482

Lincoln, K. D. (2000). Social support, negative social interactions, and psychological well-being. *Social Service Review*, *74*(2), 231–252. https://doi.org/10.1086/514478

Lorant, V., Deliège, D., Eaton, W., Robert, A., Philippot, P., & Ansseau, M. (2003). Socioeconomic inequalities in depression: A meta-analysis. *American Journal of Epidemiology*, *157*(2), 98–112. https://doi.org/10.1093/aje/kwf182

MacCann, C., Jiang, Y., Brown, L. E. R., Double, K. S., Bucich, M., & Minbashian, A. (2020). Emotional intelligence predicts academic performance: A meta-analysis. *Psychological Bulletin*, *146*(2), 150–186. https://doi.org/10.1037/bul0000219

MacCann, C., & Roberts, R. D. (2008). New paradigms for assessing emotional intelligence: Theory and data. *Emotion*, *8*(4), 540–551. https://doi.org/10.1037/a0012746

Marroquín, B., Tennen, H., & Stanton, A. L. (2017). Coping, emotion regulation, and well-being: Intrapersonal and interpersonal processes. In M. D. Robinson & M. Eid (Eds.), *The Happy Mind: Cognitive Contributions to Well-Being* (pp. 253–274). Springer International Publishing. https://doi.org/10.1007/978-3-319-58763-9_14

Martins, A., Ramalho, N., & Morin, E. (2010). A comprehensive meta-analysis of the relationship between emotional intelligence and health. *Personality and Individual Differences*, *49*(6), 554–564. https://doi.org/10.1016/j.paid.2010.05.029

Matsumoto, D., LeRoux, J., Wilson-Cohn, C., Raroque, J., Kooken, K., Ekman, P., Yrizarry, N., Loewinger, S., Uchida, H., Yee, A., Amo, L., & Goh, A. (2000). A new test to measure emotion recognition ability: Matsumoto and Ekman's Japanese and Caucasian Brief Affect Recognition Test (JACBART). *Journal of Nonverbal Behavior*, *24*(3), 179–209. https://doi.org/10.1023/A:1006668120583

Mayer, J. D., Caruso, D. R., & Salovey, P. (1999). Emotional intelligence meets traditional standards for an intelligence. *Intelligence*, *27*(4), 267–298. https://doi.org/10.1016/S0160-2896(99)00016-1

Mayer, J. D., Caruso, D. R., & Salovey, P. (2016). The ability model of emotional intelligence: Principles and updates. *Emotion Review*, *8*(4), 290–300. https://doi.org/10.1177/1754073916639667

Mayer, J. D., Caruso, D. R., Sitarenios, G., & Escobar, M. R. (2024). How many emotional intelligence abilities are there? An examination of four measures of emotional intelligence. *Personality and Individual Differences*, *219*, 112468. https://doi.org/10.1016/j.paid.2023.112468

Mayer, J. D., Roberts, R. D., & Barsade, S. G. (2008). Human abilities: Emotional intelligence. *Annual Review of Psychology*, *59*(1), 507–536. https://doi.org/10.1146/annurev.psych.59.103006.093646

Mayer, J. D., & Salovey, P. (1997). What is emotional intelligence? In P. Salovey & D. J. Sluiter (Eds.), *Emotional development and emotional intelligence: Educational implications* (pp. 3–31). Basic Books.

Mayer, J. D., Salovey, P., Caruso, D. R., & Cherkasskiy, L. (2011). Emotional intelligence. In *The Cambridge handbook of intelligence* (pp. 528–549). Cambridge University Press. https://doi.org/10.1017/CBO9780511977244.027

Mayer, J. D., Salovey, P., Caruso, D. R., & Sitarenios, G. (2003). Measuring emotional intelligence with the MSCEIT V2.0. *Emotion*, *3*(1), 97–105. https://doi.org/10.1037/1528-3542.3.1.97

McIntosh, D. N. (1996). Facial feedback hypotheses: Evidence, implications, and directions. *Motivation and Emotion*, *20*(2), 121–147. https://doi.org/10.1007/BF02253868

Momm, T., Blickle, G., Liu, Y., Wihler, A., Kholin, M., & Menges, J. I. (2015). It pays to have an eye for emotions: Emotion recognition ability indirectly predicts annual income. *Journal of Organizational Behavior*, *36*(1), 147–163. https://doi.org/10.1002/job.1975

Moors, A., Ellsworth, P. C., Scherer, K. R., & Frijda, N. H. (2013). Appraisal theories of emotion: State of the art and future development. *Emotion Review*, *5*(2), 119–124. https://doi.org/10.1177/1754073912468165

Mortillaro, M., & Schlegel, K. (2023). Embracing the emotion in emotional intelligence measurement: Insights from emotion theory and research. *Journal of Intelligence*, *11*(11), Article 11. https://doi.org/10.3390/jintelligence11110210

Murphy, B. A., & Lilienfeld, S. O. (2019). Are self-report cognitive empathy ratings valid proxies for cognitive empathy ability? Negligible meta-analytic relations with behavioral task performance. *Psychological Assessment*, *31*(8), 1062–1072. https://doi.org/10.1037/pas0000732

Myin-Germeys, I., & Kuppens, P. (Eds.). (2021). *The open handbook of experience sampling methodology: A step-by-step guide to designing, conducting, and analyzing ESM studies* (2nd ed.). Center for Research on Experience Sampling and Ambulatory Methods Leuven. https://www.kuleuven.be/samenwerking/real/real-book/index.htm

Nakano, N., Sakura, T., Ueda, K., Omura, L., Kimura, A., Iino, Y., Fukashiro, S., & Yoshioka, S. (2020). Evaluation of 3D markerless motion capture accuracy using OpenPose with multiple video cameras. *Frontiers in Sports and Active Living*, *2*. https://doi.org/10.3389/fspor.2020.00050

Newbold, A., Warren, F. C., Taylor, R. S., Hulme, C., Burnett, S., Aas, B., Botella, C., Burkhardt, F., Ehring, T., Fontaine, J. R. J., Frost, M., Garcia-Palacios, A., Greimel, E., Hoessle, C., Hovasapian, A., Huyghe, V., Lochner, J., Molinari, G., Pekrun, R., … Watkins, E. R. (2020). Promotion of mental health in young adults via mobile phone app: Study protocol of the ECoWeB (emotional competence for well-being in Young adults) cohort multiple randomised trials. *BMC Psychiatry*, *20*(1), 458. https://doi.org/10.1186/s12888-020-02857-w

Nicolet-dit-Félix, M., Gillioz, C., Mortillaro, M., Sander, D., & Fiori, M. (2023). Emotional intelligence and attentional bias to emotional faces: Evidence of hypersensitivity towards emotion information. *Personality and Individual Differences*, *201*, 111917. https://doi.org/10.1016/j.paid.2022.111917

Niedenthal, P. M. (2007). Embodying emotion. *Science*, *316*(5827), 1002–1005. https://doi.org/10.1126/science.1136930

Niedenthal, P. M., & Brauer, M. (2012). Social Functionality of Human Emotion. *Annual Review of Psychology*, *63*(Volume 63, 2012), 259–285. https://doi.org/10.1146/annurev.psych.121208.131605

Nook, E. C., Lindquist, K. A., & Zaki, J. (2015). A new look at emotion perception: Concepts speed and shape facial emotion recognition. *Emotion*, *15*(5), 569–578. https://doi.org/10.1037/a0039166

Nowicki, S., & Duke, M. P. (1994). Individual differences in the nonverbal communication of affect: The diagnostic analysis of nonverbal accuracy scale. *Journal of Nonverbal Behavior*, *18*(1), 9–35. https://doi.org/10.1007/BF02169077

Nyquist, A. C., & Luebbe, A. M. (2020). An emotion recognition–awareness vulnerability hypothesis for depression in adolescence: A systematic review. *Clinical Child and Family Psychology Review*, *23*(1), 27–53. https://doi.org/10.1007/s10567-019-00302-3

O'Boyle Jr., E. H., Humphrey, R. H., Pollack, J. M., Hawver, T. H., & Story, P. A. (2011). The relation between emotional intelligence and job performance: A meta-analysis. *Journal of Organizational Behavior*, *32*(5), 788–818. https://doi.org/10.1002/job.714

Olderbak, S. G., Mokros, A., Nitschke, J., Habermeyer, E., & Wilhelm, O. (2018). Psychopathic men: Deficits in general mental ability, not emotion perception. *Journal of Abnormal Psychology*, *127*(3), 294–304. https://doi.org/10.1037/abn0000340

Palese, T., & Schmid Mast, M. (2020). Interpersonal accuracy and interaction outcomes: Why and how reading others correctly has adaptive advantages in social interactions. In R. J. Sternberg & A. Kostić (Eds.), *Social intelligence and nonverbal communication* (pp. 305–331). Springer International Publishing. https://doi.org/10.1007/978-3-030-34964-6_11

Penton-Voak, I. S., Adams, S., Button, K. S., Fluharty, M., Dalili, M., Browning, M., Holmes, E. A., Harmer, C. J., & Munafò, M. R. (2021). Emotional recognition training modifies neural response to emotional faces but does not improve mood in healthy volunteers with high levels of depressive symptoms. *Psychological Medicine*, *51*(7), 1211–1219. https://doi.org/10.1017/S0033291719004124

Pérez-González, J. C., & Sanchez-Ruiz, M.-J. (2014). Trait emotional intelligence anchored within the Big Five, Big Two and Big One frameworks. *Personality and Individual Differences*, *65*, 53–58. https://doi.org/10.1016/j.paid.2014.01.021

Petrides, K. V., Mikolajczak, M., Mavroveli, S., Sanchez-Ruiz, M.-J., Furnham, A., & Pérez-González, J.-C. (2016). Developments in trait emotional intelligence research. *Emotion Review*, *8*(4), 335–341. https://doi.org/10.1177/1754073916650493

Ramseyer, F. T. (2020). Motion energy analysis (MEA): A primer on the assessment of motion from video. *Journal of Counseling Psychology*, *67*(4), 536–549. https://doi.org/10.1037/cou0000407

Ramseyer, F. T., & Tschacher, W. (2008). Synchrony in dyadic psychotherapy sessions. In *Simultaneity* (pp. 329–347). WORLD SCIENTIFIC. https://doi.org/10.1142/9789812792426_0020

Ramseyer, F. T., & Tschacher, W. (2011). Nonverbal synchrony in psychotherapy: Coordinated body movement reflects relationship quality and outcome. *Journal of Consulting and Clinical Psychology*, *79*, 284–295. https://doi.org/10.1037/a0023419

Riggio, R. E., & Crawley, A. (2022). Nonverbal skills in relationships: Too little or too much may be a bad thing. In R. J. Sternberg & A. Kostić (Eds.), *Nonverbal communication in close Relationships: What words don't tell us* (pp. 341–361). Springer International Publishing. https://doi.org/10.1007/978-3-030-94492-6_13

Roberts, R. D., MacCann, C., Matthews, G., & Zeidner, M. (2010). Emotional intelligence: Toward a consensus of models and measures. *Social and Personality Psychology Compass*, *4*(10), 821–840. https://doi.org/10.1111/j.1751-9004.2010.00277.x

Rogers, S. L., Broadbent, R., Brown, J., Fraser, A., & Speelman, C. P. (2022). Realistic motion avatars are the future for social interaction in virtual reality. *Frontiers in Virtual Reality*, *2*. https://doi.org/10.3389/frvir.2021.750729

Rosenthal, R., Hall, J. A., DiMatteo, M. R., Rogers, P. L., & Archer, D. (1979). *Sensitivity to nonverbal communication: The PONS test*. Johns Hopkins University Press.

Rosenthal, R., Hall, J. A., DiMatteo, M. R., Rogers, P. L., & Archer, D. (2013). *Profile of Nonverbal Sensitivity (PONS Test): Manual* (Revised October 2013). Johns Hopkins University Press.

Ruffman, T., Henry, J. D., Livingstone, V., & Phillips, L. H. (2008). A meta-analytic review of emotion recognition and aging: Implications for neuropsychological models of aging. *Neuroscience & Biobehavioral Reviews*, *32*(4), 863–881. https://doi.org/10.1016/j.neubiorev.2008.01.001

Russell, J. A. (1980). A circumplex model of affect. *Journal of Personality and Social Psychology*, *39*(6), 1161–1178. https://doi.org/10.1037/h0077714

Russell, J. A. (2003). Core affect and the psychological construction of emotion. *Psychological Review*, *110*(1), 145–172. https://doi.org/10.1037/0033-295X.110.1.145

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*. https://doi.org/10.1037/0003-066X.55.1.68

Ryan, R. M., & Deci, E. L. (2001). On happiness and human potentials: A review of research on hedonic and eudaimonic well-being. *Annual Review of Psychology*, *52*(1), 141–166. https://doi.org/10.1146/annurev.psych.52.1.141

Ryff, C. D., & Keyes, C. L. M. (1995). The structure of psychological well-being revisited. *Journal of Personality and Social Psychology*, *69*(4), 719–727. https://doi.org/10.1037/0022-3514.69.4.719

Sánchez-Álvarez, N., Extremera, N., & Fernández-Berrocal, P. (2016). The relation between emotional intelligence and subjective well-being: A meta-analytic investigation. *The Journal of Positive Psychology*, *11*(3), 276–285. https://doi.org/10.1080/17439760.2015.1058968

Sandstrom, G. M., & Dunn, E. W. (2014). Social interactions and well-being: The surprising power of weak ties. *Personality and Social Psychology Bulletin*, *40*(7), 910–922. https://doi.org/10.1177/0146167214529799

Sato, W., Fujimura, T., Kochiyama, T., & Suzuki, N. (2013). Relationships among facial mimicry, emotional experience, and emotion recognition. *PLOS ONE*, *8*(3), e57889. https://doi.org/10.1371/journal.pone.0057889

Scheier, M. F., & Carver, C. S. (1985). Optimism, coping, and health: Assessment and implications of generalized outcome expectancies. *Health Psychology*, *4*(3), 219–247. https://doi.org/10.1037/0278-6133.4.3.219

Scherer, K. R. (2009). The dynamic architecture of emotion: Evidence for the component process model. *Cognition and Emotion*, *23*(7), 1307–1351. https://doi.org/10.1080/02699930902928969

Scherer, K. R. (2020). Evidence for the existence of emotion dispositions and the effects of appraisal bias. *Emotion*, *21*, 1224–1238. https://doi.org/10.1037/emo0000861

Schlegel, K. (2020). Inter- and intrapersonal downsides of accurately perceiving others' emotions. In R. J. Sternberg & A. Kostić (Eds.), *Social intelligence and nonverbal communication* (pp. 359–395). Springer International Publishing. https://doi.org/10.1007/978-3-030-34964-6_13

Schlegel, K., Boone, R. T., & Hall, J. A. (2017). Individual differences in interpersonal accuracy: A multi-level meta-analysis to assess whether judging other people is one skill or many. *Journal of Nonverbal Behavior*, *41*(2), 103–137. https://doi.org/10.1007/s10919-017-0249-0

Schlegel, K., Fontaine, J. R. J., & Scherer, K. R. (2019). The nomological network of emotion recognition ability: Evidence from the Geneva Emotion Recognition Test. *European Journal of Psychological Assessment*, *35*(3), 352–363. https://doi.org/10.1027/1015-5759/a000396

Schlegel, K., Grandjean, D., & Scherer, K. R. (2014). Introducing the Geneva Emotion Recognition Test: An example of Rasch-based test development. *Psychological Assessment*, *26*(2), 666–672. https://doi.org/10.1037/a0035246

Schlegel, K., Gugelberg, H. M. von, Makowski, L. M., Gubler, D. A., & Troche, S. J. (2021). Emotion recognition ability as a predictor of well-being during the COVID-19 pandemic. *Social Psychological and Personality Science*, *12*(7), 1380–1391. https://doi.org/10.1177/1948550620982851

Schlegel, K., Mehu, M., van Peer, J. M., & Scherer, K. R. (2018). Sense and sensibility: The role of cognitive and emotional intelligence in negotiation. *Journal of Research in Personality*, *74*, 6–15. https://doi.org/10.1016/j.jrp.2017.12.003

Schlegel, K., & Mortillaro, M. (2019). The Geneva Emotional Competence Test (GECo): An ability measure of workplace emotional intelligence. *Journal of Applied Psychology*, *104*(4), 559–580. https://doi.org/10.1037/apl0000365

Schlegel, K., Palese, T., Mast, M. S., Rammsayer, T. H., Hall, J. A., & Murphy, N. A. (2020). A meta-analysis of the relationship between emotion recognition ability and intelligence. *Cognition and Emotion*, *34*(2), 329–351. https://doi.org/10.1080/02699931.2019.1632801

Schlegel, K., & Scherer, K. R. (2016). Introducing a short version of the Geneva Emotion Recognition Test (GERT-S): Psychometric properties and construct validation. *Behavior Research Methods*, *48*(4), 1383–1392. https://doi.org/10.3758/s13428-015-0646-4

Schmid Mast, M., & Hall, J. A. (2018). The impact of interpersonal accuracy on behavioral outcomes. *Current Directions in Psychological Science*, *27*(5), 309–314. https://doi.org/10.1177/0963721418758437

Schmid Mast, M., Jonas, K., Cronauer, C. K., & Darioly, A. (2012). On the importance of the superior's interpersonal sensitivity for good leadership. *Journal of Applied Social Psychology*, *42*(5), 1043–1068. https://doi.org/10.1111/j.1559-1816.2011.00852.x

Schmid, P. C., & Schmid Mast, M. (2010). Mood effects on emotion recognition. *Motivation and Emotion*, *34*(3), 288–292. https://doi.org/10.1007/s11031-010-9170-0

Schreckenbach, T., Ochsendorf, F., Sterz, J., Rüsseler, M., Bechstein, W. O., Bender, B., & Bechtoldt, M. N. (2018). Emotion recognition and extraversion of medical students interact to predict their empathic communication perceived by simulated patients. *BMC Medical Education*, *18*(1), 237. https://doi.org/10.1186/s12909-018-1342-8

Schurz, M., Radua, J., Tholen, M. G., Maliske, L., Margulies, D. S., Mars, R. B., Sallet, J., & Kanske, P. (2021). Toward a hierarchical model of social cognition: A neuroimaging meta-analysis and integrative review of empathy and theory of mind. *Psychological Bulletin*, *147*(3), 293–327. https://doi.org/10.1037/bul0000303

Seibt, B., Mühlberger, A., Likowski, K., & Weyers, P. (2015). Facial mimicry in its social setting. *Frontiers in Psychology*, *6*. https://www.frontiersin.org/articles/10.3389/fpsyg.2015.01122

Seligman, M. E. P. (2011). *Flourish: A visionary new understanding of happiness and well-being*. Simon and Schuster.

Seligman, M. E. P. (2019). Positive psychology: A personal history. *Annual Review of Clinical Psychology*, *15*(Volume 15, 2019), 1–23. https://doi.org/10.1146/annurev-clinpsy-050718-095653

Seligman, M. E. P., & Csikszentmihalyi, M. (2000). Positive psychology: An introduction. *American Psychologist*, *55*(1), 5–14. https://doi.org/10.1037/0003-066X.55.1.5

Serang, S., Jacobucci, R., Brimhall, K. C., & Grimm, K. J. (2017). Exploratory mediation analysis via regularization. *Structural Equation Modeling: A Multidisciplinary Journal*, *24*(5), 733–744. https://doi.org/10.1080/10705511.2017.1311775

Seuss, D., Hassan, T., Dieckmann, A., Unfried, M., Scherer, K. R., Mortillaro, M., & Garbas, J. (2023). Automatic estimation of action unit intensities and inference of emotional appraisals. *IEEE Transactions on Affective Computing*, *14*(2), 1188–1200. IEEE Transactions on Affective Computing. https://doi.org/10.1109/TAFFC.2021.3077590

Sheppes, G., Suri, G., & Gross, J. J. (2015). Emotion regulation and psychopathology. *Annual Review of Clinical Psychology*, *11*(1), 379–405. https://doi.org/10.1146/annurev-clinpsy-032814-112739

Shuman, V., Clark-Polner, E., Meuleman, B., Sander, D., & Scherer, K. R. (2017). Emotion perception from a componential perspective. *Cognition and Emotion*, *31*(1), 47–56. https://doi.org/10.1080/02699931.2015.1075964

Sommer, N. R., & Schlegel, K. (2024). Beyond mean levels and linear relationships: The complex association between emotion recognition ability and well-being. *Journal of Research in Personality*, *109*, 104467. https://doi.org/10.1016/j.jrp.2024.104467

Stel, M., & Vonk, R. (2010). Mimicry in social interaction: Benefits for mimickers, mimickees, and their interaction. *British Journal of Psychology*, *101*(2), 311–323. https://doi.org/10.1348/000712609X465424

Stratou, G., Van Der Schalk, J., Hoegen, R., & Gratch, J. (2017). Refactoring facial expressions: An automatic analysis of natural occurring facial expressions in iterative social dilemma. *2017 Seventh International Conference on Affective Computing and Intelligent Interaction (ACII)*, 427–433. https://doi.org/10.1109/ACII.2017.8273635

Su, R., Tay, L., & Diener, E. (2014). The development and validation of the Comprehensive Inventory of Thriving (CIT) and the Brief Inventory of Thriving (BIT). *Applied Psychology: Health and Well-Being*, *6*(3), 251–279. https://doi.org/10.1111/aphw.12027

Szczygiel, D., & Mikolajczak, M. (2018). Is it enough to be an extrovert to be liked? Emotional competence moderates the relationship between extraversion and peer-rated likeability. *Frontiers in Psychology*, *9*. https://doi.org/10.3389/fpsyg.2018.00804

Tan, J. J. X., Kraus, M. W., Carpenter, N. C., & Adler, N. E. (2020). The association between objective and subjective socioeconomic status and subjective well-being: A meta-analytic review. *Psychological Bulletin*, *146*(11), 970–1020. https://doi.org/10.1037/bul0000258

Tennant, R., Hiller, L., Fishwick, R., Platt, S., Joseph, S., Weich, S., Parkinson, J., Secker, J., & Stewart-Brown, S. (2007). The Warwick-Edinburgh Mental Well-being Scale (WEMWBS): Development and UK validation. *Health and Quality of Life Outcomes*, *5*(1), 63. https://doi.org/10.1186/1477-7525-5-63

Thompson, A. E., & Voyer, D. (2014). Sex differences in the ability to recognise non-verbal displays of emotion: A meta-analysis. *Cognition and Emotion*, *28*(7), 1164–1195. https://doi.org/10.1080/02699931.2013.875889

Topp, C. W., Østergaard, S. D., Søndergaard, S., & Bech, P. (2015). The WHO-5 well-being index: A systematic review of the literature. *Psychotherapy and Psychosomatics*, *84*(3), 167–176. https://doi.org/10.1159/000376585

Tschacher, W., Rees, G. M., & Ramseyer, F. T. (2014). Nonverbal synchrony and affect in dyadic interactions. *Frontiers in Psychology*, *5*. https://www.frontiersin.org/articles/10.3389/fpsyg.2014.01323

van Kleef, G. A., & Côté, S. (2022). The social effects of emotions. *Annual Review of Psychology*, *73*(1), 629–658. https://doi.org/10.1146/annurev-psych-020821-010855

Walter, F., Cole, M. S., der Vegt, G. S. van, Rubin, R. S., & Bommer, W. H. (2012). Emotion recognition and emergent leadership: Unraveling mediating mechanisms and boundary conditions. *The Leadership Quarterly*, *23*(5), 977–991. https://doi.org/10.1016/j.leaqua.2012.06.007

Wang, Y., Hawk, S. T., Tang, Y., Schlegel, K., & Zou, H. (2019). Characteristics of emotion recognition ability among primary school children: Relationships with peer status and friendship quality. *Child Indicators Research*, *12*(4), 1369–1388. https://doi.org/10.1007/s12187-018-9590-z

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, *54*, 1063–1070. https://doi.org/10.1037/0022-3514.54.6.1063

Webb, T. L., Miles, E., & Sheeran, P. (2012). Dealing with feeling: A meta-analysis of the effectiveness of strategies derived from the process model of emotion regulation. *Psychological Bulletin*, *138*(4), 775–808. https://doi.org/10.1037/a0027600

Westermann, J.-F., Schäfer, R., Nordmann, M., Richter, P., Müller, T., & Franz, M. (2024). Measuring facial mimicry: Affdex vs. EMG. *PLOS ONE*, *19*(1), e0290569. https://doi.org/10.1371/journal.pone.0290569

Wieck, C., Scheibe, S., & Kunzmann, U. (2022). Development and validation of film stimuli to assess empathy in the work context. *Behavior Research Methods*, *54*(1), 75–93. https://osf.io/dzynh/. https://doi.org/10.3758/s13428-021-01594-6

World Health Organization. (2004). *Promoting mental health: Concepts, emerging evidence, practice: Summary report*. World Health Organization. https://apps.who.int/iris/bitstream/handle/10665/42940/9241591595.pdf

Zajonc, R. B., Murphy, S. T., & Inglehart, M. (1989). Feeling and facial efference: Implications of the vascular theory of emotion. *Psychological Review*, *96*(3), 395.

Zeidner, M., & Matthews, G. (2016). Ability emotional intelligence and mental health: Social support as a mediator. *Personality and Individual Differences*, *99*, 196–199. https://doi.org/10.1016/j.paid.2016.05.008

Zeidner, M., Matthews, G., & Roberts, R. D. (2012). The emotional intelligence, health, and well-being nexus: What have we learned and what have we missed? *Applied Psychology: Health and Well-Being*, *4*(1), 1–30. https://doi.org/10.1111/j.1758-0854.2011.01062.x

9 Appendix A: Manuscripts

9.1 Study 1

9.1.1 Manuscript

Sommer, N. R., & Schlegel, K. (2024). Beyond mean levels and linear relationships: The complex association between emotion recognition ability and well-being. *Journal of Research in Personality*, *109*, 104467. https://doi.org/10.1016/j.jrp.2024.104467

Beyond Mean Levels and Linear Relationships: The Complex Association Between Emotion Recognition Ability and Well-Being

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Abstract

Emotion recognition ability (ERA) is typically conceptualized as an adaptive ability that contributes to better social functioning and well-being. However, there is a lack of studies examining the link between ERA and well-being. In the present two-week daily diary study (N = 437), this association was investigated in more detail. Although ERA was not significantly correlated with mean levels of well-being, higher ERA predicted lower affect variability and instability. There was also evidence for a U-shaped relationship between ERA and well-being. Further, maladaptive emotion regulation and neuroticism moderated the ERA-well-being link. These findings suggest that ERA should not be seen as universally adaptive for well-being.

Keywords: Emotion recognition, well-being, affect variability, daily diary study

1. Introduction

Positive social interactions and affiliations are central determinants of human well-being (Fritz et al., 2023; Kawachi & Berkman, 2001). A key competence in this context is interpersonal accuracy (IPA) – the ability to accurately judge other people's characteristics based on behavior or appearance (Hall et al., 2016; Schlegel, Boone, et al., 2017). While IPA is a superordinate ability that subsumes accuracy across different content domains (e.g., judging others' thoughts, feelings, intentions, deception, or personality traits), most research to date has focused on the accurate recognition of others' emotions based on facial, vocal, or bodily expressions (Hall et al., 2016). Individual differences in emotion recognition ability (ERA) are typically measured with performance-based tests in which participants are presented with pictures or recordings of emotional expressions and are asked to choose, out of a list, the emotion word that best described the expression (see Bänziger, 2016, for a review)[1]. Research spanning several decades has examined questions like whether the mean level of correctly identified expressions differs between men and women (e.g., Thompson & Voyer, 2014), older and younger adults (e.g., Ruffman et al., 2008), clinical and nonclinical populations (e.g., Dalili et al., 2015), or members of different cultures (e.g., Elfenbein & Ambady, 2002). ERA is a relatively stable individual difference variable that shows links to self-reported traits (e.g., self-reported empathy and alexithymia; Schlegel et al., 2019) as well as cognitive abilities (e.g., intelligence; Schlegel et al., 2020). Furthermore, ERA is considered a fundamental component of emotional intelligence (EI; Mayer et al., 2016), and higher ERA scores have been linked to better social skills, cultural adjustment, workplace effectiveness, and relationship quality (e.g., meta-analyses by Elfenbein et al., 2007; Hall et al., 2009).

Perhaps due to such findings, high ERA is also typically assumed to benefit a person's well-being (Palese & Schmid Mast, 2020). However, the few studies that examined the relationship between ERA and well-being surprisingly found little or no association (Schlegel, 2020; Schlegel et al., 2021). As these studies only used broad and brief well-being measures, the

[1] ERA is conceptually related to "empathic accuracy" which refers to accurate judgments of others' thoughts and feelings from verbal and nonverbal behavior (e.g., Hodges et al., 2015). However, ERA is typically assessed with standard tests consisting of posed nonverbal emotion expressions while empathic accuracy is usually measured in dyadic interactions that the assessee is participating in. Despite the conceptual similarities, ERA and empathic accuracy are distinct IPA facets as shown by a meta-analytic correlation of r = .27 (Schlegel et al., 2017).

present study aims to examine the relationship between ERA and well-being in more detail using a daily diary approach and a variety of measures.

1.1 ERA and Well-Being

In theory, ERA is a valuable and adaptive skill that should benefit well-being. For example, researchers in the IPA field have argued that higher ERA enables people to gather more (and more accurate) social information that is relevant to their goals and relationships (Palese & Schmid Mast, 2020). This helps people with higher ERA to manage their social interactions and relationships more effectively and should thus ultimately benefit their well-being and life satisfaction. In a similar vein, according to the ability model of emotional intelligence (EI), higher ERA enables people to better understand the causes and consequences of emotional situations, facilitating the regulation of their own and others' feelings (Joseph & Newman, 2010; Mayer et al., 2016). This, in turn, should help high-ERA individuals to build better social relationships and richer networks that can provide support during challenging times (Zeidner et al., 2012). Positive social relationships are crucial to well-being (Fritz et al., 2023; Kawachi & Berkman, 2001) and are included in various conceptualizations of psychological well-being (Ryff & Keyes, 1995; Su et al., 2014). For example, they foster positive affect and health-promoting behaviors and reduce maladaptive responses to stressful events (Cohen & Wills, 1985). Therefore, it can be assumed that being more accurate at perceiving what others are feeling should positively affect one's well-being.

In line with this theoretical reasoning, higher ERA has been relatively consistently linked to better performance-based and other-rated social interaction outcomes such as negotiation results (Schlegel et al., 2018), job performance and supervisor ratings (Byron et al., 2007; Elfenbein et al., 2007), learning outcomes (Bernieri, 1991), teaching effectiveness and student-teacher rapport (Kurkul, 2007), as well as clinical-counseling effectiveness (Hall et al., 2015). While these findings imply that such interpersonal effectiveness might also result in higher self-perceived well-being, the empirical link between ERA and well-being is unclear. In their meta-analysis, Hall et al. (2009) reported a small negative correlation between ERA and depressive symptoms, aligning with clinical literature on impaired ERA in various mental and developmental disorders (Cotter et al., 2018). Among healthy adults, Schlegel (2020) conducted a mini meta-analysis on 17 datasets which included cognitive well-being and mental health measures such as the satisfaction with life scale (SWLS; Diener et al., 1985), the WHO-5 well-being index (Topp et al., 2015), or the Beck depression inventory (BDI-II; Beck et al., 1996).

Overall, the correlation between ERA and well-being was close to zero, which is also in line with the result of a recent large-scale study examining ERA and well-being in medical students (Carrard et al., 2022). However, the studies in the meta-analysis did not contain any measures of affective well-being, such as the popular Positive And Negative Affect Schedule (PANAS; Watson et al., 1988), or measures of domain-specific or momentary well-being. A recent study showed that ERA was not associated with the SWLS, but correlated with higher negative affect in the PANAS (Gillioz et al., 2023). In summary, ERA does not seem to consistently predict better overall well-being in non-clinical populations.

There may be several explanations that could help reconcile the discrepancy between the predicted positive association and the apparent null results for ERA and well-being. First, it could be that the benefits of high ERA are not reflected in short, broad one-time questionnaires of cognitive well-being such as the SWLS and WHO-5, but would show in measures of daily affect and well-being and in their variability over time (Dawel et al., 2023; Houben et al., 2015). Second, ERA might primarily be linked to conceptualizations of well-being that include social relationships, such as in Ryff and Keyes' (1995) psychological well-being. Third, higher ERA might impact well-being in both positive and negative ways that cancel each other out. For example, hypersensitivity to emotional experiences (e.g., Fiori & Ortony, 2021) might increase positive but also negative affect, thereby resulting in no overall association with broad well-being measures. Fourth, the link between ERA and well-being may not be linear. Instead, ERA may only show a positive relation with well-being up to a certain "optimal level" beyond which the association becomes negative (Ickes & Hodges, 2013). Fifth and last, certain personality traits may determine when ERA is positively or negatively related to well-being, leading to an overall null association. The present study explores these five potential explanations, of which the latter three are discussed in more detail in the following sections.

1.2 Hypersensitivity in ERA

Some researchers have argued that high ERA (and EI more broadly) leads to a "hypersensitivity" to emotions that are expressed by others and to emotional events in one's own life (e.g., Fiori & Ortony, 2016, 2021; Nicolet-dit-Félix et al., 2023). This hypersensitivity is assumed to be driven by heightened attention towards positive and negative emotions observed in one's surroundings (Davis & Nichols, 2016; Schlegel, 2020) and higher susceptibility to emotional contagion, i.e., the amount of "taking over" others' emotions (Riggio & Crawley, 2022). As a result, it can be expected that people with higher ERA experience more positive but

also more negative affect in their daily life. These effects might cancel each other out, potentially explaining the zero correlations found with broad one-time questionnaires like the WHO-5 or SWLS. The same process may not necessarily apply to interpersonal outcomes. For example, despite feeling worse when sensing others' negative emotions, high-ERA individuals may still use these feelings in a more adaptive way resulting in better interpersonal outcomes (e.g., by expressing their negative feelings to an interaction partner in a constructive fashion which can enhance mutual understanding).

In support of the hypersensitivity hypothesis, individuals with higher ERA showed stronger facial mimicry for both positive and negative emotions than those with lower ERA, indicating more emotional contagion (Drimalla et al., 2019; Künecke et al., 2014). Furthermore, individuals with higher ERA displayed higher cortisol reactivity and slower recovery in stressful tasks than those with lower ERA (Bechtoldt & Schneider, 2016). Finally, Scherer (Scherer, 2020) found that individuals with higher emotional competencies (including ERA) appraised negative events as more personally relevant, more negative, and harder to cope with.

If individuals with high ERA are "hypersensitive", their well-being should also fluctuate more strongly over time, which can be captured in scores of variability (the within-person standard deviation of measurements across multiple time points) and instability (the magnitude of changes between consecutive time points; Houben et al., 2015). Affect variability itself has been found to be an important contributor to well-being aside from affect intensity (Dawel et al., 2023; Houben et al., 2015). Furthermore, based on Scherer's (2020) findings, it can be assumed that as specific emotional events are appraised as more relevant and impactful, they impact daily well-being measurements more strongly in individuals with higher ERA.

1.3 Possible Curvilinear Association

Another reason for an absent overall correlation between ERA and well-being might be that the association between two variables is curvilinear (Ickes & Hodges, 2013; Schlegel, 2020). Ickes and Hodges (2013) suggested that there might be an optimal level of ERA, beyond which an even higher ability is no longer beneficial or even detrimental. For example, perfectly perceiving feelings that an interaction partner intends to hide may threaten rapport and relational well-being (Elfenbein & Ambady, 2002). Optimal levels have been found for other abilities and personality traits that are typically seen as uniformly adaptive, such as intelligence, conscientiousness, and emotional stability (Antonakis et al., 2017; Le et al., 2011), but have not

yet been assessed for ERA. Here, we posit that ERA should benefit well-being below an optimal point and impede it beyond that point.

1.4 Personality as a Moderator

Another potential path to explaining the weak association between ERA and well-being found in previous studies is that personality traits moderate the role of ERA. Among the Big Five dimensions, this could be the case for extraversion, agreeableness, and neuroticism, as these traits have a strong social component and heavily influence people's affective experiences (Dweck, 2017; John, 2021). Multiple authors argue that a combination of extrovert traits such as sociability and proactivity with an accurate assessment of others' feelings may benefit interaction outcomes and, ultimately, well-being (Bechtoldt et al., 2013; Schreckenbach et al., 2018; Szczygiel & Mikolajczak, 2018). Indeed, higher extraversion and better ERA have been shown to interact in predicting social outcomes such as higher likability by peers or more empathic communication (Schreckenbach et al., 2018; Szczygiel & Mikolajczak, 2018). Similarly, individuals with high agreeableness may strongly benefit from accurate recognition of feelings to fulfill motives of social acceptance, e.g., by sensing upcoming conflict early on and taking measures to circumvent it. For example, a combination of high agreeableness and high ERA predicted more adaptive conflict appraisals in teams (Bechtoldt et al., 2013).

Lastly, individuals both high in ERA and neuroticism might be even more aware of threatening cues and prone to socially induced emotions than those high in ERA and low in neuroticism. Higher neuroticism predicts higher sensitivity to threatening social cues and lower self-esteem in response to relationship conflict (Denissen & Penke, 2008) and is associated with maladaptive emotion regulation (John, 2021), which is linked to lower well-being (Balzarotti et al., 2016). Schlegel (2020) argued that while individuals low in ERA might not be aware of and thus not affected by certain emotions in their environments, individuals with high ERA may need adaptive emotion regulation strategies to deal with perceived negative emotions in order to maintain their well-being. Accordingly, Schlegel and colleagues (2021) found that when higher ERA is paired with more maladaptive coping strategies, participants evaluated the risk of being severely affected by COVID-19 as higher. Taken together, higher ERA should be more positively associated with well-being when extraversion and agreeableness are high, and more negatively when neuroticism and maladaptive emotion regulation are high.

1.5 Present Study

The present study aims to extend research into the link between ERA and well-being with a daily diary study over a period of two weeks. With this methodology, we can investigate the association of ERA with (1) daily well-being states and (2) self-rated relational wellbeing, examine (3) a possible hypersensitivity in ERA, (4) curvilinear associations of ERA with well-being, and (5) explore interactions with personality traits. A series of hypotheses are deduced from the literature discussed above. The first set of hypotheses concerns the overall relationship between ERA and well-being. Based on previous evidence (Schlegel, 2020), we do not expect a significant association of ERA with well-being (H1), neither when measured at baseline nor daily. However, based on the relatively consistent positive link between ERA and social interaction outcomes (e.g., Hall et al., 2009), we expect that ERA positively correlates with self-rated positive relations and daily social interaction quality (H2).

The second set of hypotheses focuses on hypersensitivity to emotional events. Because of potentially stronger reactions to both positive and negative events in high ERA individuals, we expect that ERA positively correlates with positive affect and negative affect measured across the two weeks (H3). Furthermore, we expect ERA to correlate positively with variability and instability in daily well-being, daily positive affect, and daily negative affect across the two weeks (H4). Moreover, we expect that individuals with higher ERA appraise daily emotional events as more relevant, harder to cope with, and more impactful (H5). Lastly, we expect that individuals with higher ERA show stronger reactions to emotional events, which will manifest in higher well-being and positive affect on evenings following positive events but lower well-being and more negative affect on evenings following negative events (H6).

The third set of hypotheses concerns possible curvilinear associations of ERA and well-being. We test whether the association of ERA with well-being, positive affect, positive relations, and daily social interaction quality can be described with inverted U-shaped curves (H7a). For positive relations and daily social interaction quality, we expect this effect on top of the overall positive association with ERA assumed in Hypothesis 2. For aggregated daily negative affect, a U-shaped effect is tested (H7b).

The fourth set of hypotheses concerns the possible moderation of the relationship between ERA and well-being by personality traits and emotion regulation strategies. We expect that extraversion and agreeableness moderate the association of ERA and well-being positively due to a beneficial combination of social motives and social-emotional skills. Specifically, it is

hypothesized that with higher extraversion (H8a) and agreeableness (H8b), higher ERA has a more positive effect on well-being, positive affect, positive relations, and daily social interaction quality, and a more negative effect on negative affect. Furthermore, we expect that neuroticism and maladaptive emotion regulation strategies moderate the association of ERA and well-being negatively due to the combination of sensitivity to social emotions and maladaptive coping. Specifically, it is hypothesized that with higher neuroticism (H9a) and more maladaptive emotion regulation strategies (H9b), higher ERA has a more negative effect on well-being, positive affect, positive relations, and daily social interaction quality, and a more positive effect on negative affect.

2. Method

2.1 Procedure

After recruitment, participants first accessed a baseline survey on Qualtrics (https://www.qualtrics.com/), providing informed consent and completing assessments of ERA, emotion regulation strategies, Big Five traits, and baseline well-being and perceived positive relations. Participants then provided contact information on formr (Arslan et al., 2020) for daily survey invitations. Over two weeks, they received daily formr surveys to be completed between 7:00 pm and 11:30 pm, addressing daily emotional events, social interaction quality, well-being, and affect. The study was approved by the ethics committee of the Faculty of Human Sciences at the University of Bern, Switzerland.

2.2 Participants

2.2.1 Power Analysis

An a priori power analysis in G*Power (Faul et al., 2009), based on the most complex multiple regression models (e.g., in H9) and assuming small effects in the analyses of interactions of ERA with Big-5 personality traits and emotion regulation strategies (e.g., Szczygiel & Mikolajczak, 2018), yielded a sample size of 311 (α = .05, power = .80, assuming f^2 = .02). After data collection, we conducted a power analysis using the package simr in R (Green & MacLeod, 2016) to ensure adequacy for cross-level interactions in multilevel models (H6). Anticipating small to medium effects, consistent with MacCann et al.'s (2020) study on EI components, our N = 437 sample size achieved 85.9% power to detect such effects (standardized regression coefficient β = 0.20, α = .05).

2.2.2 Sample

In autumn 2021, 490 participants in Switzerland completed the baseline survey. Fifty-three participants were excluded from analyses for the following reasons: Completing less than 7 out of the 14 dairy entries (n = 40), identifying as non-binary (n = 1; excluded because gender was a control variable), having technical issues (n = 5), having completed the ERA test three or more times in the past (n = 6; excluded because of practice effects), and scoring implausibly low on the ERA test (n = 1). The final sample consisted of 437 participants, of which 253 were undergraduate psychology students and the remaining 185 were recruited via the social network of the authors and through research assistants (see Table 1 for a description of the final sample).

Table 1

Sample characteristics.

Variable		
Age (years)		
M (*SD*)	25.66	(10.83)
Range	18-74	
	n	**%**
Gender		
Male	122	27.9 %
Female	315	72.1 %
Relationship status		
Currently in a romantic relationship	237	54.2 %
Not currently in a romantic relationship	200	45.8 %
Occupation		
Psychology Student	253	57.9 %
Other	184	42.1 %
Highest degree [a]		
Compulsory school	3	0.7 %
Apprenticeship	31	7.1 %
High school diploma / comparable degree	233	53.3 %
University degree	157	35.9 %
Doctorate	13	3.0 %
GERT experience		
No experience	352	80.5 %
Some experience [b]	85	19.5 %

Note. $N = 437$.
[a] Achieved or currently aspiring.
[b] Completed the GERT or GERT-S once or twice.

2.3. Materials

2.3.1. Predictor Variables

ERA. ERA was measured with the short version of the Geneva Emotion Recognition Test (GERT-S; Schlegel et al., 2014; Schlegel & Scherer, 2016). Participants watched 42 short videos (duration 1-3 s) of actors portraying 14 different emotions (joy, amusement, pride, pleasure, relief, interest, anger, fear, despair, irritation, anxiety, sadness, disgust, surprise). The videos are multimodal, i.e., they contain facial, vocal, and gestural/postural cues. After watching each video,

participants are asked to select the one emotion out of 14 they think was portrayed. Each video item is scored correct (1) or incorrect (0). The mean of correct answers is calculated to indicate individual ERA. The GERT-S was developed using Item Response Theory and has demonstrated strong convergent validity with other ability EI measures as well as predictive validity for interpersonal outcomes in face-to-face interactions (Schlegel et al., 2018; Schlegel, Vicaria, et al., 2017).

Because of possible learning effects when the ERA tests are completed multiple times, participants that reported having taken the GERT-S more than twice in previous studies were excluded, and all other participants were categorized as "experienced" (completed some version of the GERT once or twice) or "unexperienced" (never completed any version of the GERT). This variable was used to control for prior test experience in the analyses.

Emotion Regulation Strategies. Emotion regulation strategies were measured using the short version of the Cognitive Emotion Regulation Questionnaire (CERQ-S; Garnefski & Kraaij, 2006; German adaptation by Loch et al., 2011). This self-report questionnaire consists of 18 items and assesses nine distinct cognitive ER strategies (five adaptive and four maladaptive). The adaptive ER strategies are positive reappraisal, refocus on planning, acceptance, positive refocusing, and putting into perspective, and the maladaptive ER strategies are rumination, catastrophizing, self-blame, and other-blame. Participants indicated how often they think similarly to the presented strategies after experiencing adverse or stressful events on a five-point Likert scale from 1 "(almost) never" to 5 "(almost) always". Mean scores were created separately for adaptive and maladaptive strategies, with higher scores representing more frequent use of these strategies.

Big Five Personality Traits. Extraversion, agreeableness, and neuroticism were measured with the Big Five Inventory 2 (BFI-2; Soto & John, 2017; German adaptation by Danner et al., 2019) on a five-point Likert scale from 1 "disagree strongly" to 5 "agree strongly" with 12 items per construct.

2.3.2. Baseline Outcome Variables

Well-Being. To measure baseline well-being, two questionnaires were administered and analyzed separately. First, participants completed the Satisfaction With Life Scale (SWLS; Diener et al., 1985; German adaptation by Janke & Glöckner-Rist, 2014) which consists of five items (e.g., "In most ways my life is close to my ideal.") that are rated on a seven-point Likert scale from 1 "strongly disagree" to 7 "strongly agree". Second, participants completed the

Warwick-Edinburgh Mental Well-Being Scale (WEMWBS; Taggart et al., 2015; German adaptation by Lang & Bachinger, 2017) which consists of 14 Items (e.g., “I’ve been dealing with problems well”). Participants were asked to rate the items concerning the past two weeks on a five-point Likert scale from 1 “none of the time” to 5 “all of the time”.

Positive Relations. Baseline positive relations with others were measured with two questionnaires that were analyzed separately. Participants completed the *positive relations with others* subscale in Ryff’s scales of psychological well-being (Ryff, 1989), consisting of 14 items (e.g., “I know that I can trust my friends, and they know that they can trust me.”) rated on a seven-point Likert scale from 1 “strongly disagree” to 7 “strongly agree”. Satisfaction with romantic relationships was measured with the Relationship Assessment Scale (RAS; Hendrick, 1988; German adaptation by Hassebrauck, 1991), consisting of seven items (e.g., “In general, how satisfied are you with your relationship?”) on a seven-point Likert scale with varying descriptions (e.g., for the item presented here from 1 “not at all satisfied” to 7 “very satisfied”).

2.3.3. Daily Outcome Variables

Well-Being. Daily well-being was measured with the short version of the Warwick-Edinburgh Mental Well-Being Scale (SWEMWBS; Taggart et al., 2015; German adaptation by Lang & Bachinger, 2017). This scale consists of seven items included in the longer WEMWBS, but participants were instructed to respond to each item regarding the last 24 hours.

Social Interaction Quality. Daily social interaction quality was assessed with a single question (“What was the quality of your interactions with others?”) concerning the last 24 hours. Participants indicated their answer on a seven-point Likert scale from 1 “not good at all/unsatisfying/rough” to 7 “very good/satisfying/smooth”.

Positive and Negative Affect. Daily positive and negative affect were measured with 12 emotion categories containing one or two emotion words each (taken from a large clinical trial assessing daily well-being; Newbold et al., 2020): Positive emotions were joy/happiness, pleasure/amusement, pride, relaxation, and affection/love, and negative emotions were shame/guilt, hopelessness, anxiety/fear, irritation/anger, boredom, disappointment/frustration, and sadness. Participants were asked to select all emotions they had felt in the last 24 hours. For each emotion they selected, they were asked to rate the intensity of the emotion in a popup window on a seven-point Likert scale from “very weak” to “very strong”. Emotions that were not selected were scored 0, and selected emotions were scored 1-7. For each daily survey, mean

scores of both positive and negative emotions were calculated per participant to represent daily positive and negative affect.

Appraisal of Emotional Events. In the daily surveys, participants briefly described the most emotional event they experienced during the day in writing. They also rated the emotions they experienced during and immediately after the event, as well as their appraisals of the event with items adapted from the Emotion Disposition Index (Emodis) by Scherer (2020). Participants indicated on a slider from 1 to 100 if they experienced the event as positive (vs. negative), relevant (vs. irrelevant), impactful to their mood (vs. not impactful), and hard to deal with (vs. easy to deal with) for them.

2.4. Data Preparation and Analysis Plan

To analyze variation in daily well-being, positive and negative affect, individual scores for variability and instability for these measures were calculated. Variability was calculated as the within-person standard deviation of affect over the two weeks, and instability as the mean of squared successive differences from one day to the next (Houben et al., 2015). For all daily outcome variables, aggregated scores were calculated as the within-person mean scores across days. In models predicting affect variability and instability, effects were controlled for the aggregated scores of the respective measure (as suggested by Houben et al., 2015).

All hypotheses were tested with regression analyses calculated in R (https://www.r-project.org/). Multiple linear regressions were conducted for all models predicting baseline outcome variables, and variability and instability measures. For hypotheses H7a and H7b, curvilinear regressions were calculated with baseline and aggregated daily outcome variables, representing between-person-effects. Adjusted R^2 and standardized regression coefficients (β) were calculated for effect size estimation for all multiple linear and curvilinear regression models. Multilevel linear regression models were calculated for all models predicting daily outcome variables using the R-package lme4 (Bates et al., 2015). This type of analysis was used to account for multiple daily reports nested within each participant and, for H6, to differentiate between-person from within-person effects. For all multilevel linear regression models, pseudo-R^2 (Nakagawa & Schielzeth, 2013) was calculated for effect size estimation, and β coefficients for all models except the models testing interactions with positive and negative events (H6).

In all analyses, effects were controlled for gender, age, and GERT experience, as age and gender are consistently related to ERA, and practice effects have been documented when ERA tests are completed multiple times (e.g., Schlegel et al., 2019). To this end, gender and GERT

experience were added as dummy-coded variables to the regression models. Additionally, in all multilevel linear regression models, the linear effect of time (daily reports 1 to 14) was added to the model. This was done to control for possible participant-specific changes in well-being reports over the two weeks, as recommended by Myin-Germeys and Kuppens (2021). In all multilevel regression models, gender, age, GERT experience, and ERA were added as level 2 predictors, representing stable variables for each participant. The effect of time was added to all models as a level 1 predictor, both as fixed and random effects. For specific models, the time-variant predictor event valence was added as a level 1 predictor, only as a fixed effect, assuming invariant effects across subjects (H6). The big Five personality traits extraversion, agreeableness, and neuroticism were added simultaneously to each model testing Hypotheses H8 and H9a, and adaptive and maladaptive emotion regulation strategies were added simultaneously to each model testing H9b, as level 2 predictors.

3. Results

Descriptive statistics and intercorrelations of the variables used in the analyses are shown in Tables 2, 3, and 4. As expected, there were significant bivariate correlations between gender, age, and GERT experience with the ERA score. When these variables were not controlled for, ERA correlated negatively with some well-being measures, such as baseline and daily well-being, and positively with negative affect. Also, ERA was associated with higher neuroticism and lower adaptive emotion regulation strategies. Results for all hypotheses are presented in detail below and are summarized in Table 5.

Table 2

Means, standard deviations, Cronbach's α reliability coefficients, variability, and instability scores of collected variables.

Variable	*M*	*SD*	Cronbach's α	Variability M (SD)	Instability M (SD)
Predictor variables					
Emotion recognition ability	0.69	0.11	.63	–	–
Adaptive emotion regulation	3.14	0.61	.76	–	–
Maladaptive emotion regulation	2.53	0.57	.69	–	–
Extraversion	3.19	0.66	.86	–	–
Agreeableness	3.98	0.45	.75	–	–
Neuroticism	2.86	0.70	.88	–	–
Baseline outcome variables					
SWLS	4.99	1.17	.86	–	–
WEMWBS	3.56	0.54	.88	–	–
Positive relations w. others	5.31	0.86	.86	–	–
Relationship satisfaction [a]	6.09	0.74	.85	–	–
Daily outcome variables [b]					
Well-being	3.48	0.46	.80 [c]	0.47 (0.18)	0.43 (0.35)
Social interaction quality	5.31	0.73	–	–	–
Positive affect	2.64	1.01	–	1.18 (0.35)	2.66 (1.89)
Negative affect	1.00	0.63	–	0.76 (0.35)	1.19 (1.33)
Event appraisal valence	65.87	12.07	–	–	–
Event appraisal relevance	70.57	12.92	–	–	–
Event appraisal impact	65.61	11.95	–	–	–
Event appraisal coping	60.24	11.68	–	–	–

Note. $N = 437$. SWLS = Satisfaction with life scale; WEMWBS = Warwick-Edinburgh Mental Well-Being Scale

[a] Only participants in a romantic relationship; $n = 237$.

[b] Within-person mean scores of the 14 daily reports.

[c] Cronbach's α calculated on responses of the first day of diary entry; $n = 380$.

Table 3

Bivariate correlations.

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Demographics																				
1. Gender	–																			
2. Age	-.26***	–																		
Predictor variables																				
3. ERA	.23***	-.35***	–																	
4. GERT experience	.19***	-.18***	.27***	–																
5. Adaptive ER	-.14**	-.01	-.10*	-.07	–															
6. Maladaptive ER	.17***	-.30***	.09	.04	-.16***	–														
7. Extraversion	-.04	.04	-.05	.04	.22***	-.15**	–													
8. Agreeableness	.20***	-.02	.07	-.01	.04	-.06	.06	–												
9. Neuroticism	.35***	-.26***	.15**	.14**	-.41***	.52***	-.27***	-.23***	–											
Baseline outcome variables																				
10. SWLS	-.08	.10*	-.02	-.01	.38***	-.34***	.28***	.16**	-.52***	–										
11. WEMWBS	-.18***	.16**	-.11*	-.10*	.41***	-.34***	.34***	.16***	-.59***	.63***	–									
12. Positive rel. w. others	.07	.10*	-.01	-.04	.23***	-.21***	.45***	.41***	-.35***	.44***	.43***	–								
13. Relationship satisfaction [a]	.03	.05	.04	-.08	.13	-.16*	-.03	.18**	-.29***	.18**	.20**	.14*	–							
Daily outcome variables [b]																				
14. Well-being	-.12**	.24***	-.14**	-.11*	.37***	-.31***	.23***	.14**	-.50***	.54***	.64***	.37***	.20**	–						
15. Social interaction quality	.06	.02	-.01	-.02	.26***	-.23***	.18***	.30***	-.37***	.43***	.49***	.42***	.35***	.67***	–					
16. Positive affect	.03	.18***	-.05	-.05	.20***	-.21***	.11*	.16***	-.22***	.36***	.39***	.33***	.33***	.54***	.49***	–				
17. Negative affect	.18***	-.12*	.15**	.09	-.30***	.38***	-.20***	-.07	.54***	-.40***	-.48***	-.20***	-.23***	-.56***	-.41***	-.12*	–			
18. Event appraisal valence	-.04	.07	-.02	-.09	.26***	-.28***	.11*	.17***	-.30***	.26***	.33***	.23***	.19**	.50***	.48***	.40***	-.45***	–		
19. Event appraisal relevance	.13**	.10*	-.07	-.03	.11*	-.05	.18***	.10*	-.01	.06	.09	.16***	.08	.19***	.26***	.20***	.01	.15**	–	
20. Event appraisal impact	.07	.18***	-.15**	-.10*	.12*	-.07	.18***	.10*	-.06	.05	.11*	.17***	.10	.23***	.25***	.25***	-.03	.21***	.68***	–
21. Event appraisal coping	-.08	.04	-.04	-.14**	.21***	-.04	.03	.02	-.15**	.06	.10*	.05	.04	.20***	.13**	.13**	-.10*	.38***	.11*	.18***

Note. N = 437. Gender = male (0) vs. female (1); ERA = Emotion recognition ability; GERT experience = No experience in the Geneva Emotion Recognition Test (0) vs. some experience (1); ER = Emotion Regulation Strategies; SWLS = Satisfaction with life scale; WEMWBS = Warwick-Edinburgh mental well-being scale.

[a] Only participants in a romantic relationship; $n = 237$.

[b] Within-person mean scores of the 14 daily reports.

* $p < .05$. ** $p < 0.01$. *** $p < 0.001$.

Table 4

Bivariate correlations of variability and instability scores of daily well-being and affect.

Variable	1	2	3	4	5	6	7	8
Daily well-being								
1. Mean [a]	–							
2. Variability	-.25***	–						
3. Instability	-.22***	.82***	–					
Daily positive affect								
4. Mean [a]	.54***	-.13**	-.12*	–				
5. Variability	.11*	.37***	.30***	.09	–			
6. Instability	.11*	.22***	.31***	.10*	.78***	–		
Daily negative affect								
7. Mean [a]	-.56***	.24***	.21***	-.12*	-.04	-.04	–	
8. Variability	-.43***	.43***	.39***	-.10*	.21***	.14**	.71***	–
9. Instability	-.26***	.32***	.38***	-.02	.17***	.16***	.54***	.81***

Note. $N = 437$.
[a] Within-person mean scores of the 14 daily reports.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 5

Summary of results per hypothesis.

Hypothesis	Overall result	Result description
ERA and well-being		
H1: ERA does not predict well-being	supported	No significant effects and very small effect sizes
H2: Higher ERA predicts better social relationships	rejected	No significant effects
Hypersensitivity in ERA		
H3: Higher ERA predicts more daily positive and negative affect	rejected	No significant effects
H4: Higher ERA predicts more variability and instability in daily well-being, positive affect, and negative affect	rejected	Higher ERA predicted **less** variability in daily well-being, positive affect, and negative affect Higher ERA predicted **less** instability in daily well-being and positive affect
H5: Higher ERA predicts higher event relevance and impact appraisals, and lower coping appraisals	rejected	Higher ERA predicted **lower** impact appraisals No significant effects on relevance and coping appraisals
H6: Higher ERA reinforces the effects of negative and positive emotional events on daily well-being and affect	rejected	Higher ERA predicted a **lower** negative effect of negative events on daily positive emotions
Curvilinear effects		
H7a: Higher ERA predicts well-being, social relationships and positive affect with inverted U-shaped effects	rejected	Higher ERA showed a **U-shaped** effect on baseline well-being No significant effects on other outcomes
H7b: Higher ERA predicts negative affect with a U-shaped effect	rejected	No significant effect
Interactions with personality traits		
H8a: Higher extraversion positively moderates the effect of ERA on well-being and social relationships	rejected	No significant effects
H8b: Higher agreeableness positively moderates the effect of ERA on well-being and social relationships	rejected	No significant effects
H9a: Higher neuroticism negatively moderates the effect of ERA on well-being and social relationships	rejected	Higher neuroticism **positively** moderated the effect of ERA on baseline well-being No significant effects on other outcomes
H9b: More maladaptive emotion regulation strategies negatively moderate the effect of ERA on well-being and social relationships	rejected	More maladaptive emotion regulation strategies **positively** moderated the effect of ERA on baseline well-being No significant effects on other outcomes

3.1. ERA and Well-Being

H1. ERA did not predict SWLS, WEMWBS or daily well-being (see regression results in Table 6). Post-hoc equivalence tests to assess whether these effects were equivalent to a negligible effect around zero were conducted according to the guidelines of Lakens et al. (2018). A standardized regression coefficient of $\beta = \pm 0.10$ was determined as the smallest effect size of interest corresponding to the small effects in previous studies (MacCann et al., 2020; Schlegel, 2020). The 95% confidence interval boundaries largely fell into the expected range of $-.10 < \beta < .10$ (see Table 6), with some deviations up to $\beta = \pm 0.13$, meaning that with high probability the coefficients did not extend beyond a very small effect. Moreover, the effects differed in direction, with the confidence interval regarding SWLS leaning towards a positive and the intervals regarding WEMWBS and daily well-being leaning towards a negative sign. Overall, there was no evidence for a (positive) effect of ERA on well-being in the present study. This replicated previous findings, and H1 was supported.

Table 6

Regression coefficients of ERA predicting baseline and daily outcome variables.

Outcome Variables	*b (SE)*	β	95% CI	*p*	R^2
Baseline [a]					
SWLS	0.27 (0.58)	0.02	[-0.08, 0.13]	.64	.00
WEMWBS	-0.15 (0.26)	-0.03	[-0.13, 0.07]	.56	.04
Positive relations w. others	0.13 (0.42)	0.02	[-0.09, 0.12]	.75	.01
Relationship Satisfaction [c]	0.66 (0.51)	0.10	[-0.05, 0.25]	.20	.00
Daily [b]					
Well-being	-0.26 (0.22)	-0.04	[-0.11, 0.03]	.23	.04
Social interaction quality	-0.15 (0.36)	-0.01	[-0.08, 0.05]	.67	.00
Positive affect	-0.06 (0.49)	-0.00	[-0.07, 0.06]	.90	.02
Negative affect	0.55 (0.30)	0.06	[-0.00, 0.12]	.07	.02
Event appraisal relevance	-6.67 (6.24)	-0.03	[-0.09, 0.03]	.29	.01
Event appraisal impact	-12.60 (5.66) *	-0.06	[-0.11, -0.01]	.03	.02
Event appraisal coping	-0.17 (5.72)	-0.00	[-0.04, 0.04]	.98	.00

Note. $N = 437$. All effects are controlled for gender, age, and GERT experience. ERA = Emotion recognition ability; SWLS = Satisfaction with life scale; WEMWBS = Warwick-Edinburgh mental well-being scale.
[a] Multiple linear regression models. R^2 = Adjusted R^2 of the full model
[b] Multilevel linear regression models. R^2 = Pseudo R^2 of the full model. Effects further controlled the linear effect of time.
[c] Only participants in a romantic relationship; $n = 237$.
* $p < .05$.

H2. ERA did not predict baseline positive relations with others, baseline relationship satisfaction, or daily social interaction quality (see Table 6). Overall, H2 was rejected.

3.2. Hypersensitivity in ERA

H3. There was no evidence for higher ERA predicting higher daily positive and negative affect (see Table 6), and H3 was rejected.

H4. Table 7 shows the regression coefficients of ERA predicting variability and instability scores for well-being and affect across the two weeks. Contrary to our expectations, ERA predicted lower (and not higher) variability and instability in daily well-being and daily positive affect, as well as lower (and not higher) variability in daily negative affect. All effects were small. Thus, individuals higher in ERA reported less variation and smaller day-to-day changes in well-being, positive and negative affect over two weeks, and H4 was rejected.

Table 7

Regression coefficients of ERA predicting variability and instability of daily well-being and affect (linear regression).

Outcome variables	*b (SE)*	β	95% CI	*p*	R^2
Daily well-being					
Variability	-0.29 (0.08) ***	-0.18	[-0.28, -0.08]	<.001	.11
Instability	-0.46 (0.17) **	-0.14	[-0.24, -0.04]	.006	.07
Daily positive affect					
Variability	-0.40 (0.17) *	-0.13	[-0.23, -0.02]	.02	.02
Instability	-2.23 (0.92) *	-0.13	[-0.23, -0.02]	.02	.02
Daily negative affect					
Variability	-0.24 (0.12) *	-0.07	[-0.14, -0.00]	.047	.52
Instability	-0.62 (0.55)	-0.05	[-0.14, 0.04]	.26	.30

Note. N = 437. All effects are controlled for the aggregated within-person mean level of the respective outcome variable, gender, age, and GERT experience. R^2 = Adjusted R^2 of the full model.

* $p < .05$. ** $p < .01$. *** $p < .001$.

H5. Higher ERA predicted lower (and not higher) impact appraisals, and was unrelated to appraisals of relevance and coping (see Table 6). This result contradicted our expectations, and H5 was rejected.

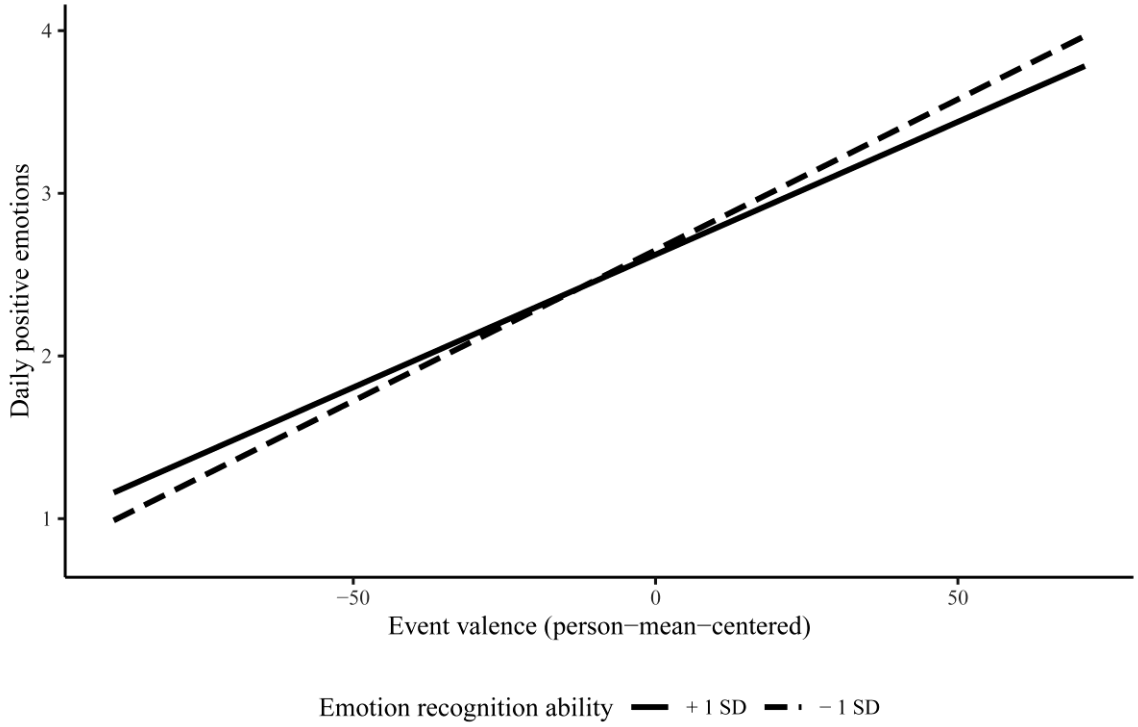
H6. The person mean (PM; mean score of daily event valence appraisals) and person-mean-centered (PMC; subtracted PM from each daily report of event valence) scores of the reported event valence were calculated to investigate whether higher ERA reinforces the effects of negative and positive emotional events on daily well-being and affect. When added together to a multilevel regression model, PM represents the average level of each participant's daily event valence (between-person-effect), while PMC represents the participant's deviance of the daily event valence report from their average value (within-person-effect).

In all models, PMC event valence was added as a level one predictor and PM event valence as a level two predictor, and the interaction effects of ERA with both PMC and PM event valence in predicting well-being of the same day were added. The within-person interaction effect of ERA and PMC event valence significantly predicted daily positive affect, b = -0.01, SE = 0.00, p = .02 (see Figure 1 for a graphical illustration), but not the between-person interaction

effect of ERA and PM event valence, *b* = -0.03, *SE* = 0.04, p = .35. This signifies that the higher the individual ERA, the lower positive emotions were rated on days where a relatively positive event was reported, and the higher positive emotions were rated on days where a rather negative event was reported, independent of the average valence of reported events. Subsequent simple slope analyses revealed that PMC event valence positively predicted daily positive affect at one standard deviation above the mean level of ERA, *b* = 0.016, *p* < .001, and at one standard deviation below the mean, *b* = 0.019, *p* < .001. No significant interaction effects for daily well-being and daily negative affect were found (respective results are presented in Table S1 in the supplementary material). Instead of reinforcing effects, higher ERA weakened the effect of event valence on daily positive emotions. H6 was therefore rejected.

Figure 1

Interaction of event valence and ERA predicting daily positive affect.



Note. N = 437. Controlled for gender, age, GERT experience, and the linear effect of time.

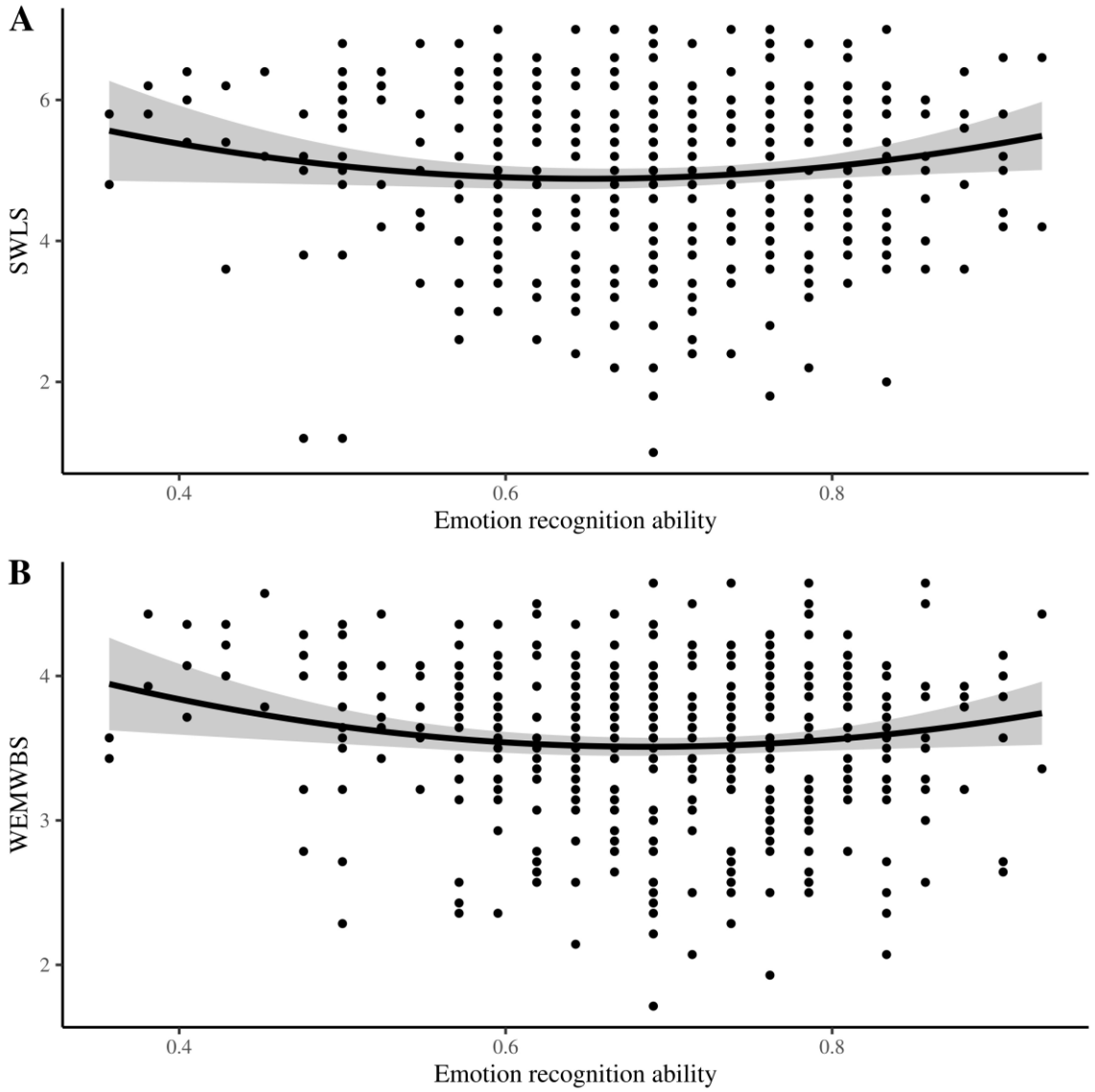
3.3. Curvilinear Effects

H7a and 7b. Contrary to our expectation, ERA showed significant positive quadratic effects in predicting baseline well-being with small effect sizes, both for the SWLS, β = 0.08, *p* =

.03, and WEMWBS, $\beta = 0.09$, $p = .01$. A visual inspection of the effects in Figure 2A and B suggests that participants with very inaccurate emotion recognition reported well-being comparable to those that achieve very accurate emotion recognition, while medium-ERA individuals reported the lowest well-being. All other outcome variables were not predicted by quadratic effects of ERA (respective results are presented in Table S2 in the supplementary material). Therefore, both H7a and H7b were rejected.

Figure 2

Prediction of baseline well-being by quadratic effects of ERA.



Note. N = 437. All effects are controlled for gender, age, and GERT experience. Grey bands represent 95%-confidence intervals. ERA = Emotion recognition ability; SWLS = Satisfaction with life scale; WEMWBS = Warwick-Edinburgh mental well-being scale.

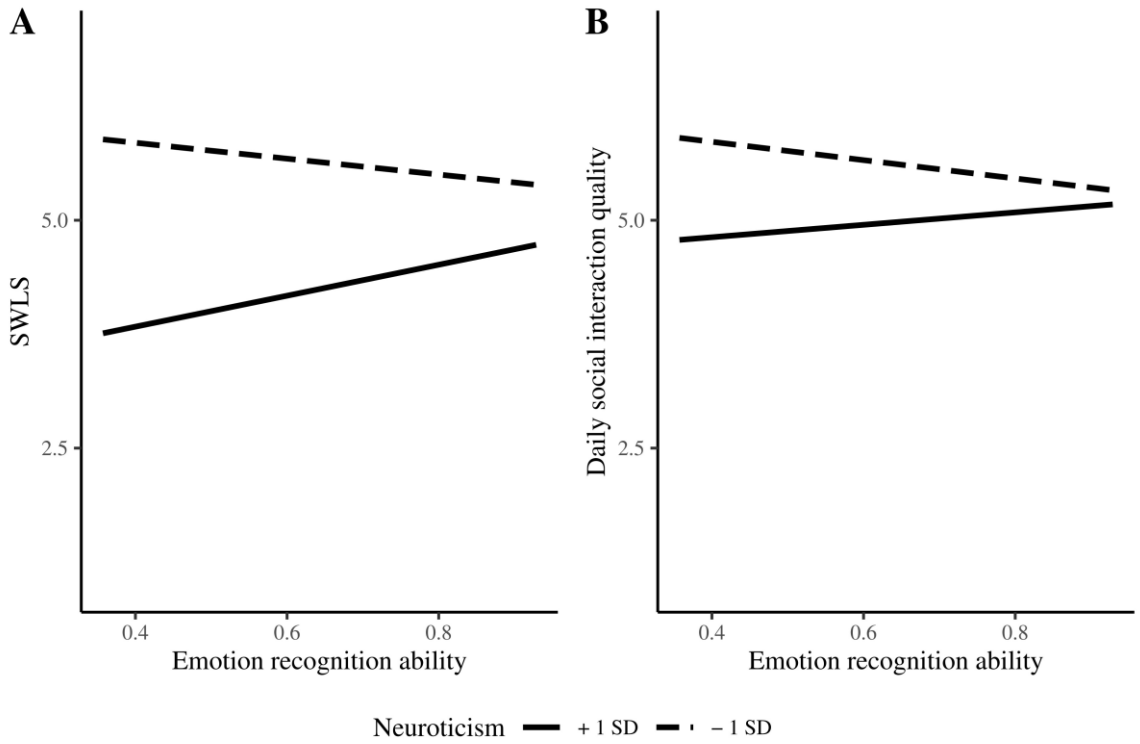
3.4. Interactions with Personality Traits

H8a and H8b. No interaction effect was found for ERA and extraversion or agreeableness in predicting any of the outcome variables. The resulting interaction coefficients of these models are presented in Table S3 in the supplementary material. H8a and H8b were rejected.

H9a. A significant interaction effect of ERA and neuroticism was found for two of the outcome variables. The higher the participants' neuroticism, the more positive the effect of ERA on both baseline SWLS, $\beta = 0.12$, $p = .02$, and daily social interaction quality, $\beta = 0.07$, $p = .01$. Both interaction coefficients indicate small effects (illustrated in Figure 3). Subsequent simple slope analyses revealed that ERA positively predicted SWLS at one standard deviation above the mean level of neuroticism, $b = 1.70$, $p = .02$, but not at one standard deviation below the mean, $b = -0.87$, $p = .22$. These results imply that accurate emotion recognition is important for higher well-being especially for people with very high neuroticism. Daily social interaction quality was not predicted by ERA at one standard deviation above the mean level of neuroticism, $b = .68$, $p = .15$, but it was negatively predicted by ERA at one standard deviation below the mean, $b = -1.01$, $p = .03$. For people with very low neuroticism, accurate emotion recognition corresponds to lower perceived social interaction quality. These positive interaction effects contradict our expectations, and no effect was found for the other outcome variables (respective results are presented in Table S3 in the supplementary material). Therefore, H9a was rejected.

Figure 3

Interaction of ERA and neuroticism predicting life satisfaction (A) and daily social interaction quality (B).

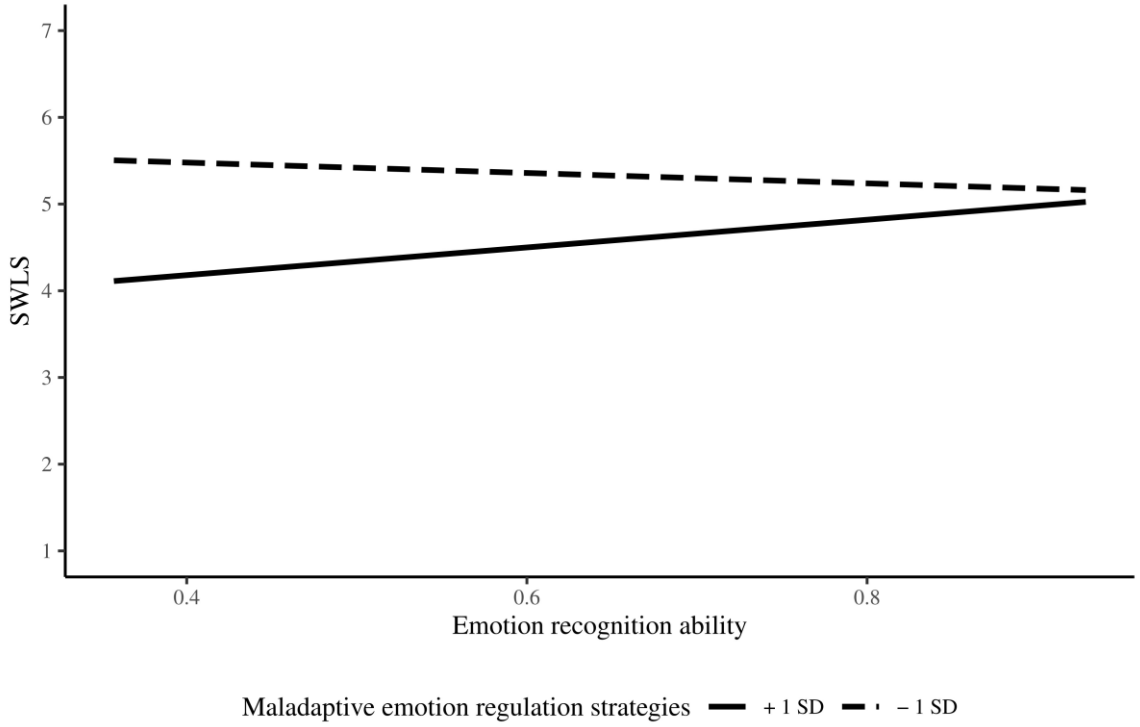


Note. N = 437. Effects are controlled for gender, age, and GERT experience. Effect in (B) is further controlled for the linear effect of time. ERA = Emotion recognition ability; SWLS = Satisfaction with life scale.

H9b. There was a significant small interaction effect of ERA and maladaptive emotion regulation strategies predicting baseline well-being (SWLS), β = 0.10, p = .02 (Figure 4). Subsequent simple slope analyses revealed that ERA positively predicted SWLS at one standard deviation above the mean level of maladaptive emotion regulation strategies, b = 1.60, p = .02, but not at one standard deviation below the mean, b = -0.60, p = .39. This means that for people that are bad at regulating their emotions, accurately recognizing emotions in others is important. This result opposed our expectation, and no significant interaction effects of ERA and adaptive or maladaptive emotion regulation strategies predicting any other outcome variable were found (results for all models are presented in Table S4 in the supplementary material). Hence, H9b was rejected.

Figure 4

Interaction of ERA and maladaptive emotion regulation strategies predicting life satisfaction.



Note. N = 437. Controlled for gender, age, and GERT experience. ERA = Emotion recognition ability; SWLS = Satisfaction with life scale.

For exploratory purposes, we repeated the interaction analyses with single emotion regulation strategies (results can be found in Table S6 in the supplementary material). The higher the maladaptive strategy other-blame, the more positive the effect of ERA on baseline well-being, daily well-being, and daily positive affect. The strategies putting into perspective, positive reappraisal, and self-blame also showed significant interaction effects, but only in predicting one outcome variable each (relationship satisfaction and positive affect). These effects generally aligned with the results of the mean adaptive and maladaptive strategies scores described in this section.

4. Discussion

Theory suggests that people who are more accurate at reading others' feelings should experience higher well-being (e.g., Palese & Schmid Mast, 2020). However, previous empirical studies are sparse and imply that ERA and well-being are largely uncorrelated (Schlegel, 2020).

The present study investigated the association between ERA and well-being in more detail using a high-powered daily diary design and a variety of well-being measures. Specifically, five potential explanations were tested that could help reconcile the previous null findings with the theoretical idea that ERA may (at least partly or sometimes) benefit people's personal well-being: (1) positive effects may be revealed only when well-being is assessed using daily measures and not in broad one-time questionnaires, (2) positive effects may be revealed only when well-being is assessed in terms of the perceived quality of social relations, (3) high ERA may increase positive, but also negative affect resulting in an overall null association, (4) positive effects may only be found at low-to-medium ERA levels, and (5) positive effects are only found in combination with certain personality traits.

Overall, there was little support for the first three explanations. Confirming previous findings, ERA showed no significant linear relationships with broad, one-time cognitive well-being measures, but also not with the perceived quality of social relationships and daily levels of positive and negative affect. However, curvilinear analyses revealed that individuals with high ERA did report higher baseline well-being than those with medium ERA levels, but the same was true for people low in ERA, leading to a null linear effect. In addition, high ERA was positively related to baseline well-being for a subgroup of participants, namely those scoring high on neuroticism and maladaptive emotion regulation. While no simple linear relation with mean well-being levels was found, ERA appeared to be adaptive in other ways: Specifically, the daily well-being and affect of individuals with higher ERA was more stable over time as reflected in smaller within-person standard deviations of the daily measures (i.e., less variability) and a smaller magnitude of changes between days (i.e., less instability). In addition, high ERA individuals found emotional events to be less impactful to their well-being, and their daily positive affect was less strongly affected by negative events.

Taken together, the present study challenges the typical (and intuitively plausible) claim that ERA as an interpersonal communication skill generally benefits one's own well-being and life outcomes (e.g., Palese & Schmid Mast, 2020). That is, ERA generally does not linearly predict mean levels of self-rated well-being, irrespective of whether broad, daily, or domain-specific questionnaires are used. This rules out the possibility that the measures used in previous studies were not "sensitive" enough or too broad to detect the benefits of high ERA. Notably, our findings also suggest that individuals with high ERA do not perceive their social relationship quality as better, even though ERA has been positively associated with other-rated and objective

social outcomes (e.g., negotiation outcomes or job performance ratings) in other studies (e.g., Elfenbein et al., 2007). It appears that against our prediction, successfully managing specific interpersonal situations or life domains does not translate into high ERA individuals' self-ratings of their social relations in general. Interestingly, these results mirror findings for cognitive intelligence which is an important predictor of many performance-based outcomes (e.g., job satisfaction) but at the same time largely unrelated to well-being and life satisfaction (e.g., Kanazawa, 2014). One reason could be that that individuals with higher intelligence and/or ERA assess their social world and its challenges more realistically and in a more complex fashion, thus affecting their subjective evaluation of happiness and satisfaction (Scherer, 2007, 2020).

The same idea might also explain why the daily well-being of individuals with higher ERA was less strongly impacted by previous emotional events. Higher realism in assessing one's social world could decrease the probability of carrying over momentary affect to unrelated situations and thus reduce both exceptionally high and exceptionally low well-being ratings, thereby stabilizing well-being around an average level. This assumption is supported by our result that affect variability and instability were lower in high ERA individuals. This result is in line with emotional intelligence theory where ERA is a crucial predecessor of adaptive emotion regulation (Joseph & Newman, 2010), which should facilitate well-being stability. In addition, this result again mirrors findings for cognitive intelligence which also appears to be linked to higher well-being stability while being unrelated to mean levels of well-being (Kanazawa, 2014).

However, our findings contradict the "emotional hypersensitivity" hypothesis (e.g., Nicolet-dit-Félix et al., 2023) according to which high ERA people should be more strongly affected by emotions in their surroundings and thus experience stronger fluctuations in their affect and well-being. A possible explanation may be that the effects of hypersensitivity occur mostly during or right after emotions are perceived, but level off as more time passes and one's own emotions are successfully regulated. While the present study design with one assessment of well-being and affect per day may not have captured such immediate effects, future studies could investigate hypersensitivity and subsequent emotion regulation using real-time data collection with ecological momentary assessments (EMAs).

The U-shaped association between ERA and well-being found in the present study also potentially fits the idea of more realistic and pragmatic perceptions of one's social experiences when ERA is higher. The visual interpretation of the present data (Figure 2) indicates that lower ERA in particular seems to be associated with higher well-being compared to average and higher

ERA. The increase of well-being towards the lower end of the ERA scale could indicate an effect of "unrealism" or "rose-colored glasses" in assessing social situations. It is possible that low-ERA individuals interpret social situations with a self-favoring, positive bias (Hoorens, 1995, 2014) and therefore rate their general well-being more positively. On the other hand, the U-shaped association contradicts our original assumption which was based on the low ERA levels found in clinical populations, e.g., in people with depression (Cotter et al., 2018) and the finding that very high ERA levels can harm social interactions and rapport (Elfenbein et al., 2007). Given that the U-shaped relationship (with a small effect size) was observed only for baseline well-being and not for affect and perceived social relationship quality, the present finding should be interpreted with caution and requires further replication.

With respect to interactions with personality variables, we expected that high neuroticism might intensify the impact of perceived negative cues in high-ERA individuals, leading to lower well-being (Denissen & Penke, 2008; Pfeiler et al., 2018). Instead, we found opposite results: ERA benefits individuals with high levels of neuroticism and maladaptive coping. This interaction may also be interpreted differently: Rather than neuroticism determining whether ERA is positively or negatively associated with well-being, one might say that ERA "buffers" the generally negative effect of neuroticism on well-being. If higher ERA leads to a more realistic assessment of the situation, the perceived cues may not appear as negatively for individuals with high neuroticism and higher ERA as to those with high neuroticism and lower ERA. Similarly, an accurate assessment of other people's feelings may result in fewer interpersonal misunderstandings or conflicts, which may require less emotion regulation and could thus reduce the negative effects of maladaptive regulation strategies.

Interestingly, the higher their ERA was, the more the social interaction quality reported by individuals with very low neuroticism appeared to decrease. A more realistic assessment of social situations may lead to lower social interaction quality and well-being in very carefree and emotionally stable individuals that otherwise assess situations overly positively. To date, we know of no study that investigated if ERA is linked to a more realistic assessment of social situations and well-being. Future studies could examine this, for example by assessing forms of positivity bias such as unrealistic optimism or the "better-than-average effect" (Hoorens, 2014).

The results of the present study also show that in future research it is important to distinguish between different emotion regulation strategies. For example, the strategy other-blame appeared to quite consistently affect well-being in conjunction with ERA in the present

study, but has not received much attention in emotion regulation research (Garnefski & Kraaij, 2006). Furthermore, other strategies that go beyond the regulation of negative emotions should be investigated together with ERA, such as the savoring of positive moments as a form of up-regulating positive emotions proposed by Nelis et al. (2011).

4.1. Limitations

Although the present study has several strengths such as a large sample size, multiple measures for different conceptualizations of well-being, and the measurement of ERA with a multimodal performance test, some limitations remain. One limitation of the present study is that it was impossible to fully disentangle reports on emotional events and daily well-being with the daily diary method. Due to the retrospective reporting, participants may have confounded the recalled event with their overall well-being and vice versa. It has been shown that recalled affective states and well-being are often biased (Levine et al., 2018). In the present study, the recall was limited to 24 hours, possibly reducing recall bias. However, this could be further improved by conducting strictly momentary assessments, i.e., in an experience sampling study (Myin-Germeys & Kuppens, 2021). Relatedly, the measure of daily social interaction quality in the present study consisted of only one item, possibly limiting its reliability. Furthermore, the results of the present study do not indicate causality and should be replicated with randomized controlled trials.

It is also unclear to what extent the results of the present study can be generalized to other populations and cultural settings. Although a diverse sample in terms of age and educational background was targeted, our sample consisted mainly of undergraduate psychology students at one single university in Switzerland. This form of sampling was chosen in the present study because it is the first to investigate possible reasons for the seemingly absent link between ERA and well-being and because of the intensive diary design. Furthermore, generalizability could be enhanced by using different ERA tests in future studies. Although the GERT-S is considered to capture ERA more comprehensively than other tests due to the inclusion of 14 emotions and facial, vocal, as well as bodily expressions (e.g., Schlegel et al., 2014), ERA tests generally have only low to moderate intercorrelations, suggesting that they may display differential relations with external variables such as well-being (Schlegel, Boone, et al., 2017).

The overall small effects found in the present study might limit the practical implications. However, the study was well-powered and therefore able to capture minimal effects, meaning that the zero correlations found for most ERA associations with well-being gained more meaning.

4.2. Conclusion

The present study suggests that the intuitively plausible assumption of higher ERA contributing to higher well-being may have to be revised. It appears that accurately perceiving what others are feeling does not in itself make a person happier or unhappier, although it seems to benefit outcomes as assessed by others or through objective criteria (e.g., sales; Byron et al., 2007). Instead, higher ERA may make people less "vulnerable" by contributing to higher well-being stability over time. Potential mechanisms that can explain this association but require further research include more effective emotion regulation and a more realistic and balanced assessment of social situations. It can be concluded that previous research overemphasized the direct benefits of high ERA for well-being and self-rated social interaction quality: No evidence for such effects was found in the present study.

Open Practices

This study earned the Open Data badge for transparent practices. The current data and R code are publicly available at https://osf.io/sbr6h/?view_only=99a22a2fc007463396105d67c047ba97. This study's design and its analysis were not pre-registered. Portions of this study were presented as a poster at the 2022 Conference of the Swiss Psychological Society and the 2023 International Convention of Psychological Science (ICPS).

CRediT Authorship Contribution Statement

Nils R. Sommer: Conceptualization, Formal analysis, Investigation, Project administration, Writing – original draft, Writing – review & editing. **Katja Schlegel:** Conceptualization, Funding acquisition, Project administration, Supervision, Writing – review & editing.

Declaration of Generative AI in Scientific Writing

During the preparation of this work the authors used ChatGPT (https://chat.openai.com/) in order to improve the readability and concision of the manuscript in some sections. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

Declaration of Competing Interest

The authors declare no conflicts of interests with respect to the research, authorship, and/or publication of this article.

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References

Antonakis, J., House, R. J., & Simonton, D. K. (2017). Can super smart leaders suffer from too much of a good thing? The curvilinear effect of intelligence on perceived leadership behavior. *Journal of Applied Psychology, 102*, 1003–1021. https://doi.org/10.1037/apl0000221

Arslan, R. C., Walther, M. P., & Tata, C. S. (2020). formr: A study framework allowing for automated feedback generation and complex longitudinal experience-sampling studies using R. *Behavior Research Methods, 52*(1), 376–387. https://doi.org/10.3758/s13428-019-01236-y

Balzarotti, S., Biassoni, F., Villani, D., Prunas, A., & Velotti, P. (2016). Individual differences in cognitive emotion regulation: Implications for subjective and psychological well-being. *Journal of Happiness Studies, 17*(1), 125–143. https://doi.org/10.1007/s10902-014-9587-3

Bänziger, T. (2016). Accuracy of judging emotions. In J. A. Hall, M. Schmid Mast, & T. V. West (Eds.), *The social psychology of perceiving others accurately* (pp. 23–51). Cambridge University Press. https://doi.org/10.1017/CBO9781316181959.002

Bates, D., Mächler, M., Bolker, B., & Walker, S. (2015). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software, 67*, 1–48. https://doi.org/10.18637/jss.v067.i01

Bechtoldt, M. N., Beersma, B., Rohrmann, S., & Sanchez-Burks, J. (2013). A gift that takes its toll: Emotion recognition and conflict appraisal. *European Journal of Work and Organizational Psychology, 22*(1), 56–66. https://doi.org/10.1080/1359432X.2011.614726

Bechtoldt, M. N., & Schneider, V. K. (2016). Predicting stress from the ability to eavesdrop on feelings: Emotional intelligence and testosterone jointly predict cortisol reactivity. *Emotion, 16*(6), 815–825. https://doi.org/10.1037/emo0000134

Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Manual for the Beck Depression Inventory-II*. TX: Psychological Corporation.

Bernieri, F. J. (1991). Interpersonal sensitivity in teaching interactions. *Personality and Social Psychology Bulletin, 17*(1), 98–103. https://doi.org/10.1177/0146167291171015

Byron, K., Terranova, S., & Nowicki Jr., S. (2007). Nonverbal emotion recognition and salespersons: Linking ability to perceived and actual success. *Journal of Applied Social Psychology*, *37*(11), 2600–2619. https://doi.org/10.1111/j.1559-1816.2007.00272.x

Carrard, V., Bourquin, C., Berney, S., Schlegel, K., Gaume, J., Bart, P.-A., Preisig, M., Schmid Mast, M., & Berney, A. (2022). The relationship between medical students' empathy, mental health, and burnout: A cross-sectional study. *Medical Teacher*, *44*(12), 1392–1399. https://doi.org/10.1080/0142159X.2022.2098708

Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin*, *98*, 310–357. https://doi.org/10.1037/0033-2909.98.2.310

Cotter, J., Granger, K., Backx, R., Hobbs, M., Looi, C. Y., & Barnett, J. H. (2018). Social cognitive dysfunction as a clinical marker: A systematic review of meta-analyses across 30 clinical conditions. *Neuroscience & Biobehavioral Reviews*, *84*, 92–99. https://doi.org/10.1016/j.neubiorev.2017.11.014

Dalili, M. N., Penton-Voak, I. S., Harmer, C. J., & Munafò, M. R. (2015). Meta-analysis of emotion recognition deficits in major depressive disorder. *Psychological Medicine*, *45*(6), 1135–1144. https://doi.org/10.1017/S0033291714002591

Danner, D., Rammstedt, B., Bluemke, M., Lechner, C., Berres, S., Knopf, T., Soto, C. J., & John, O. P. (2019). Das Big Five Inventar 2 [The Big Five Inventory 2]. *Diagnostica*, *65*(3), 121–132. https://doi.org/10.1026/0012-1924/a000218

Davis, S. K., & Nichols, R. (2016). Does emotional intelligence have a "dark" side? A review of the literature. *Frontiers in Psychology*. https://www.frontiersin.org/article/10.3389/fpsyg.2016.01316

Dawel, A., Gulliver, A., Farrer, L. M., Kalokerinos, E. K., Cherbuin, N., Calear, A. L., McCallum, S., Morse, A. R., & Monaghan, C. (2023). Do emotion intensity, variability, differentiation, co-occurrence, and positive–negative ratios make unique contributions to predicting longitudinal change in psychological distress and well-being? *Emotion*, *23*(7), 1945–1959. https://doi.org/10.1037/emo0001204

Denissen, J. J. A., & Penke, L. (2008). Neuroticism predicts reactions to cues of social inclusion. *European Journal of Personality*, *22*(6), 497–517. https://doi.org/10.1002/per.682

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment*, *49*(1), 71–75. https://doi.org/10.1207/s15327752jpa4901_13

Drimalla, H., Landwehr, N., Hess, U., & Dziobek, I. (2019). From face to face: The contribution of facial mimicry to cognitive and emotional empathy. *Cognition and Emotion*, *33*(8), 1672–1686. https://doi.org/10.1080/02699931.2019.1596068

Dweck, C. S. (2017). From needs to goals and representations: Foundations for a unified theory of motivation, personality, and development. *Psychological Review*, *124*(6), 689–719. https://doi.org/10.1037/rev0000082

Elfenbein, H. A., & Ambady, N. (2002). Predicting workplace outcomes from the ability to eavesdrop on feelings. *The Journal of Applied Psychology*, *87*, 963–971. https://doi.org/10.1037//0021-9010.87.5.963

Elfenbein, H. A., Foo, M. D., White, J., Tan, H. H., & Aik, V. C. (2007). Reading your counterpart: The benefit of emotion recognition accuracy for effectiveness in negotiation. *Journal of Nonverbal Behavior*, *31*(4), 205–223. https://doi.org/10.1007/s10919-007-0033-7

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, *41*(4), 1149–1160. https://doi.org/10.3758/BRM.41.4.1149

Fiori, M., & Ortony, A. (2016). Are emotionally intelligent individuals hypersensitive to emotions? Testing the curse of emotion. *Academy of Management Proceedings*, *2016*(1), 10023. https://doi.org/10.5465/ambpp.2016.10023abstract

Fiori, M., & Ortony, A. (2021). Initial evidence for the hypersensitivity hypothesis: Emotional intelligence as a magnifier of emotional experience. *Journal of Intelligence*, *9*(2), 2. https://doi.org/10.3390/jintelligence9020024

Fritz, M. M., Margolis, S., Radošić, N., Revord, J. C., Rosen Kellerman, G., Nieminen, L. R. G., Reece, A., & Lyubomirsky, S. (2023). Examining the social in the prosocial: Episode-level features of social interactions and kind acts predict social connection and well-being. *Emotion*, *23*(8), 2270–2285. https://doi.org/10.1037/emo0001232

Garnefski, N., & Kraaij, V. (2006). Cognitive Emotion Regulation Questionnaire – Development of a short 18-item version (CERQ-short). *Personality and Individual Differences*, *41*(6), 1045–1053. https://doi.org/10.1016/j.paid.2006.04.010

Gillioz, C., Nicolet-dit-Félix, M., & Fiori, M. (2023). Emotional intelligence and emotional hypersensitivity in gifted individuals. *Journal of Intelligence*, *11*(2), 2. https://doi.org/10.3390/jintelligence11020020

Green, P., & MacLeod, C. J. (2016). SIMR: An R package for power analysis of generalized linear mixed models by simulation. *Methods in Ecology and Evolution*, *7*(4), 493–498. https://doi.org/10.1111/2041-210X.12504

Hall, J. A., Andrzejewski, S. A., & Yopchick, J. E. (2009). Psychosocial correlates of interpersonal sensitivity: A meta-analysis. *Journal of Nonverbal Behavior*, *33*(3), 149–180. https://doi.org/10.1007/s10919-009-0070-5

Hall, J. A., Mast, M. S., & West, T. V. (2016). Accurate interpersonal perception: Many traditions, one topic. In J. A. Hall, M. Schmid Mast, & T. V. West (Eds.), *The Social Psychology of Perceiving Others Accurately* (pp. 3–22). Cambridge University Press. https://doi.org/10.1017/CBO9781316181959.001

Hall, J. A., Ship, A. N., Ruben, M. A., Curtin, E. M., Roter, D. L., Clever, S. L., Smith, C. C., & Pounds, K. (2015). Clinically relevant correlates of accurate perception of patients' thoughts and feelings. *Health Communication*, *30*(5), 423–429. https://doi.org/10.1080/10410236.2013.865507

Hassebrauck, M. (1991). ZIP - Ein Instrumentarium zur Erfassung der Zufriedenheit in Paarbeziehungen [ZIP - An instrument for assessing satisfaction in romantic relationships]. *Zeitschrift Für Sozialpsychologie*, *22*, 256–259.

Hendrick, S. S. (1988). A generic measure of relationship satisfaction. *Journal of Marriage and the Family*, *50*(1), 93. https://doi.org/10.2307/352430

Hoorens, V. (1995). Self-favoring biases, self-presentation, and the self-other asymmetry in social comparison. *Journal of Personality*, *63*(4), 793–817. https://doi.org/10.1111/j.1467-6494.1995.tb00317.x

Hoorens, V. (2014). Positivity bias. In A. C. Michalos (Ed.), *Encyclopedia of quality of life and well-being research* (pp. 4938–4941). Springer Netherlands. https://doi.org/10.1007/978-94-007-0753-5_2219

Houben, M., Van Den Noortgate, W., & Kuppens, P. (2015). The relation between short-term emotion dynamics and psychological well-being: A meta-analysis. *Psychological Bulletin*, *141*(4), 901–930. https://doi.org/10.1037/a0038822

Ickes, W., & Hodges, S. D. (2013). Empathic accuracy in close relationships. In J. A. Simpson & L. Campbell (Eds.), *The Oxford handbook of close relationships*. Oxford University Press. https://doi.org/10.1093/oxfordhb/9780195398694.013.0016

Janke, S., & Glöckner-Rist, A. (2014). Deutsche Version der Satisfaction with Life Scale (SWLS) [German version of the Satisfaction with Life Scale (SWLS)]. *Zusammenstellung sozialwissenschaftlicher Items und Skalen (ZIS)*. https://doi.org/10.6102/ZIS147

John, O. P. (2021). History, measurement, and conceptual elaboration of the Big-Five trait taxonomy: The paradigm matures. In O. P. John & R. W. Robins (Eds.), *Handbook of personality: Theory and research, 4th ed* (pp. 35–82). The Guilford Press.

Joseph, D. L., & Newman, D. A. (2010). Emotional intelligence: An integrative meta-analysis and cascading model. *Journal of Applied Psychology*, *95*(1), 54–78. https://doi.org/10.1037/a0017286

Kanazawa, S. (2014). Why is intelligence associated with stability of happiness? *British Journal of Psychology*, *105*(3), 316–337. https://doi.org/10.1111/bjop.12039

Kawachi, I., & Berkman, L. F. (2001). Social ties and mental health. *Journal of Urban Health*, *78*(3), 458–467. https://doi.org/10.1093/jurban/78.3.458

Künecke, J., Hildebrandt, A., Recio, G., Sommer, W., & Wilhelm, O. (2014). Facial EMG responses to emotional expressions are related to emotion perception ability. *PLOS ONE*, *9*(1), e84053. https://doi.org/10.1371/journal.pone.0084053

Kurkul, W. W. (2007). Nonverbal communication in one-to-one music performance instruction. *Psychology of Music*, *35*(2), 327–362. https://doi.org/10.1177/0305735607070385

Lakens, D., Scheel, A. M., & Isager, P. M. (2018). Equivalence testing for psychological research: A tutorial. *Advances in Methods and Practices in Psychological Science*, *1*(2), 259–269. https://doi.org/10.1177/2515245918770963

Lang, G., & Bachinger, A. (2017). Validation of the German Warwick-Edinburgh Mental Well-Being Scale (WEMWBS) in a community-based sample of adults in Austria: A bi-factor modelling approach. *Journal of Public Health*, *25*(2), 135–146. https://doi.org/10.1007/s10389-016-0778-8

Le, H., Oh, I.-S., Robbins, S. B., Ilies, R., Holland, E., & Westrick, P. (2011). Too much of a good thing: Curvilinear relationships between personality traits and job performance. *Journal of Applied Psychology*, *96*, 113–133. https://doi.org/10.1037/a0021016

Levine, L. J., Lench, H. C., Karnaze, M. M., & Carlson, S. J. (2018). Bias in predicted and remembered emotion. *Current Opinion in Behavioral Sciences*, *19*, 73–77. https://doi.org/10.1016/j.cobeha.2017.10.008

Loch, N., Hiller, W., & Witthöft, M. (2011). Der Cognitive Emotion Regulation Questionnaire (CERQ) [The Cognitive Emotion Regulation Questionnaire (CERQ)]. *Zeitschrift Für Klinische Psychologie Und Psychotherapie*, *40*(2), 94–106. https://doi.org/10.1026/1616-3443/a000079

MacCann, C., Erbas, Y., Dejonckheere, E., Minbashian, A., Kuppens, P., & Fayn, K. (2020). Emotional intelligence relates to emotions, emotion dynamics, and emotion complexity: A meta-analysis and experience sampling study. *European Journal of Psychological Assessment*, *36*(3), 460–470. https://doi.org/10.1027/1015-5759/a000588

Mayer, J. D., Caruso, D. R., & Salovey, P. (2016). The ability model of emotional intelligence: Principles and updates. *Emotion Review*, *8*(4), 290–300. https://doi.org/10.1177/1754073916639667

Myin-Germeys, I., & Kuppens, P. (Eds.). (2021). *The open handbook of experience sampling methodology: A step-by-step guide to designing, conducting, and analyzing ESM studies* (2nd ed.). Center for Research on Experience Sampling and Ambulatory Methods Leuven. https://www.kuleuven.be/samenwerking/real/real-book/index.htm

Nakagawa, S., & Schielzeth, H. (2013). A general and simple method for obtaining R2 from generalized linear mixed-effects models. *Methods in Ecology and Evolution*, *4*(2), 133–142. https://doi.org/10.1111/j.2041-210x.2012.00261.x

Nelis, D., Kotsou, I., Quoidbach, J., Hansenne, M., Weytens, F., Dupuis, P., & Mikolajczak, M. (2011). Increasing emotional competence improves psychological and physical well-being, social relationships, and employability. *Emotion*, *11*(2), 354–366. https://doi.org/10.1037/a0021554

Newbold, A., Warren, F. C., Taylor, R. S., Hulme, C., Burnett, S., Aas, B., Botella, C., Burkhardt, F., Ehring, T., Fontaine, J. R. J., Frost, M., Garcia-Palacios, A., Greimel, E., Hoessle, C., Hovasapian, A., Huyghe, V., Lochner, J., Molinari, G., Pekrun, R., … Watkins, E. R. (2020). Promotion of mental health in young adults via mobile phone app: Study protocol of the ECoWeB (emotional competence for well-being in Young adults) cohort multiple randomised trials. *BMC Psychiatry*, *20*(1), 458. https://doi.org/10.1186/s12888-020-02857-w

Nicolet-dit-Félix, M., Gillioz, C., Mortillaro, M., Sander, D., & Fiori, M. (2023). Emotional intelligence and attentional bias to emotional faces: Evidence of hypersensitivity towards

emotion information. *Personality and Individual Differences*, *201*, 111917. https://doi.org/10.1016/j.paid.2022.111917

Palese, T., & Schmid Mast, M. (2020). Interpersonal accuracy and interaction outcomes: Why and how reading others correctly has adaptive advantages in social interactions. In R. J. Sternberg & A. Kostić (Eds.), *Social intelligence and nonverbal communication* (pp. 305–331). Springer International Publishing. https://doi.org/10.1007/978-3-030-34964-6_11

Pfeiler, T. M., Weber, H., & Kubiak, T. (2018). Experiencing anger in a social interaction: The role of personality. *Personality and Individual Differences*, *132*, 45–51. https://doi.org/10.1016/j.paid.2018.04.045

Riggio, R. E., & Crawley, A. (2022). Nonverbal skills in relationships: Too little or too much may be a bad thing. In R. J. Sternberg & A. Kostić (Eds.), *Nonverbal communication in close Relationships: What words don't tell us* (pp. 341–361). Springer International Publishing. https://doi.org/10.1007/978-3-030-94492-6_13

Ruffman, T., Henry, J. D., Livingstone, V., & Phillips, L. H. (2008). A meta-analytic review of emotion recognition and aging: Implications for neuropsychological models of aging. *Neuroscience & Biobehavioral Reviews*, *32*(4), 863–881. https://doi.org/10.1016/j.neubiorev.2008.01.001

Ryff, C. D. (1989). Happiness is everything, or is it? Explorations on the meaning of psychological well-being. *Journal of Personality and Social Psychology*, *57*, 1069–1081. https://doi.org/10.1037/0022-3514.57.6.1069

Ryff, C. D., & Keyes, C. L. M. (1995). The structure of psychological well-being revisited. *Journal of Personality and Social Psychology*, *69*(4), 719–727. https://doi.org/10.1037/0022-3514.69.4.719

Scherer, K. R. (2007). Componential emotion theory can inform models of emotional competence. In *The science of emotional intelligence: Knowns and unknowns* (pp. 101–126). Oxford University Press.

Scherer, K. R. (2020). Evidence for the existence of emotion dispositions and the effects of appraisal bias. *Emotion*, *21*, 1224–1238. https://doi.org/10.1037/emo0000861

Schlegel, K. (2020). Inter- and intrapersonal downsides of accurately perceiving others' emotions. In R. J. Sternberg & A. Kostić (Eds.), *Social intelligence and nonverbal communication* (pp. 359–395). Springer International Publishing. https://doi.org/10.1007/978-3-030-34964-6_13

Schlegel, K., Boone, R. T., & Hall, J. A. (2017). Individual differences in interpersonal accuracy: A multi-level meta-analysis to assess whether judging other people is one skill or many. *Journal of Nonverbal Behavior*, *41*(2), 103–137. https://doi.org/10.1007/s10919-017-0249-0

Schlegel, K., Fontaine, J. R. J., & Scherer, K. R. (2019). The nomological network of emotion recognition ability: Evidence from the Geneva Emotion Recognition Test. *European Journal of Psychological Assessment*, *35*(3), 352–363. https://doi.org/10.1027/1015-5759/a000396

Schlegel, K., Grandjean, D., & Scherer, K. R. (2014). Introducing the Geneva Emotion Recognition Test: An example of Rasch-based test development. *Psychological Assessment*, *26*(2), 666–672. https://doi.org/10.1037/a0035246

Schlegel, K., Gugelberg, H. M. von, Makowski, L. M., Gubler, D. A., & Troche, S. J. (2021). Emotion recognition ability as a predictor of well-being during the COVID-19 pandemic. *Social Psychological and Personality Science*, *12*(7), 1380–1391. https://doi.org/10.1177/1948550620982851

Schlegel, K., Mehu, M., van Peer, J. M., & Scherer, K. R. (2018). Sense and sensibility: The role of cognitive and emotional intelligence in negotiation. *Journal of Research in Personality*, *74*, 6–15. https://doi.org/10.1016/j.jrp.2017.12.003

Schlegel, K., Palese, T., Mast, M. S., Rammsayer, T. H., Hall, J. A., & Murphy, N. A. (2020). A meta-analysis of the relationship between emotion recognition ability and intelligence. *Cognition and Emotion*, *34*(2), 329–351. https://doi.org/10.1080/02699931.2019.1632801

Schlegel, K., & Scherer, K. R. (2016). Introducing a short version of the Geneva Emotion Recognition Test (GERT-S): Psychometric properties and construct validation. *Behavior Research Methods*, *48*(4), 1383–1392. https://doi.org/10.3758/s13428-015-0646-4

Schlegel, K., Vicaria, I. M., Isaacowitz, D. M., & Hall, J. A. (2017). Effectiveness of a short audiovisual emotion recognition training program in adults. *Motivation and Emotion*, *41*(5), 646–660. https://doi.org/10.1007/s11031-017-9631-9

Schreckenbach, T., Ochsendorf, F., Sterz, J., Rüsseler, M., Bechstein, W. O., Bender, B., & Bechtoldt, M. N. (2018). Emotion recognition and extraversion of medical students interact to predict their empathic communication perceived by simulated patients. *BMC Medical Education*, *18*(1), 237. https://doi.org/10.1186/s12909-018-1342-8

Soto, C. J., & John, O. P. (2017). The next Big Five Inventory (BFI-2): Developing and assessing a hierarchical model with 15 facets to enhance bandwidth, fidelity, and predictive power. *Journal of Personality and Social Psychology*, *113*(1), 117–143. https://doi.org/10.1037/pspp0000096

Su, R., Tay, L., & Diener, E. (2014). The development and validation of the Comprehensive Inventory of Thriving (CIT) and the Brief Inventory of Thriving (BIT). *Applied Psychology: Health and Well-Being*, *6*(3), 251–279. https://doi.org/10.1111/aphw.12027

Szczygiel, D., & Mikolajczak, M. (2018). Is it enough to be an extrovert to be liked? Emotional competence moderates the relationship between extraversion and peer-rated likeability. *Frontiers in Psychology*, *9*. https://doi.org/10.3389/fpsyg.2018.00804

Taggart, F., Stewart-Brown, S., & Parkinson, J. (2015). *Warwick-Edinburgh Mental Well-Being Scale (WEMWBS)—User guide* (2nd ed.). NHS Health Scotland.

Thompson, A. E., & Voyer, D. (2014). Sex differences in the ability to recognise non-verbal displays of emotion: A meta-analysis. *Cognition and Emotion*, *28*(7), 1164–1195. https://doi.org/10.1080/02699931.2013.875889

Topp, C. W., Østergaard, S. D., Søndergaard, S., & Bech, P. (2015). The WHO-5 well-being index: A systematic review of the literature. *Psychotherapy and Psychosomatics*, *84*(3), 167–176. https://doi.org/10.1159/000376585

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, *54*, 1063–1070. https://doi.org/10.1037/0022-3514.54.6.1063

Zeidner, M., Matthews, G., & Roberts, R. D. (2012). The emotional intelligence, health, and well-being nexus: What have we learned and what have we missed? *Applied Psychology: Health and Well-Being*, *4*(1), 1–30. https://doi.org/10.1111/j.1758-0854.2011.01062.x

9.1.2 Supplementary Material

The utilized dataset and R code corresponding to the analyses in the manuscript and supplementary material can be found here: https://osf.io/sbr6h/?view_only=99a22a2fc007463396105d67c047ba97. Common abbreviations: ERA = Emotion recognition ability. CERQ = Cognitive Emotion Regulation Questionnaire. GERT = Geneva Emotion Recognition Questionnaire.

Additional Results Tables

These results tables are mentioned in the results section of the manuscript but were removed for the sake of brevity.

Table S1

Interaction coefficients of ERA and valence of emotional events predicting daily well-being and affect (multilevel regression).

Outcome variables	ERA x event valence (PM)		ERA x event valence (PMC)		R^2
	b (SE)	*p*	*b (SE)*	*p*	
Daily well-being	0.00 (0.02)	.90	-0.00 (0.00)	.08	.29
Daily positive affect	-0.03 (0.04)	.35	-0.01 (0.00) *	.02	.20
Daily negative affect	0.02 (0.02)	.44	0.00 (0.00)	.72	.27

Note. N = 437. All effects are controlled for gender, age, GERT experience, and chronological number of daily reports. PM = Person-mean. PMC = Person-mean-centered. $R2$ = pseudo $R2$ of the full model.
* $p < .05$

Table S2

Quadratic regression coefficients of ERA predicting baseline and daily outcome variables.

Outcome Variables	*b (SE)*	β	95% CI	*p*	R^2
Baseline					
SWLS	7.88 (3.56) *	0.08	[0.01, 0.15]	.03	.01
WEMWBS	3.99 (1.61) *	0.09	[0.02, 0.16]	.01	.05
Positive relations w. others	2.85 (2.59)	0.04	[-0.03, 0.11]	.27	.01
Relationship Satisfaction [a]	-3.96 (3.24)	-0.06	[-0.16, 0.04]	.22	.00
Daily [b]					
Well-being	1.01 (1.38)	0.03	[-0.04, 0.09]	.46	.06
Social interaction quality	1.74 (2.22)	0.03	[-0.04, 0.10]	.43	.00
Positive affect	-3.38 (3.03)	-0.04	[-0.11, 0.03]	.26	.03
Negative affect	-2.90 (1.87)	-0.05	[-0.12, 0.01]	.12	.04

Note. $N = 437$. All effects are controlled for gender, age, and GERT experience. SWLS = Satisfaction with life scale; WEMWBS = Warwick-Edinburgh mental well-being scale.
R^2 = Adjusted R^2 of the full model.
[a] Only participants in a romantic relationship; $n = 237$.
[b] Within-person mean scores of the 14 daily reports.
* $p < .05$.

Table S3

Interaction coefficients of ERA and Big Five personality traits predicting well-being.

Outcome Variables	ERA x extraversion			ERA x agreeableness			ERA x neuroticism			R^2
	***b* (*SE*)**	**β**	**95% CI**	***b* (*SE*)**	**β**	**95% CI**	***b* (*SE*)**	**β**	**95% CI**	
Baseline [a]										
SWLS	-0.18 (0.73)	-0.01	[-0.10, 0.08]	1.08 (0.97)	-0.04	[-0.03, 0.12]	1.83 (0.75) *	0.12	[0.02, 0.21]	.31
WEMWBS	-0.08 (0.32)	-0.01	[-0.09, 0.07]	0.70 (0.43)	0.06	[-0.01, 0.14]	0.17 (0.33)	0.02	[-0.07, 0.12]	.38
Positive relations w. others	-0.60 (0.50)	-0.05	[-0.13, 0.03]	0.81 (0.67)	0.05	[-0.03, 0.12]	-0.17 (0.52)	-0.01	[-0.11, 0.08]	.37
Relationship Satisfaction [c]	1.11 (0.79)	0.11	[-0.04, 0.26]	-1.35 (0.99)	-0.09	[-0.22, 0.04]	0.69 (0.72)	0.07	[-0.08, 0.22]	.13
Daily [b]										
Well-being	0.19 (0.28)	0.02	[-0.04, 0.08]	0.49 (0.38)	0.04	[-0.02, 0.09]	0.40 (0.29)	0.05	[-0.02, 0.11]	.15
Social interaction quality	-0.19 (0.47)	-0.01	[-0.07, 0.04]	0.59 (0.63)	0.02	[-0.03, 0.07]	1.20 (0.49) *	0.07	[0.02, 0.14]	.08
Positive affect	-0.10 (0.71)	-0.00	[-0.07, 0.06]	-0.08 (0.96)	-0.00	[-0.06, 0.06]	0.43 (0.74)	0.02	[-0.05, 0.09]	.04
Negative affect	0.21 (0.39)	0.01	[-0.04, 0.07]	0.42 (0.52)	0.02	[-0.03, 0.07]	-0.24 (0.40)	-0.02	[-0.08, 0.04]	.12

Note. N = 437. All effects are controlled for gender, age, and GERT experience. ERA = Emotion recognition ability; SWLS = Satisfaction with life scale; WEMWBS = Warwick-Edinburgh mental well-being scale.

[a] Multiple linear regression models. R^2 = Adjusted R^2 of the full model.

[b] Multilevel linear regression models. R^2 = Pseudo R^2 of the full model. Effects further controlled for the linear effect of time.

[c] Only participants in a romantic relationship; n = 237.

* $p < .05$.

Table S4

Interaction coefficients of ERA and emotion regulation strategies predicting well-being.

Outcome Variables	ERA x adaptive ER strategies			ERA x maladaptive ER strategies			R^2
	b (SE)	β	95% CI	*b (SE)*	β	95% CI	
Baseline [a]							
SWLS	-0.24 (0.77)	-0.01	[-0.10, 0.07]	1.91 (0.83) *	0.10	[0.01, 0.19]	.25
WEMWBS	-0.55 (0.35)	-0.07	[-0.15, 0.02]	0.46 (0.38)	0.05	[-0.03, 0.14]	.09
Positive relations w. others	0.27 (0.60)	0.02	[-0.07, 0.11]	0.10 (0.65)	0.01	[-0.09, 0.10]	.22
Relationship Satisfaction [c]	0.57 (0.74)	0.05	[-0.08, 0.18]	0.95 (0.82)	0.08	[-0.06, 0.22]	.03
Daily [b]							
Well-being	-0.36 (0.30)	-0.04	[-0.09, 0.02]	0.34 (0.32)	0.03	[-0.03, 0.09]	.12
Social interaction quality	-0.02 (0.50)	-0.00	[-0.05, 0.05]	0.90 (0.55)	0.05	[-0.01, 0.10]	.04
Positive affect	-0.88 (0.70)	-0.04	[-0.10, 0.02]	0.73 (0.77)	0.03	[-0.03, 0.09]	.05
Negative affect	-0.09 (0.41)	-0.01	[-0.06, 0.05]	-0.80 (0.45)	-0.05	[-0.10, 0.00]	.09

Note. $N = 437$. All effects are controlled for gender, age, and GERT experience. ERA = Emotion recognition ability; SWLS = Satisfaction with life scale; WEMWBS = Warwick-Edinburgh mental well-being scale.
[a] Multiple linear regression models. R^2 = Adjusted R^2 of the full model.
[b] Multilevel linear regression models. R^2 = Pseudo R^2 of the full model. Effects further controlled for the linear effect of time.
[c] Only participants in a romantic relationship; $n = 237$.
* $p < .05$.

Extended Descriptives

In addition to the focal variables in the manuscript, exploratory analyses with ERA separated for positive and negative emotions, single CERQ strategies, Conscientiousness and Openness (measured with two items each from the Big Five Inventory 10; Rammstedt & John, 2007), and percentage of affect words in the daily open questions regarding emotional events using LIWC (https://www.liwc.app/). For results see Table S2.

Table S5

Means, standard deviations, and bivariate correlations of extended variables and the focal variables in the manuscript.

Variables	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 ERA positive emotions	0.71	0.13	-															
2 ERA negative emotions	0.71	0.14	.38***	-														
3 CERQ acceptance	3.44	0.90	-.05	-.01	-													
4 CERQ positive refocusing	2.24	0.92	-.08	-.12*	.16***	-												
5 CERQ refocus on planning	3.72	0.88	.02	-.05	.27***	.21***	-											
6 CERQ positive reappraisal	3.35	1.01	-.09	-.06	.28***	.21***	.44***	-										
7 CERQ putting into perspective	2.97	1.01	-.08	-.03	.20***	.32***	.19***	.39***	-									
8 CERQ self-blame	2.91	0.94	.02	.08	.06	-.22***	-.25***	-.18***	-.11*	-								
9 CERQ rumination	3.22	0.93	.06	.16***	.11*	.00	-.04	-.03	-.13**	.27***	-							
10 CERQ catastrophizing	2.16	0.92	.02	.06	-.06	-.02	-.17***	-.12*	-.19***	.34***	.39***	-						
11 CERQ other-blame	1.83	0.69	-.03	-.04	-.06	.09	.03	.02	.01	-.05	.13**	.29***	-					
12 Conscientiousness	3.56	0.87	-.01	.01	-.06	.00	.08	.14**	.01	-.12*	-.07	-.20***	-.17***	-				
13 Openness	3.70	0.97	.03	.09*	.01	.05	-.03	.05	-.09	.00	.15**	-.01	-.01	.09	-			
14 LIWC overall affect	8.23	4.45	-.04	-.06	.00	.06	-.01	.17***	.06	-.05	.06	.02	.04	.06	-.05	-		
15 LIWC positive affect	5.36	3.70	-.09	-.06	.03	.08	.01	.17***	.11*	-.07	.03	.00	-.05	.10*	-.01	.81***	-	
16 LIWC negative affect	2.82	2.56	.07	-.02	-.05	-.01	-.04	.04	-.06	.03	.07	.02	.14**	-.03	-.06	.56***	-.02	-
17 Gender	-	-	.16***	.23***	-.13**	.01	-.23***	-.09	-.03	.16***	.23***	.11*	-.10*	.08	.08	-.10*	-.06	-.08
18 Age	-	-	-.16***	-.41***	-.12*	.05	.07	-.03	.01	-.20***	-.29***	-.20***	-.07	.22***	-.03	.09	.03	.10*
19 ERA	-	-	.79***	.84***	-.03	-.11*	-.03	-.08	-.06	.07	.15**	.03	-.04	.02	.08	-.05	-.08	.04
20 GERT experience	-	-	.20***	.25***	-.08	-.09	-.02	-.02	-.02	-.02	.08	.08	-.04	.02	.05	-.05	-.04	-.03
21 Adaptive ER	-	-	-.09	-.08	.58***	.58***	.64***	.74***	.67***	-.22***	-.03	-.18***	.03	.05	.00	.09	.13**	-.03
22 Maladaptive ER	-	-	.03	.11*	.03	-.07	-.18***	-.12**	-.17***	.64***	.71***	.78***	.45***	-.21***	.05	.03	-.03	.09
23 Neuroticism	-	-	.06	.19***	-.19***	-.20***	-.40***	-.30***	-.22***	.42***	.33***	.45***	.11*	-.21***	.04	-.04	-.08	.05
24 Extraversion	-	-	-.01	-.10*	.04	.10*	.21***	.27***	.08	-.22***	-.01	-.16***	.05	.27***	.09*	.09	.09	.03
25 Agreeableness	-	-	.04	.08	.08	.00	-.03	.02	.04	.10*	.06	-.10*	-.30***	.18***	.10*	-.07	.03	-.16***
26 SWLS	-	-	.03	-.06	.14**	.22***	.30***	.24***	.31***	-.26***	-.16**	-.35***	-.10*	.28***	-.06	-.01	.04	-.07
27 WEMWBS	-	-	-.04	-.14**	.17***	.22***	.32***	.31***	.27***	-.32***	-.24***	-.29***	.01	.23***	-.02	.04	.13**	-.12*
28 Positive rel. w. others	-	-	.03	-.06	.02	.12*	.26***	.19***	.14**	-.15**	-.08	-.22***	-.11*	.20***	.04	-.01	.02	-.04
29 Relationship satisfaction [a]	-	-	.09	-.03	.03	.12	.09	.05	.14*	-.10	-.13*	-.08	-.11	.01	-.07	-.12	-.11	-.07
30 Daily well-being	-	-	-.05	-.18***	.12*	.26***	.30***	.30***	.19***	-.30***	-.19***	-.24***	-.06	.22***	.02	.05	.16***	-.15**
31 Daily well-being variability	-	-	-.06	-.01	.07	-.06	-.04	.00	-.06	.16***	.12*	.14**	.08	.00	.03	-.08	-.10*	.01
32 Daily well-being instability	-	-	-.06	-.01	.05	.00	-.04	.05	.04	.11*	.06	.10*	.10*	-.04	.00	-.04	-.05	.00
33 Daily social interaction quality	-	-	.01	-.04	.09	.19***	.19***	.18***	.20***	-.14**	-.09	-.20***	-.18***	.21***	.01	-.07	.06	-.21***
34 Daily positive affect	-	-	-.01	-.07	.01	.18***	.14**	.12*	.18***	-.20***	-.09	-.17***	-.09	.19***	.03	-.03	.08	-.17***
35 Daily positive affect variability	-	-	-.02	-.08	-.02	.05	.07	.11*	.07	-.02	-.01	.06	.10*	.01	-.04	-.03	.03	-.08
36 Daily positive affect instability	-	-	-.06	-.10*	-.04	.09	.03	.09	.09	-.05	.00	.05	.07	-.04	-.03	-.01	.05	-.08
37 Daily negative affect	-	-	.10*	.14**	-.1*	-.24***	-.25***	-.24***	-.14**	.35***	.25***	.25***	.11*	-.11*	-.01	-.06	-.16**	.13**
38 Daily negative affect variability	-	-	.03	.11*	-.08	-.16***	-.18***	-.12*	-.10*	.23***	.21***	.22***	.16**	-.07	-.03	.01	-.1*	.17***
39 Daily negative affect instability	-	-	.04	.06	-.03	-.10*	-.13**	-.05	-.02	.11*	.16***	.13**	.14**	-.02	-.05	.08	-.04	.20***
40 Event appraisal valence	-	-	-.03	.00	.10*	.15**	.20***	.20***	.18***	-.22***	-.12*	-.20***	-.20***	.12*	.10*	-.05	.19***	-.37***
41 Event appraisal relevance	-	-	.00	-.11*	-.05	.12**	.02	.14**	.09*	-.04	-.03	.00	-.07	.17***	.05	-.02	.04	-.09
42 Event appraisal impact	-	-	-.07	-.19***	-.06	.11*	.04	.14**	.13**	-.08	-.07	-.02	-.01	.17***	.02	-.01	.05	-.09
43 Event appraisal coping	-	-	-.07	-.02	.14**	.13**	.15**	.18***	.08	-.04	.02	-.06	-.02	-.01	.10*	.02	.08	-.09

Note. $N = 437$.

[a] Only participants in a romantic relationship; $n = 237$.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Interactions with single CERQ strategies

To further investigate the interaction of ERA and maladaptive cognitive emotion recognition, analyses for H9b were conducted with single CERQ strategies instead of average scores for adaptive and maladaptive emotion regulation. All strategies and interactions were added to the same model; one model for each outcome variable. All variables were standardized. Effects were controlled for gender, age, and GERT experience. For results see Table S3.

Table S6
Standardized interaction coefficients of ERA interacting with cognitive emotion recognition strategies to predict well-being and social relationships.

Outcome Variables	ERA x CERQ strategy (β)									
	ACC	PRF	RPL	PRE	PPE	SBL	RUM	CAT	OBL	adj. R^2
Baseline										
SWLS	-0.05	0.00	0.04	-0.02	-0.03	0.01	0.08	0.02	0.06	.23
WEMWBS	-0.05	-0.02	0.02	-0.03	-0.04	-0.03	0.03	0.01	0.10 *	.26
Positive relations w. others	-0.02	-0.01	0.10	0.01	-0.06	0.02	-0.02	0.01	-0.00	.11
Relationship Satisfaction [a]	-0.02	0.01	0.09	0.21 *	-0.20 *	0.12	-0.09	0.06	-0.02	.06
Daily (aggregated)										
Well-being	-0.07	-0.09	0.03	-0.00	0.06	0.03	0.01	-0.03	0.13 **	.24
Social interaction quality	0.00	-0.06	0.06	0.01	-0.01	0.04	0.03	-0.00	0.07	.11
Positive affect	-0.02	-0.04	0.04	-0.00	-0.02	0.12 *	-0.04	-0.05	0.11 *	.10
Negative affect	-0.04	0.03	0.05	-0.00	-0.06	-0.01	-0.05	-0.04	-0.02	.22

Note. $N = 437$. SWLS = Satisfaction with life scale; WEMWBS = Warwick-Edinburgh mental well-being scale; ACC = Acceptance; PRF = Positive refocusing; FPL = Refocusing on planning; PRE = Positive reappraisal; PPE: Putting into Perspective; SBL = Self-blame; RUM = Rumination; CAT = Catastrophizing; OBL = Other-blame.
[a] Only participants in a romantic relationship; $n = 237$.
* $p < .05$. ** $p < .01$.

References

Rammstedt, B. (2007). The 10-Item Big Five Inventory. *European Journal of Psychological Assessment*, *23*(3), 193–201. https://doi.org/10.1027/1015-5759.23.3.193

9.2 Study 2

9.2.1 Manuscript

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Navigating Social Waters: Exploring the Impacts of Trait Cognitive Emotion Regulation and Emotion Recognition Ability in Naturalistic Social Situations

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Abstract

People's habitual cognitive emotion regulation (CER) strategies have been shown to affect well-being, but their role in naturalistic face-to-face interactions remains underexplored. The present study investigated the role of CER styles in predicting self-reported and observer-rated social and affective outcomes in a sample of 152 undergraduate students who interacted either with a friendly or unfriendly confederate. Results showed that participants with more adaptive CER strategies reported higher positive affect and social competence and showed more positive social behavior across conditions. Neither condition or emotion recognition ability (ERA) interacted with CER, but higher ERA appeared to intensify negative effects of maladaptive CER on affect in a three-way interaction with condition. Exploratory analyses of specific CER strategies, like positive refocusing, suggest that difficulties in applying distancing strategies could explain these findings. This study supports the beneficial impact of adaptive CER in naturalistic social interactions and implies intricate mechanisms of different emotional competencies.

Keywords: Cognitive emotion regulation; emotion recognition ability; social interaction; emotional intelligence; individual differences

1. Introduction

In social interactions, people are typically motivated to regulate their emotions towards a happy and empathic state (Fischer & Manstead, 2016; Tamir, 2016). Tamir (2016) posits that regulation towards experiencing and expressing positive emotions can be grounded in hedonic motives (e.g., to have pleasant experiences), instrumental social motives (e.g., to appear attractive or to elicit trust), and instrumental behavioral motives (e.g., to promote collaboration). According to Fischer and Manstead (2016), the up-regulation of positive emotions and the down-regulation of negative ones fulfill the social function of affiliation, i.e., forming and maintaining positive social relationships. The successful regulation of one's own emotions benefits social interactions because it also facilitates regulating the interaction partner's feelings (interpersonal emotion regulation; for an overview, see Mortillaro & Schlegel, 2023). Additionally, these regulation processes may be modified by another emotion-related competence, namely the ability to recognize emotions in others from nonverbal cues (emotion recognition ability/ ERA, as described in more detail below; e.g., Bänziger, 2016). Accurately perceiving others' emotional states provides crucial information for determining appropriate regulatory responses in social situations (e.g., Mayer et al., 2016).

Despite the theoretical importance of successful emotion regulation in oneself for social relationships, much of the research in this domain has focused on predicting intrapersonal outcomes such as well-being and mental health (e.g., Kraiss et al., 2020). For example, people who use more adaptive regulation strategies such as positive reappraisal consistently report higher well-being and lower psychopathological symptoms, whereas more maladaptive strategies such as rumination or catastrophizing predict lower well-being and higher psychopathological symptoms (Balzarotti et al., 2016; Garnefski et al., 2001; Garnefski & Kraaij, 2007; Loch et al., 2011). On a more interpersonal level, several studies have also linked adaptive emotion regulation in oneself to higher dyadic coping and relationship satisfaction (Rusu et al., 2019; Sasaki et al., 2022) as well as less conflictual relationships and lower loneliness (Ricciardi et al., 2022; Vanhalst et al., 2018).

Furthermore, one line of research has examined how emotion regulation affects physiological and affective responses in stressful social situations such as speaking in front of an audience. These studies suggest that maladaptive regulation strategies (assessed through questionnaires) are linked to a higher physiological stress response (Fiol-Veny et al., 2019) and more negative affect (Krkovic et al., 2018), while the reverse pattern has been found for more

adaptive regulation strategies (Christensen et al., 2017; Lewis et al., 2018). However, these studies typically do not involve a conversation or joint task with an interaction partner.

To date, surprisingly few studies have examined intrapersonal emotion regulation in face-to-face social interactions. In these studies, participants discussed sad or upsetting film clips (Butler et al., 2003, 2006; Duijndam et al., 2020) or current events topics (with a prerecorded interaction partner; Deits-Lebehn et al., 2023) and were instructed to use different emotion regulation strategies (e.g. reappraisal versus suppression). Results showed that using reappraisal positively influenced self-reported affect and interaction quality, physiological stress responses, and observer-rated positive social behavior (Butler et al., 2003, 2006; Deits-Lebehn et al., 2023; Duijndam et al., 2020). To our knowledge, only one study examined emotion regulation in a face-to-face interaction without experimentally manipulating the strategies participants used (Luong & Charles, 2014). This study revealed that when interacting with a disagreeable confederate, older participants used more self-distraction than younger participants. While these studies shed light on how specific strategies can affect social outcomes and on age differences in emotion regulation, it remains largely unknown how people's habitual emotion regulation styles (i.e., the ones they use without specific instructions) influence social interactions.

The present study attempts to close this gap by examining habitual cognitive emotion regulation (CER) styles in participants engaging in a collaborative task with either a friendly or a disagreeable/grumpy confederate. Cognitive emotion regulation refers to self-regulatory and conscious ways of thinking about (negative) events in order to reduce one's own negative affect (Garnefski et al., 2001). As such, CER strategies can be distinguished from behavioral strategies (Gross, 2015) and emotion regulation through the recruitment of social resources (Williams et al., 2018). CER includes adaptive strategies such as acceptance, cognitive reappraisal, relativizing the negative event, focusing on planning how to handle the situation, and refocusing one's thoughts on more positive things; and maladaptive strategies such as rumination, catastrophizing, and blaming oneself or others (Garnefski et al., 2001). Although adaptive strategies facilitate the reduction of negative feelings and maladaptive strategies tend to prolong negative affect, the two types of strategies are largely uncorrelated and may predict different outcomes (e.g., Gubler et al., 2021). As the focus of the present study was on people's habitual CER styles (and not on the strategies that participants employed during the collaborative task they engaged in), adaptive and maladaptive strategies were measured with the widely used Cognitive Emotion Regulation

Questionnaire (CERQ short form; Garnefski & Kraaij, 2006) in which participants indicate how they typically think when something bad happens.

In the present study, several hypotheses are tested. We first hypothesize that individuals habitually using more adaptive CER should benefit intra- and interpersonally in collaborative social interactions. In social situations, people are motivated to up-regulate positive and down-regulate negative affect in order to improve trust and collaboration (Tamir, 2016). Therefore, individuals with more adaptive (Hypothesis 1a) and less maladaptive CER (Hypothesis 1b) are expected to report higher positive affect, lower negative affect, higher self-rated social competence, and higher interaction quality, as well as express more positive behavior and less distress verbally and nonverbally (measured with observer-ratings).

Second, we test whether adaptive and maladaptive CER affect intra- and interpersonal outcomes in both positive and negative interactions, i.e., with both friendly and disagreeable/ grumpy confederates. On the one hand, adaptive emotion regulation does not only involve the downregulation of negative feelings, but also the up-regulation or maintenance of positive emotions (Gross, 2015). It can therefore be assumed that more adaptive CER and less maladaptive CER should benefit affect and social outcomes in both positive and negative social situations. On the other hand, habitual CER strategies are typically measured by asking participants to rate their responses to negative events only and some strategies are not readily applicable to positive situations (e.g., self- and other-blame). It could thus also be expected that habitual CER styles are more important in negative interactions (e.g., with an unfriendly or angry person) compared to positive interactions that involve fewer negative feelings that need to be downregulated. We therefore hypothesize that when interacting with a disagreeable confederate, the association of adaptive CER with all outcomes (self-reported positive affect, social competence, and interaction quality; low self-reported negative affect; high observed positive behavior and low distress) will be more positive than when interacting with a friendly confederate (Hypothesis 2a). Vice versa, the associations of maladaptive CER with all outcomes will be more negative (Hypothesis 2b).

Third, we examine whether the effects of adaptive and maladaptive CER depend on the person's emotion recognition ability (ERA). ERA is considered a basic component of emotional intelligence in that it precedes the successful management of one's own and others' emotions (e.g., see Mayer et al., 2016), and previous studies consistently showed a positive association between ERA and social outcomes (for an overview see Hall et al., 2009). In contrast to CER

which is usually assessed with self-report questionnaires, ERA is typically measured with performance-based tests; i.e., participants view stimuli of expressed emotions and choose the emotion label that best describes them (e.g., Schlegel & Scherer, 2016).

Although both ERA and CER are often discussed within an emotional intelligence framework (e.g., Mortillaro & Schlegel, 2023), they are empirically virtually uncorrelated (Schlegel & Mortillaro, 2019). Instead, other authors argued that the two competencies might interact to predict well-being and social outcomes. For example, individuals who perceive nonverbal cues more accurately are expected to be more affected by emotions in their surroundings, resulting in an emotional "hypersensitivity" (Davis & Nichols, 2016; Fiori & Ortony, 2021; Gillioz et al., 2023). Therefore, high ERA individuals may experience a higher need for CER (Schlegel, 2020). This has rarely been investigated empirically, except for one study which found that individuals with more maladaptive CER perceived the COVID-19 situation in 2020 more negatively when their ERA was higher, lending partial support to this idea (Schlegel et al., 2021). However, such an interaction of CER and ERA on social interaction outcomes has not been studied previously.

Individuals with high ERA should therefore benefit more strongly from adaptive CER and be more negatively affected by maladaptive CER. This interaction in turn is expected to be stronger when interacting with an unfriendly and disagreeable person: The perceived negative emotions of the interaction partner may require stronger regulation to maintain or increase positive affect. Taken together, in individuals with higher ERA, the associations of more adaptive CER with all outcomes are expected to be more positive (Hypothesis 3a), and the associations of more maladaptive CER more negative (Hypothesis 3b). Furthermore, these associations should be even more pronounced (more positive and negative, respectively) when interacting with a disagreeable confederate compared to a friendly confederate (Hypothesis 3c; three-way interactions between confederate mood, ERA, and CER styles).

2. Methods

2.1 Design and Procedure

This study implemented a one-factor between-subjects design with two levels (friendly versus unfriendly interaction partner/ confederate). In the unfriendly condition, confederates were instructed to behave in an unmotivated and grumpy fashion during all interactions with the participant. In the friendly condition, confederates were instructed to behave cooperatively and appear motivated and interested (see supplementary materials for detailed instructions:

https://osf.io/dmb7x/?view_only=e030b8c7a5ae431d9174197764d8b797). Four female undergraduate psychology students with acting experience were recruited and trained to play the role of the confederate under the guise of participating as another study participant.

After briefly meeting the confederate, participants first individually gave written consent to participate in this study and completed a survey on demographic data, emotion recognition, CER, and other questionnaires irrelevant to this study. Second, the participant-confederate dyads were instructed to get to know each other in an unstructured five-minute conversation. Third, dyads completed a collaborative task consisting of rebuilding a LEGO® model. Participants were always given the role of the "instructor" which involved looking up the original model which was placed behind a wall and giving instructions to the confederate about how to assemble the structure. They were not allowed to physically help in the building process. Confederates were always given the role of the "builder," i.e., they built the LEGO® construction but were not allowed to see the original model. One out of 8 different LEGO® models was pseudo randomly assigned to each interaction to prevent biases due to the confederate remembering the model from a previous session. Each model consisted of 32 bricks and formed a complex tower-like structure which was hard to remember. The dyads had 15 minutes to complete the task. After the task, the "instructors" (i.e., the participants) were asked to give the confederates feedback about their performance and collaboration. All parts of the interaction were videotaped, and the experimenter left the room between instructions. After the feedback, participants and confederates were separated again, and participants rated their own affect and social competence during the interaction, overall interaction quality, and the confederate's mood during the interaction. Finally, participants were informed about the study's true purpose and the confederate's role (see more details in the supplementary material). The study was approved by the ethics committee of the Faculty of Human Sciences at the University of Bern (reference number 2022-07-0001).

2.2 Sample

An a priori power analysis conducted with G*Power (Faul et al., 2009) for the detection of small to medium effects ($f2 = .10$) returned an appropriate sample size of 133 participants ($\alpha = .05$, power = .95). A total of 152 undergraduate students (93 female, 59 non-female (two non-binary), age M = 22.28 years, SD = 3.58 years) were recruited and randomly assigned to one of the conditions, stratified by gender, resulting in 47 female and 29 non-female participants in the friendly condition and 46 female and 30 non-female participants in the unfriendly condition. Two

participants were excluded from the analysis of the observer ratings due to corrupted video files. Participants either gained course credit or a small monetary reward for participating.

2.3 Materials

The measures used to assess predictor variables (CER and ERA) and self-report outcomes are described in Table 1. In addition, participants' behavior was rated by six independent observers with six five-point Likert scale variables (social orientation, distress, (positive) affect, expressivity, confidence, and motivation). Interrater-reliabilities (intraclass correlation coefficients; ICC) from ICC = .67 (distress rating during the LEGO® task) to ICC = .89 (affect rating during feedback) were achieved. These variables were reduced using a principal component analysis (oblique rotation). Two components were extracted: "Positivity" (with high positive loadings on social orientation, affect, expressivity, and motivation, and with a medium positive loading on confidence) and "distress" (with high positive loadings on distress and a medium negative loading on confidence). Component scores for each participant were extracted and used as scores for observed positivity and distress (see details in the supplementary material).

Table 1

Descriptions of predictor variables and self-report outcome measures.

Variable	Measure	Description
Predictor variables		
Habitual cognitive emotion recognition (CER)	Cognitive Emotion Regulation Questionnaire, short version (CERQ-short; Garnefski & Kraaij, 2006; German translation by Loch et al., 2011)	This questionnaire measures five adaptive (positive reappraisal, positive refocusing, refocus on planning, acceptance, putting into perspective) and four maladaptive (self-blame, other-blame, catastrophizing, rumination) CER strategies with two items each (total of 18 items). Participants were asked to indicate how often they experienced the thoughts described in each item after a negative event. Response format: Five-point Likert scale from 1 "(almost) never" to 5 "(almost) always." Score: Separate mean scores for adaptive and maladaptive CER.
Emotion recognition ability (ERA)	Geneva Emotion Recognition Test, short version (GERT-S; Schlegel & Scherer, 2016).	The GERT-S is a multimodal emotion recognition test where test-takers view 42 short videos (1-5 seconds) of an actor portraying one of 14 emotions with facial, vocal, and bodily expressions. Response format: Participants selected one of 14 options in each item. Responses were scored as 0 (incorrect) or 1 (correct). Score: Mean accuracy score across all items.
Self-report outcomes		
Positive and negative affect	Positive and Negative Affect Scale (PANAS; Watson et al., 1988; translation to German by Krohne et al., 1996).	Participants read ten positive and ten negative affect words and rated the intensity of the corresponding affect during the interaction with the other interactant. Response format: Five-point Likert scale from 0 "not at all" to 5 "extremely." Score: Separate mean scores for positive and negative affect.
Participants' view of confederate's affect (manipulation check)	Selected items of the PANAS (Watson et al., 1988)	Three positive items (interested, excited, and attentive) and two negative items (distressed and irritable) of the original scale were chosen and participants rated the perceived intensity of the confederates' affect. Response format: Five-point Likert scale from 0 "not at all" to 5 "extremely." Score: Separate mean scores for positive and negative affect.
Social competence	Questionnaire adapted from Puccinelli and Tickle-Degnen (2004) and Schlegel et al. (2018)	Participants read ten adjectives ("understanding", "committed", "natural", "sympathetic", "incapable", "cooperative", "self-confident", "competent", "uninvolved", "friendly") and indicated how much they had acted accordingly during the social interaction with the confederate. Response format: Seven-point Likert scale from 0 "do not at all agree" to 7 "completely agree." Score: Mean score across all items.
Social interaction quality	Questionnaire adapted from Berry and Hansen (1996) and Puccinelli and Tickle-Degnen (2004)	Participants read five statements ("I enjoyed the interaction", "the interaction was smooth, natural and relaxed", "I would like to work or interact with the other person again", "I had a good rapport with the other person", "I was interested in the other person"). Response format: Seven-point Likert scale from 0 "do not at all agree" to 7 "completely agree." Score: Mean score across all items.

3. Results

All analyses were conducted with R version 4.4.2 (R Core Team, 2024) and R Studio version 2024.09.1 (Posit Team, 2024). Means, standard deviations, Cronbach's' alpha reliability coefficients, and bivariate correlations can be found in Table 2. Welch's analysis of variance showed that there were no significant differences between confederates for self-rated positive affect, $F = 1.13$, $p = .341$, negative affect, $F = 0.77$, $p = .512$, social competence, $F = 0.35$, $p = .786$, interaction quality, $F = 1.51$, $p = .220$, nor observed positivity, $F = 1.85$, $p = .145$, or distress, $F = 1.61$, $p = .194$. Therefore, confederate identity was not controlled in the subsequent regression models. The manipulation of social interaction valence (friendly vs. unfriendly condition) worked well: Participants in the friendly condition rated the positive affect of the confederate as substantially higher, $t = 13.91$, $df = 125.81$, $p < .001$, $d = 2.26$, and the negative affect as substantially lower than participants in the unfriendly condition, $t = -4.61$, $df = 145.63$, $p < .001$, $d = -.75$ (Welch's *t*-test).

Table 2

Descriptive Statistics and bivariate correlations.

Variable	*M*	*SD*	α	1	2	3	4	5	6	7	8	9	10	11
1. Age			–	–										
2. Gender	–	–	–	.22**	–									
3. Condition	–	–	–	-.06	.01	–								
4. ERA	0.72	0.09	.55	.02	-.13	.11	–							
5. Adaptive CER	3.27	0.58	.77	.02	.05	-.14	-.16	–						
6. Maladaptive CER	2.41	0.51	.66	-.09	-.15	-.03	-.06	-.23**	–					
7. Positive affect	3.10	0.69	.87	.10	-.01	-.56***	-.12	.30***	-.07	–				
8. Negative affect	1.63	0.46	.76	-.18*	-.13	.32***	.02	-.24**	.38***	-.33***	–			
9. Social competence	5.40	0.71	.84	.23**	.00	-.40***	-.03	.25**	-.12	.60***	-.48***	–		
10. Interaction quality	4.92	1.53	.94	.04	-.01	-.73***	-.10	.20*	-.06	.78***	-.39***	.55***	–	
11. Observed positivity [a]	0.00	1.00	–	.13	-.02	-.55***	-.10	.26**	-.08	.45***	-.26**	.37***	.44***	–
12. Observed distress [a]	0.00	1.00	–	-.16*	.09	.38***	.04	-.04	-.02	-.24**	.12	-.33***	-.25**	-.19*

Note. $N = 152$. α = Cronbach's α reliability; Gender = female (0) vs. non-female (1); Condition = friendly (0) vs. unfriendly (1); ERA = Emotion recognition ability; CER = Cognitive emotion regulation;

[a] $n = 150$.

* $p < .05$. ** $p < .01$. *** $p < .001$.

A multivariate multiple regression analysis was conducted to test H1a and H1b, including adaptive and maladaptive CER as predictors and controlling for age and gender. The omnibus Pillai statistics (Pillai, 1955) indicated that both adaptive and maladaptive CER showed significant explanatory contribution to the model across all outcomes (see Table 3, Step 1). Table 3 also shows the respective regression coefficients for the separate multiple regression analyses per outcome, with *p*-values adjusted with the Benjamini-Hochberg method to control the false discovery rate due to multiple testing (FDR; Benjamini & Hochberg, 1995; see also García-Pérez, 2023). Adaptive CER predicted more self-reported positive affect, social competence, interaction quality, and more observed positivity (small to medium effects), but not self-reported negative affect or observed distress. Therefore, H1a was generally supported. Maladaptive CER failed to predict outcomes, except for higher self-reported negative affect. H1b was only partially supported, with some evidence pointing to a unique relationship with self-rated negative affect.

Table 3

Multivariate Pillai statistics and standardized regression coefficients of CER and condition predicting outcome variables.

Outcome variables	**Step 1**					**Step 2**										
	Main effect CER					**Main effect CER**				**Main Effect condition**		**Interaction CER * condition**				
	Adaptive		**Maladaptive**			**Adaptive**		**Maladaptive**				**Adaptive**		**Maladaptive**		
Multivariate regression	**Pillai**	***p***	**Pillai**	***p***		**Pillai**	***p***	**Pillai**	***p***	**Pillai**	***p***	**Pillai**	***p***	**Pillai**	***p***	
Multivariate test statistic	**.13**	**.003**	**.12**	**.005**		**.10**	**.02**	**.14**	**.002**	**.64**	**<.001**	.05	.321	.03	.668	
Multiple regression	**β**	$p_{adj.}$	**β**	$p_{adj.}$	$R^2_{adj.}$	**β**	$p_{adj.}$	**β**	$p_{adj.}$	**β**	$p_{adj.}$	**β**	$p_{adj.}$	**β**	$p_{adj.}$	$R^2_{adj.}$
Self-rated outcomes																
Positive affect	**0.30**	**.001**	0.00	.966	.08	**0.22**	**.007**	-0.03	0.895	**-0.53**	**<.001**	-0.02	.938	-0.01	.938	.34
Negative affect	-0.16	.073	**0.33**	**<.001**	.17	-0.12	.220	**0.34**	**<.001**	**0.31**	**<.001**	-0.12	.220	0.13	.172	.29
Social competence	**0.24**	**.010**	-0.05	.861	.10	0.18	.065	-0.08	0.556	**-0.36**	**<.001**	-0.03	.914	-0.01	.938	.21
Interaction quality	**0.20**	**.043**	-0.01	.947	.02 [b]	0.08	.321	-0.06	0.546	**-0.72**	**<.001**	-0.02	.914	0.01	.938	.53
Observer-rated outcomes [a]																
Observed positivity	**0.27**	**.006**	-0.02	.947	.07	0.16	.075	-0.05	0.703	**-0.52**	**<.001**	-0.06	.703	-0.05	.731	.32
Observed distress	-0.05	.861	-0.02	.947	.02 [b]	0.03	.914	0.00	0.953	**0.37**	**<.001**	0.07	.703	-0.01	.938	.14

Note. N = 152. CER = Cognitive emotion regulation; Condition = friendly (0) vs. unfriendly (1). Significant coefficients displayed in bold. P-Values in multiple regression adjusted with the Benjamini-Hochberg method (FDR; Benjamini & Hochberg, 1995).

[a] $n = 150$.

[b] Regression Model not significant.

When the main effects and interaction terms of condition were added to the multivariate regression model to test H2a and H2b, the omnibus Pillai statistics indicated that both adaptive and maladaptive CER remained significant contributors to the model (see Table 3, Step 2). Additionally, condition contributed significantly to the model, but not the interaction terms between condition and adaptive or maladaptive CER. The specific regression coefficients indicated that adaptive CER kept predicting more positive affect, but ceased to predict social competence and observed positivity. The main effect of maladaptive CER on self-rated negative affect also remained the same. Condition consistently predicted all outcomes as expected: Participants in the unfriendly condition reported lower positive affect, social competence, social interaction quality, and higher negative affect, and their behavior was rated less positive and more distressed compared to the friendly condition. None of the interaction coefficients with condition were significant, meaning that the effect of CER did not differ between conditions. In H2a and H2b we expected stronger positive and negative associations in the unfriendly condition for mean scores of adaptive and maladaptive CER, respectively, and these hypotheses were therefore rejected.

Explorative analyses with separate scores for each of the nine adaptive and maladaptive regulation strategies were then performed to disentangle possible strategy-specific effects (see Garnefski & Kraaij, 2007). In a series of multiple regression models, all nine strategies of the CERQ, condition, and their interaction terms were inserted together as predictors of self-rated and observed outcomes, controlling age and gender (see Table 4 for significant coefficients; complete results can be found in Table S1 in the supplementary materials). Positive refocusing and positive reappraisal appeared to be responsible for the positive effects of adaptive CER in H1a. Furthermore, the maladaptive strategies of self-blame and catastrophizing predicted higher self-rated negative affect in H1b. Additionally, catastrophizing predicted lower self-rated positive outcomes.

Table 4

Summary of significant effects of separate CER strategies (standardized regression coefficients).

Outcome Variables	Main Effect CER						Interaction CER * Condition					
	Adaptive			Maladaptive			Adaptive			Maladaptive		
	Strategy	β	*p*	Strategy	β	*p*	Strategy	β	*p*	Strategy	β	*p*
Self-rated outcomes												
Positive affect	Positive refocusing	0.25	<.001	Catastrophizing	-0.17	.039	–			–		
Negative affect	–			Self-blame	0.21	.006	–			Rumination	0.16	.048
				Catastrophizing	0.25	.005						
Social competence	Positive refocusing	0.27	<.001	–			Acceptance	-0.16	.041	–		
Interaction quality	Positive refocusing	0.12	.038	Catastrophizing	-0.20	.005	Refocus on planning	0.18	.012	Self-blame	0.13	.031
							Positive reappraisal	-0.18	.008			
Observer-rated outcomes [a]												
Observed positivity	Positive reappraisal	0.21	.018	–			–			–		
Observed distress	–			–			–			–		

Note. $N = 152$. CER = Cognitive emotion regulation; Condition = friendly (0) vs. unfriendly (1).
[a] $n = 150$.

The explorative analyses uncovered some conflicting patterns in regard to the separated CER strategies in interaction with condition (see Table 4). While refocusing on planning was linked to more self-rated social interaction quality in the negative condition (supporting H2a), the opposite was true for positive reappraisal, and acceptance was linked to less self-rated social competence (contradicting H2a). Rumination appeared to increase self-rated negative affect in the negative compared to the positive social interaction (supporting H2b). However, participants with higher habitual self-blame reported increased interaction quality in the unfriendly, but not in the friendly condition (contradicting H2b). These conflicting results for individual CER strategies may explain why the mean adaptive and maladaptive scores did not yield any overall interaction effects.

Another multivariate multiple regression was used to test H3a, H3b, and H3c about moderation effects of ERA. The regression model to test H2a and H2b was extended with interaction terms of ERA with CER and condition. The Pillai statistics indicated that neither ERA or its two-way interaction terms with adaptive and maladaptive CER contributed significantly to the model (see Table 5). This is also reflected in the regression coefficients: There were no significant main effects of ERA on interaction outcomes, and no evidence could be found that higher ERA increased the positive effects of adaptive CER or the negative effects of maladaptive CER across conditions. H3a and H3b were rejected.

Table 5

Multivariate Pillai statistics and standardized regression coefficients of CER, ERA, and condition predicting outcome variables.

Outcome variables	ERA		Interaction CER * ERA				Three-way interaction CER * condition * ERA				
			Adaptive		Maladaptive		Adaptive		Maladaptive		
Multivariate regression	**Pillai**	***p***	**Pillai**	***p***	**Pillai**	***p***	**Pillai**	***p***	**Pillai**	***p***	
Multivariate test statistic	.01	.988	.03	.733	.07	.166	.08	.084	**.10**	**.025**	
Multiple regression	**β**	$p_{adj.}$	**β**	$p_{adj.}$	**β**	$p_{adj.}$	**β**	$p_{adj.}$	**β**	$p_{adj.}$	$R^2_{adj.}$
Self-rated outcomes											
Positive affect	-0.04	.802	-0.01	.875	-0.01	.902	-0.04	.802	0.17	.142	.35
Negative affect	0.07	.802	0.02	.830	-0.04	.802	0.16	.236	-0.10	.531	.30
Social competence	-0.01	.902	-0.02	.830	0.06	.802	-0.08	.638	0.10	.531	.20
Interaction quality	0.02	.830	0.07	.593	-0.06	.638	0.03	.802	**0.17**	**.050**	.56
Observer-rated outcomes [a]											
Observed positivity	-0.05	.802	-0.05	.802	0.04	.802	-0.05	.802	-0.10	.531	.31
Observed distress	0.10	.638	0.11	.531	-0.13	.506	0.14	.428	0.04	.802	.15

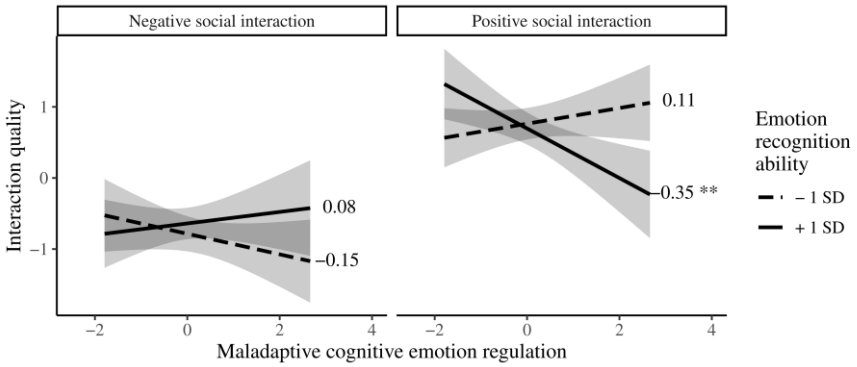
Note. $N = 152$. ERA = Emotion recognition ability; CER = Cognitive emotion regulation; Condition = friendly (0) vs. unfriendly (1). Significant coefficients displayed in bold. P-Values in multiple regression adjusted with the Benjamini-Hochberg method (FDR; Benjamini & Hochberg, 1995).

[a] $n = 150$.

However, the omnibus Pillai statistic indicated that the three-way interaction between ERA, condition, and maladaptive CER was a significant contributor to the model (see Table 5). The regression coefficients showed that this was mainly due to the interaction effect on the self-reported social interaction quality (visualized in Figure 1). With higher ERA, higher maladaptive CER predicted lower social interaction quality in the friendly condition compared to the unfriendly condition. Of note, the same three-way interaction showed a comparable effect size of $\beta = 0.17$ in the same direction regarding positive affect, but this coefficient was not significant after the FDR-adjustment. Taken together, participants with higher ERA appeared to be more negatively affected by maladaptive CER in the friendly condition. Hence, no evidence was found for ERA intensifying the effects of adaptive and maladaptive CER in negative social interactions (assumed in H3c).

Figure 1

Three-way interaction between CER and ERA predicting interaction quality.



Note. $N = 152$. Controlled for gender and age. Standardized simple slopes are displayed on the right. Gray bands represent 95% confidence intervals.

4. Discussion

This study is among the first to examine the impact of CER on naturalistic positive and negative social interactions. It was shown that adaptive CER strategies benefitted positive interaction outcomes overall, increasing participant's self-rated positive affect and social competence, and even observer-rated positive behavior. Adaptive CER further predicted positive affect over and above the strong impact of the friendly or unfriendly interaction partner. This result aligns with previous research that found positive impacts of adaptive emotion regulation on intra- and interpersonal interaction outcomes, although with different methodologies such as instructed regulation (e.g., Butler et al., 2003), social stress induction instead of actual interaction (Lewis et al., 2018), or using self-report surveys (e.g., Garnefski & Kraaij, 2007). The present study therefore corroborates the positive impact of unmanipulated, habitual adaptive CER styles in naturalistic social interactions.

Averaged maladaptive CER was linked to increased self-reported negative affect, supporting previous findings of elevated stress and negative affect (Fiol-Veny et al., 2019; Krkovic et al., 2018), but did not predict further self-report or observational measures (except for the strategy catastrophizing). The reason for this could be that of the maladaptive strategies assessed in this study, only catastrophizing may be performed in the focal social situation itself, while rumination or self-blame may occur primarily after the situation has passed. Theory and research on rumination and self-blame show that these constitute a longer-term maladaptive coping style aiming to analyze (negative) life events in detail (for a review, see Watkins &

Roberts, 2020). In contrast, adaptive strategies like positive refocusing and refocusing on planning may happen during the situation itself, enabling positive effects on short-term affect and behavior. Future studies should examine the differences between short- and long-term effects of CER strategies in more detail.

The differential impacts of specific CER strategies might explain why the valence of social interactions did not affect the outcomes of averaged adaptive and maladaptive CER strategies. Adaptive strategies like positive refocusing and planning showed benefits in both interactions, whereas positive reappraisal and acceptance were less beneficial, or even detrimental, in negative interactions. This variation could be attributed to the ability of some strategies to create psychological distance from a situation (enhancing emotion regulation), while others intensify focus on the situation (Powers & LaBar, 2019). Distraction with unrelated positive thoughts and other forms of mental distancing (e.g., planning the next steps to improve the situation) are most effective to up-regulate positive and down-regulate negative affect, whereas concentrating on the situation can have opposite effects (Webb et al., 2012). Positive refocusing and planning are distancing strategies, in contrast to acceptance and positive reappraisal, which engage directly with the situation. Indeed, positive reappraisal has been found to be adaptive only in situations that are less controllable to the individual and may even be harmful when used in controllable situations, where other strategies would be more effective (Haines et al., 2016; Troy et al., 2013). The situation created in our study was controllable (e.g., temporally restricted; no long-term-impact on participants) and distancing oneself from it by attentional or cognitive means may be more effective than, e.g., concentrating on the negative situation to reappraise it.

Furthermore, the reason for the unexpected "positive" effect of blaming oneself concerning rapport is perhaps found in the self-report measure of interaction quality which tapped into the confederate's likability. Individuals high in self-blame may rate their partner more positively as a way to compensate for what they perceive as their own fault. The results of the present study show that pooling distinct adaptive and maladaptive strategies, although it is common practice, may cover meaningful effects of single strategies (Fiol-Veny et al., 2019; Ricciardi et al., 2022; see Garnefski & Kraaij, 2007).

The joint examination of CER and ERA implies a complex interplay between the two emotional competencies in social situations. High ERA individuals appeared to suffer more from maladaptive CER in positive situations. Possibly, a "hypersensitivity" towards the emotions of

others (e.g., Gillioz et al., 2023) lets individuals with high ERA and a maladaptive CER style overemphasize ambivalent or subtle cues in positive interactions (e.g., insecurity of the partner), e.g., by catastrophizing. This matches findings that high ERA can lead to lower rapport because of the ability to "eavesdrop" on feelings in the interaction partner (Puccinelli & Tickle-Degnen, 2004). However, this hypersensitivity effect does not appear to simply intensify the beneficial and detrimental effects of adaptive and maladaptive CER, respectively, as was initially expected. Furthermore, the present study found this complex effect only for the self-reported quality of the social interaction but not for the other five outcome measures, and it should be treated with caution.

The present study was the first to study habitual CER in naturalistic social interactions. However, some limitations in the generalizability of the results remain. For instance, future studies could focus on well-acquainted dyads of individuals and manipulate positive and negative social context through eliciting discussions about existing conflicts, e.g., similar to what has been done in married couples but with other research aims (Bloch et al., 2014). Furthermore, the recruited sample of the present study mainly consisted of undergraduate students and the results cannot easily be transferred to the general population. The present study further has limited transferability to social interactions in dyads with varying gender compositions: Due to using only female confederates, effects of attraction or gender stereotypes might have applied. Lastly, the present study focused on CER as a personality trait, measured before the social interaction, making it impossible to say which CER strategies the participants actually used during the social interaction. Although CER is useful for assessing real-life behavior, it should be combined with self-reports specific to the focal social interaction and with other regulation strategies, such as interpersonal or behavioral emotion regulation in future studies.

In summary, this study revealed that adaptive CER strategies can enhance affect, self-judgements, and engaging behaviors in social interactions, while maladaptive strategies are linked to increased negative affect. Distancing emerged as a valuable emotion regulation categorization, possibly being able to differentiate various CER strategies in social interactions. Furthermore, the interplay between CER and ERA is intricate but roughly supports the notion of an emotional "hypersensitivity" in emotional intelligence research. These findings contribute to a deeper understanding of CER's impact on social dynamics and underscore the importance of considering individual strategies in various contexts.

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Declaration of Interests

The authors report there are no competing interests to declare.

Data Availability and Supplemental Material

Data, code, and supplementary material is publicly available on the Open Science Framework repository: https://osf.io/dmb7x/?view_only=e030b8c7a5ae431d9174197764d8b797 (DOI 10.17605/OSF.IO/DMB7X)

Declaration of Generative AI in Scientific Writing

During the preparation of this work the authors used ChatGPT 3.5 and 4o (https://chatgpt.com/) in order to improve the readability and concision of the manuscript in some sections. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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References

Balzarotti, S., Biassoni, F., Villani, D., Prunas, A., & Velotti, P. (2016). Individual differences in cognitive emotion regulation: Implications for subjective and psychological well-being. *Journal of Happiness Studies*, *17*(1), 125–143. https://doi.org/10.1007/s10902-014-9587-3

Bänziger, T. (2016). Accuracy of judging emotions. In J. A. Hall, M. Schmid Mast, & T. V. West (Eds.), *The social psychology of perceiving others accurately* (pp. 23–51). Cambridge University Press.

Benjamini, Y., & Hochberg, Y. (1995). Controlling the False Discovery Rate: A Practical and Powerful Approach to Multiple Testing. *Journal of the Royal Statistical Society: Series B (Methodological)*, *57*(1), 289–300. https://doi.org/10.1111/j.2517-6161.1995.tb02031.x

Bloch, L., Haase, C. M., & Levenson, R. W. (2014). Emotion regulation predicts marital satisfaction: More than a wives' tale. *Emotion*, *14*(1), 130–144. https://doi.org/10.1037/a0034272

Butler, E. A., Egloff, B., Wilhelm, F. H., Smith, N. C., Erickson, E. A., & Gross, J. J. (2003). The social consequences of expressive suppression. *Emotion*, *3*(1), 48–67. https://doi.org/10.1037/1528-3542.3.1.48

Butler, E. A., Wilhelm, F. H., & Gross, J. J. (2006). Respiratory sinus arrhythmia, emotion, and emotion regulation during social interaction. *Psychophysiology*, *43*(6), 612–622. https://doi.org/10.1111/j.1469-8986.2006.00467.x

Christensen, K. A., Aldao, A., Sheridan, M. A., & McLaughlin, K. A. (2017). Habitual reappraisal in context: Peer victimisation moderates its association with physiological reactivity to social stress. *Cognition and Emotion*, *31*(2), 384–394. https://doi.org/10.1080/02699931.2015.1103701

Davis, S. K., & Nichols, R. (2016). Does emotional intelligence have a "dark" side? A review of the literature. *Frontiers in Psychology*. https://www.frontiersin.org/article/10.3389/fpsyg.2016.01316

Deits-Lebehn, C., Smith, T. W., Williams, P. G., & Uchino, B. N. (2023). Heart rate variability during social interaction: Effects of valence and emotion regulation. *International Journal of Psychophysiology*, *190*, 20–29. https://doi.org/10.1016/j.ijpsycho.2023.06.004

Duijndam, S., Karreman, A., Denollet, J., & Kupper, N. (2020). Emotion regulation in social interaction: Physiological and emotional responses associated with social inhibition.

International Journal of Psychophysiology, *158*, 62–72. https://doi.org/10.1016/j.ijpsycho.2020.09.013

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, *41*(4), 1149–1160. https://doi.org/10.3758/BRM.41.4.1149

Fiol-Veny, A., Balle, M., De la Torre-Luque, A., & Bornas, X. (2019). Negative cognitive emotion regulation as a predictor of adolescent heart rate variability and entropy under social stress. *Anxiety, Stress, & Coping*, *32*(6), 641–653. https://doi.org/10.1080/10615806.2019.1641199

Fiori, M., & Ortony, A. (2021). Initial evidence for the hypersensitivity hypothesis: Emotional intelligence as a magnifier of emotional experience. *Journal of Intelligence*, *9*(2), Article 2. https://doi.org/10.3390/jintelligence9020024

Fischer, A. H., & Manstead, A. S. R. (2016). Social functions of emotion and emotion regulation. In M. Lewis, J. M. Haviland-Jones, & L. Feldman Barrett (Eds.), *Handbook of Emotions* (4th edition, pp. 424–439). The Guilford Press.

García-Pérez, M. A. (2023). Use and misuse of corrections for multiple testing. *Methods in Psychology*, *8*, 100120. https://doi.org/10.1016/j.metip.2023.100120

Garnefski, N., & Kraaij, V. (2006). Cognitive Emotion Regulation Questionnaire – Development of a short 18-item version (CERQ-short). *Personality and Individual Differences*, *41*(6), 1045–1053. https://doi.org/10.1016/j.paid.2006.04.010

Garnefski, N., & Kraaij, V. (2007). The Cognitive Emotion Regulation Questionnaire. *European Journal of Psychological Assessment*, *23*(3), 141–149. https://doi.org/10.1027/1015-5759.23.3.141

Garnefski, N., Kraaij, V., & Spinhoven, P. (2001). Negative life events, cognitive emotion regulation and emotional problems. *Personality and Individual Differences*, *30*(8), 1311–1327. https://doi.org/10.1016/S0191-8869(00)00113-6

Gillioz, C., Nicolet-dit-Félix, M., Wilhelm, O., & Fiori, M. (2023). Emotional intelligence and emotion information processing: Proof of concept of a test measuring accuracy in discriminating emotions. *Frontiers in Psychology*, *14*, 1085971. https://doi.org/10.3389/fpsyg.2023.1085971

Gross, J. J. (2015). Emotion regulation: Current status and future prospects. *Psychological Inquiry*, *26*(1), 1–26. https://doi.org/10.1080/1047840X.2014.940781

Gubler, D. A., Makowski, L. M., Troche, S. J., & Schlegel, K. (2021). Loneliness and well-being during the Covid-19 pandemic: Associations with personality and emotion regulation. *Journal of Happiness Studies*, *22*(5), 2323–2342. https://doi.org/10.1007/s10902-020-00326-5

Haines, S. J., Gleeson, J., Kuppens, P., Hollenstein, T., Ciarrochi, J., Labuschagne, I., Grace, C., & Koval, P. (2016). The wisdom to know the difference: Strategy-situation fit in emotion regulation in daily life is associated with well-being. *Psychological Science*, *27*(12), 1651–1659. https://doi.org/10.1177/0956797616669086

Hall, J. A., Andrzejewski, S. A., & Yopchick, J. E. (2009). Psychosocial correlates of interpersonal sensitivity: A meta-analysis. *Journal of Nonverbal Behavior*, *33*(3), 149–180. https://doi.org/10.1007/s10919-009-0070-5

Kraiss, J. T., ten Klooster, P. M., Moskowitz, J. T., & Bohlmeijer, E. T. (2020). The relationship between emotion regulation and well-being in patients with mental disorders: A meta-analysis. *Comprehensive Psychiatry*, *102*, 152189. https://doi.org/10.1016/j.comppsych.2020.152189

Krkovic, K., Clamor, A., & Lincoln, T. M. (2018). Emotion regulation as a predictor of the endocrine, autonomic, affective, and symptomatic stress response and recovery. *Psychoneuroendocrinology*, *94*, 112–120. https://doi.org/10.1016/j.psyneuen.2018.04.028

Lewis, E. J., Yoon, K. L., & Joormann, J. (2018). Emotion regulation and biological stress responding: Associations with worry, rumination, and reappraisal. *Cognition and Emotion*, *32*(7), 1487–1498. https://doi.org/10.1080/02699931.2017.1310088

Loch, N., Hiller, W., & Witthöft, M. (2011). Der Cognitive Emotion Regulation Questionnaire (CERQ) [The Cognitive Emotion Regulation Questionnaire (CERQ)]. *Zeitschrift Für Klinische Psychologie Und Psychotherapie*, *40*(2), 94–106. https://doi.org/10.1026/1616-3443/a000079

Luong, G., & Charles, S. T. (2014). Age differences in affective and cardiovascular responses to a negative social interaction: The role of goals, appraisals, and emotion regulation. *Developmental Psychology*, *50*(7), 1919–1930. https://doi.org/10.1037/a0036621

Mayer, J. D., Caruso, D. R., & Salovey, P. (2016). The ability model of emotional intelligence: Principles and updates. *Emotion Review*, *8*(4), 290–300. https://doi.org/10.1177/1754073916639667

Mortillaro, M., & Schlegel, K. (2023). Embracing the emotion in emotional intelligence measurement: Insights from emotion theory and research. *Journal of Intelligence*, *11*(11), Article 11. https://doi.org/10.3390/jintelligence11110210

Pillai, K. C. S. (1955). Some new test criteria in multivariate analysis. *The Annals of Mathematical Statistics*, *26*(1), 117–121. https://doi.org/10.1214/aoms/1177728599

Posit Team. (2024). *RStudio: Integrated Development Environment for R* (Version 2024.09.1) [Computer software]. Posit Software, PBC. http://www.posit.co/

Powers, J. P., & LaBar, K. S. (2019). Regulating emotion through distancing: A taxonomy, neurocognitive model, and supporting meta-analysis. *Neuroscience & Biobehavioral Reviews*, *96*, 155–173. https://doi.org/10.1016/j.neubiorev.2018.04.023

Puccinelli, N. M., & Tickle-Degnen, L. (2004). Knowing too much about others: Moderators of the relationship between eavesdropping and rapport in social interaction. *Journal of Nonverbal Behavior*, *28*(4), 223–243. https://doi.org/10.1007/s10919-004-4157-8

R Core Team. (2024). *R: A Language and Environment for Statistical Computing* (Version 4.4.2) [Computer software]. R Foundation for Statistical Computing. https://www.r-project.org/

Ricciardi, C., Kornienko, O., & Garner, P. W. (2022). The role of cognitive emotion regulation for making and keeping friend and conflict networks. *Frontiers in Psychology*, *13*. https://www.frontiersin.org/articles/10.3389/fpsyg.2022.802629

Rusu, P. P., Bodenmann, G., & Kayser, K. (2019). Cognitive emotion regulation and positive dyadic outcomes in married couples. *Journal of Social and Personal Relationships*, *36*(1), 359–376. https://doi.org/10.1177/0265407517751664

Sasaki, E., Overall, N. C., Chang, V. T., & Low, R. S. T. (2022). A dyadic perspective of expressive suppression: Own or partner suppression weakens relationships. *Emotion*, *22*(8), 1989–1994. https://doi.org/10.1037/emo0000978

Schlegel, K. (2020). Inter- and intrapersonal downsides of accurately perceiving others' emotions. In R. J. Sternberg & A. Kostić (Eds.), *Social intelligence and nonverbal communication* (pp. 359–395). Springer International Publishing. http://link.springer.com/10.1007/978-3-030-34964-6_13

Schlegel, K., Gugelberg, H. M. von, Makowski, L. M., Gubler, D. A., & Troche, S. J. (2021). Emotion recognition ability as a predictor of well-being during the COVID-19 pandemic. *Social Psychological and Personality Science*, *12*(7), 1380–1391. https://doi.org/10.1177/1948550620982851

Schlegel, K., & Mortillaro, M. (2019). The Geneva Emotional Competence Test (GECo): An ability measure of workplace emotional intelligence. *Journal of Applied Psychology*, *104*(4), 559–580. https://doi.org/10.1037/apl0000365

Schlegel, K., & Scherer, K. R. (2016). Introducing a short version of the Geneva Emotion Recognition Test (GERT-S): Psychometric properties and construct validation. *Behavior Research Methods*, *48*(4), 1383–1392. https://doi.org/10.3758/s13428-015-0646-4

Tamir, M. (2016). Why do people regulate their emotions? A taxonomy of motives in emotion regulation. *Personality and Social Psychology Review*, *20*(3), 199–222. https://doi.org/10.1177/1088868315586325

Troy, A. S., Shallcross, A. J., & Mauss, I. B. (2013). A person-by-situation approach to emotion regulation: Cognitive reappraisal can either help or hurt, depending on the context. *Psychological Science*, *24*(12), 2505–2514. https://doi.org/10.1177/0956797613496434

Vanhalst, J., Luyckx, K., Van Petegem, S., & Soenens, B. (2018). The detrimental effects of adolescents' chronic loneliness on motivation and emotion regulation in social situations. *Journal of Youth and Adolescence*, *47*(1), 162–176. https://doi.org/10.1007/s10964-017-0686-4

Watkins, E. R., & Roberts, H. (2020). Reflecting on rumination: Consequences, causes, mechanisms and treatment of rumination. *Behaviour Research and Therapy*, *127*, 103573. https://doi.org/10.1016/j.brat.2020.103573

Webb, T. L., Miles, E., & Sheeran, P. (2012). Dealing with feeling: A meta-analysis of the effectiveness of strategies derived from the process model of emotion regulation. *Psychological Bulletin*, *138*(4), 775–808. https://doi.org/10.1037/a0027600

Williams, W. C., Morelli, S. A., Ong, D. C., & Zaki, J. (2018). Interpersonal emotion regulation: Implications for affiliation, perceived support, relationships, and well-being. *Journal of Personality and Social Psychology*, *115*(2), 224–254. https://doi.org/10.1037/pspi0000132

9.2.2 Detailed Results on ERA

Table A1

Standardized regression coefficients of ERA and condition predicting outcome variables.

Outcome Variables	Main Effect Condition		Main Effect ERA		Interaction ERA * Condition		*Adj.* R^2
	β	*p*	β	*p*	β	*p*	
Self-rated outcomes							
Positive affect	**-0.52**	**<.001**	-0.04	.561	-0.02	.817	.35
Negative affect	**0.32**	**<.001**	0.07	.399	0.06	.414	.30
Social competence	**-0.37**	**<.001**	-0.01	.891	-0.03	.726	.20
Interaction quality	**-0.72**	**<.001**	0.02	.748	0.05	.384	.56
Observer-rated outcomes [a]							
Observed positivity	**-0.52**	**<.001**	-0.05	.496	-0.04	.564	.31
Observed distress	**0.37**	**<.001**	0.10	.259	0.01	.863	.15

Note. N = 152. ERA = Emotion recognition ability; Condition = friendly (0) vs. unfriendly (1). Significant coefficients displayed in bold. All effects controlled for cognitive emotion regulation and its interactions with ERA and condition.

[a] n = 150.

9.2.3 Supplementary Material

The utilized dataset and R code corresponding to the analyses in the manuscript and supplementary material can be found here: https://osf.io/dmb7x/?view_only=e030b8c7a5ae431d9174197764d8b797

Detailed Results for Separate Cognitive Emotion Regulation Strategies

Table S1

Standardized regression coefficients of separate CER strategies and condition predicting outcome variables.

CER strategies	Positive affect				Negative affect				Social competence				Interaction quality				Observed positivity [a]				Observed distress [a]			
	Main effect		Interaction w. condition		Main effect		Interaction w. condition		Main effect		Interaction w. condition		Main effect		Interaction w. condition		Main effect		Interaction w. condition		Main effect		Interaction w. condition	
	β	*p*	β	*p*	β	*p*	β	*p*	β	*p*	β	*p*	β	*p*	β	*p*	β	*p*	β	*p*	β	*p*	β	*p*
Adaptive strategies																								
Positive reappraisal	0.11	.172	-0.10	.211	0.07	.439	0.01	.934	0.03	.727	0.09	.316	0.09	.168	**-0.18**	**.008**	**0.21**	**.017**	0.05	.572	-0.08	.410	0.01	.923
Positive refocusing	**0.25**	**<.001**	0.04	.592	-0.05	.459	-0.13	.078	**0.27**	**<.001**	0.08	.285	**0.12**	**.038**	0.02	.780	-0.02	.844	-0.12	.120	0.05	.609	-0.01	.892
Refocus on planning	0.06	.476	0.08	.342	-0.10	.290	-0.13	.151	0.09	.348	0.05	.628	-0.07	.331	**0.18**	**.012**	0.03	.715	-0.01	.923	-0.03	.788	0.03	.772
Acceptance	-0.09	.234	-0.09	.200	-0.10	.187	0.02	.815	-0.08	.307	**-0.16**	**.041**	-0.04	.500	-0.04	.458	-0.01	.911	-0.02	.789	0.10	.280	0.05	.615
Putting into perspective	0.02	.820	0.08	.300	0.02	.795	-0.02	.800	-0.03	.711	-0.09	.253	0.05	.413	0.01	.893	-0.05	.528	-0.04	.661	0.07	.448	-0.00	.963
Maladaptive strategies																								
Self-blame	0.08	.257	0.12	.095	**0.21**	**.006**	-0.01	.876	-0.03	.744	0.07	.413	0.08	.176	**0.13**	**.032**	-0.02	.759	0.10	.230	0.01	.903	-0.01	.935
Other-blame	-0.06	.396	0.07	.330	0.01	.916	-0.12	.119	-0.01	.883	0.12	.121	0.02	.760	0.07	.227	0.06	.500	0.05	.495	0.07	.409	0.04	.696
Catastrophizing	**-0.17**	**.039**	-0.09	.281	**0.25**	**.005**	0.11	.211	-0.17	.074	-0.06	.486	**-0.20**	**.005**	-0.12	.079	-0.11	.225	-0.12	.195	0.02	.868	-0.07	.516
Rumination	0.13	.088	-0.05	.508	0.02	.804	**0.16**	**.048**	0.14	.107	-0.05	.555	0.05	.455	-0.02	.743	0.00	.998	-0.07	.382	-0.09	.359	0.04	.637
Adjusted R^2	.408				.353				.280				.591				.308				.091			

Note. N = 152. CER = Cognitive emotion regulation; Condition = friendly (0) vs. unfriendly (1). Significant coefficients displayed in bold.
[a] n = 150.

Confederate Instructions

Confederates were trained with a semi-structured script. The general instructions and instructions specific to the two conditions (friendly and unfriendly) and the three sections of the social interaction (conversation, LEGO®-task, feedback) for the confederates are summarized below.

Before the Experiment and During Instructions

Confederates were instructed to …

- … appear preoccupied while in the waiting area, e.g., with their smartphone
- … greet the experimenter and the participant and otherwise talk as little as possible and behave neutrally during the initial briefing and all subsequent instructions by the experimenter

Friendly Condition

Confederates were instructed to …

General

- … appear friendly and generally motivated, but in a rather neutral than exuberant fashion
- … to keep an attentive, open and other-facing posture, to not frequently cross their arms or legs, to not lounge on their chair, and to react quickly and friendly to what is said by the participant

Conversation

- … listen and respond attentively and empathically
- … actively maintain the conversation if the participant does not (e.g., by asking about the participant's studies etc.)
- … otherwise be themselves – talk about their hobbies, studies, etc.

LEGO®-Task

- … keep an attentive posture, express readiness for the next instructions
- … double-check instructions about 4x in a friendly and constructive manner
- … sort LEGO®-bricks after the first few instructions for quicker building to represent engagement
- … make positive / reinforcing / assuring statements about 3x, e.g.:
- "you're doing well, the model seems to be extremely complex"

- "you are doing so well, I think I could never memorize all this"
- "come on, we can still do this in time"

Feedback

- … actively take part in the feedback in an agreeing and understanding manner
- … simulate interest in the feedback, e.g., by asking about something that was not quite clear
- … appease self-criticism of the participant

Unfriendly Condition

Confederates were instructed to …

General

- … appear to be in a bad mood, unmotivated, and somewhat unpleasant (without hinting at specific underlying reasons for, e.g., the bad mood)
- … frequently assume a closed body posture (cross arms and legs, lean back, rest head on arms), or turn away from the participant, rarely make eye-contact
- … appear distracted and employ "fidgeting" with material in the room
- …display skeptical / annoyed frowns, blinks, smirks, stares and also use paraverbal clues (e.g., frustrated sighs)
- … rarely laugh, and quickly return to "grumpy" attitude and / or make laughter appear somewhat cynical
- … not make jokes themselves
- … react to participants asking about the "bad mood" by evasively appeasing (e.g., "it's nothing…"), if necessary briefly act more motivated but then quickly return to the "bad mood".

Conversation

- … make short, demotivated, or skeptical responses, comments, or questions (e.g., "really…?")
- … frequently make quick and abrupt changes of topic and "awkward" silences as if disinterested, and 1x ask a question but then appear disinterested
- … only ask questions / initiate conversation when participant does not (after an "awkward" pause)
- … drink during conversation and place bottle between you and participant (1x)

- … build in direct “grumpy” statements:
- 1x statement about the task, e.g., “how much longer do we have to talk here?”
- 1x statement about something the participant talked about, e.g., "I find chess pretty boring…” or “but don’t you have to read tons of books when studying history?!”

LEGO®-Task

- … lean back and assume a closed posture, be slow to move to action when instruction is given (but still cooperate begrudgingly); sigh when participant returns etc.
- … not say much and rarely make eye-contact
- … double-check instructions about 4x in an irritated / annoyed / skeptical tone, e.g., “are you sure?” or “that can’t be correct…”
- … 1x build the bricks incorrectly on purpose while the instruction is not yet finished
- … about 3x loudly fidget with bricks, combine / build them randomly between instructions
- … make direct negative statements about 3x :
- to build up pressure, e.g., “maybe you could try to memorize more bricks at once” or “come on, speed up a little, otherwise we'll never make it!”
- to emphasize disinterest, e.g., “Wow, this task is really boring, hopefully the time will be up soon”

Feedback

- … be surprised about positive feedback and add own negative feedback, e.g., “that’s nice of you, but I think we could have improved quite a few things”
- … react to negative feedback with annoyed responses, e.g., “I think that's unfair, I often had trouble understanding your instructions”
- … emphasize self-criticism of the participant by agreeing to it
- … cut off discussions, e.g., by saying “… but okay…” or “if you say so”

Rating Process, Reliability and Participant Scores

The Six independent observers were first trained with the eight experiment piloting video clips. Second, all six observers rated the same 20 randomly selected experiment videos. They were instructed to cover the screen area so that only the participants was visible. Interrater

reliability after this second training step was analyzed by calculating intraclass correlation coefficients (ICCs) across all time intervals for each interaction section and behavioral variable (displayed in Table S1, left of the "/"). The ICC (1, k) Form was chosen (see Koo & Li, 2016; Shrout & Fleiss, 1979). Interrater reliabilities ranged from acceptable to very good.

Table S2
Intraclass correlation coefficients ICC (1, *k*) for the observer ratings.

Behavioral Variables	Interaction Sections		
	Conversation	LEGO®-task	Feedback
Social orientation	.89 /.86	–	–
Distress	.80 /.75	.73 /.67	.86 /.70
(Positive) affect	.78 /.81	–	.92 /.89
Expressivity	.82 /.85	.70 /.80	.84 /.81
Confidence	–	.70 /.72	–
Motivation	–	.81 /.83	–

Note. $N = 150$. Values on the left of the "/" indicate ICCs of the training set of videos (6 observers), values on the right indicate ICCs on the full sample (3-6 observers).

Third, the remaining videos were randomly assigned to the observers so that each observer rated half of the videos and with varying "team" compositions (observers that rated the same videos), resulting in each video being rated by 3 observers. ICCs of these final ratings are displayed in Table S1 (right of the "/"). Interrater reliabilities again ranged from acceptable to very good. Participants were then assigned one mean score across all time intervals and observers for each interaction section and behavioral variable, resulting in 11 scores.

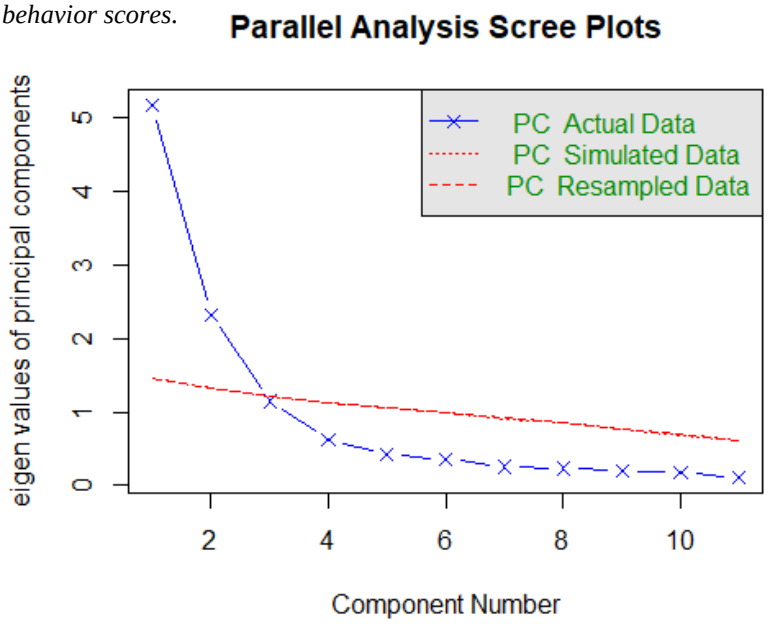
Principal component analysis (PCA)

The 11 scores (social orientation, distress, (positive) affect, expressivity, confidence, and motivation; per interaction section) were reduced using a principal component analysis. The Kaiser-Meyer-Olkin index was good for the overall matrix, KMO = .81, and acceptable to excellent for individual scores, ranging between .64 (confidence in the LEGO®-Task) and .91 (social orientation in the conversation). Bartlett test was significant, $X2(55) = 1191.99$, $p < .001$, indicating that the data matrix has sufficient underlying intercorrelations for PCA.

First, an unrestricted PCA without any rotation was conducted to determine the number of components. The Parallel Analyses indicated to proceed with 2 components (see Figure S1).

Figure S1

Parallel Analysis for unrotated principal component analysis for observed behavior scores.



Second, a PCA with oblique rotation and the preset extraction of two components was conducted. The component loadings are displayed in Table S3. One Component was named "positivity," with high positive loadings on the social orientation, affect, expressivity, and motivation ratings, as well as a medium positive loading on the confidence rating. The other was named "distress," with high positive loadings on the distress ratings of all three interaction sections and a medium negative loading on the confidence rating. The two components were correlated with r = -.19. Component scores for each participant were extracted and used as scores for observed positivity and distress.

Table S3
Final PCA component loadings.

Behavioral Variables	Components	
	Positivity	**Distress**
Expressivity conversation	**0.89**	0.08
Expressivity feedback	**0.87**	0.11
Expressivity LEGO®-task	**0.85**	0.11
(Positive) affect conversation	**0.78**	-0.14
(Positive) affect feedback	**0.78**	-0.23
Motivation LEGO®-task	**0.76**	0.15
Social orientation conversation	**0.74**	-0.29
Distress LEGO®-task	0.18	**0.91**
Distress feedback	-0.07	**0.88**
Distress conversation	-0.14	**0.84**
Confidence LEGO®-task	**0.31**	**-0.33**

Note. $N = 150$. Loadings assigned to components in bold.

Questionnaires (German)

The following questionnaires were completed by the participant after the social interaction. Only the administered German items are reported here.

Social Competence

Instructions

Geben Sie bitte an, wie sehr Sie folgenden Aussagen bezüglich Ihres Verhaltens während der Interaktion mit der anderen Versuchsperson (Konversation und LEGO®-Aufgabe) zustimmen.

Ich verhielt mich …

Items

- verständnisvoll
- engagiert
- natürlich
- sympathisch
- unfähig
- kooperativ
- selbstsicher
- kompetent
- unbeteiligt
- freundlich

Interaction Quality

Instructions

Geben Sie bitte an, wie sehr Sie folgenden Aussagen bezüglich der der Interaktion mit der anderen Versuchsperson (Konversation und LEGO®-Aufgabe) zustimmen.

Items

- Ich hatte Spass an der Interaktion.
- Die Interaktion verlief reibungslos, natürlich und entspannt.
- Ich würde gerne wieder mit der anderen Versuchsperson zusammenarbeiten oder mich mit ihr austauschen.
- Ich hatte einen guten Draht zu der anderen Versuchsperson.
- Ich interessierte mich für die andere Versuchsperson.

References

Koo, T. K., & Li, M. Y. (2016). A guideline of selecting and reporting intraclass correlation coefficients for reliability research. *Journal of Chiropractic Medicine*, *15*(2), 155–163. https://doi.org/10.1016/j.jcm.2016.02.012

Shrout, P. E., & Fleiss, J. L. (1979). Intraclass correlations: Uses in assessing rater reliability. *Psychological Bulletin*, *86*(2), 420–428. https://doi.org/10.1037/0033-2909.86.2.420

9.3 Study 3

9.3.1 Manuscript

Sommer, N. R., Carrard, V., Bourquin, C., Berney, A., & Schlegel, K. (2024). Social support and avoidance explain positive and negative effects of emotion recognition ability on mental health in medical students. [Manuscript submitted for publication]. Institute of Psychology, University of Bern and Psychiatric Liaison Service, Lausanne University Hospital (CHUV).

Social Support and Avoidance Explain Positive and Negative Effects of Emotion Recognition Ability on Mental Health in Medical Students

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Abstract

The ability to recognize others' feelings from nonverbal expressions, known as emotion recognition ability (ERA), is considered a crucial socio-emotional competence that may enhance both intra- and interpersonal functioning in healthcare professionals. However, evidence for its association with mental health is mixed, primarily based on cross-sectional studies, and has not thoroughly examined potential underlying mechanisms. The present study examined whether medical students who are more accurate at identifying emotions in others show better mental health over one year and whether this effect is mediated by a higher perceived availability of social support. Longitudinal mediation analyses were conducted with data from 986 medical students in Switzerland who completed questionnaires at two time points, one year apart. While ERA at T1 was not directly associated with mental health issues and burnout at T2, it predicted greater social support availability at T2, which in turn predicted fewer mental health issues and lower burnout. Post-hoc analyses revealed that although ERA increased social support, it also predicted higher habitual avoidance coping, which was negatively related to mental health. Overall, this study sheds light on both positive and negative pathways through which ERA may affect mental health in future healthcare professionals.

Keywords: emotion recognition ability, emotional intelligence, social support, mental health

1. Introduction

Emotion recognition ability (ERA), i.e., the ability to correctly assess others' thoughts and feelings from nonverbals cues, is a crucial skill for psychosocial functioning and has been linked to various positive social interaction outcomes. For instance, people who are more accurate at reading others' emotions have been judged as more socially skilled (Hall et al., 2009, 2015), cooperative and likable (Schlegel et al., 2018), and reported higher relationship quality (Hall et al., 2009; He & Côté, 2023). Such interpersonal benefits of high ERA have also been reported in the field of healthcare, where high-stakes interactions and empathy are central to quality patient care (Zulman et al., 2020) and higher ERA may enable healthcare workers to gather relevant social information, adapt to patient needs, and engage effectively with colleagues (Mayer & Salovey, 1997; Palese & Schmid Mast, 2020). For example, healthcare professionals with higher ERA received higher ratings of empathic communication and patient-centered behavior (Hall et al., 2015; Schreckenbach et al., 2018) and have more satisfied clients or patients (Abargil & Tishby, 2022; Hall, 2011).

While the interpersonal benefits of high ERA are well-documented, evidence on its potential benefits for one's own well-being and mental health is limited. Although this connection seems plausible, given that positive social interactions and relationships—linked to higher ERA—are essential to mental health (Kawachi & Berkman, 2001), studies on the ERA-well-being relationship in non-clinical populations are uncommon and tend to find limited direct effects, often using cross-sectional designs (Schlegel, 2020). Notably, very few studies have examined this link among healthcare professionals (Carrard et al., 2022), who face a particularly high risk of mental health challenges compared to other occupations (Carrard, Berney, et al., 2024; Weinberg & Creed, 2000). The present study therefore seeks to extend our understanding of the link between ERA and mental health in future healthcare professionals by investigating whether ERA constitutes a protective factor for mental health in a large sample of medical students over a period of one year. Furthermore, the study examines whether the perceived availability of social resources may explain such a link. To our knowledge, this is the first study to investigate longitudinal mediation effects of people's accuracy in judging others' emotions via perceived availability of social support.

ERA is seen as a key emotional competence within ability emotional intelligence (ability EI) frameworks, particularly in Mayer and Salovey's four-branch EI model (Mayer & Salovey, 1997). This model suggests that accurately perceiving emotions in others through nonverbal cues

enhances the understanding and management of emotions in oneself and others in social contexts. ERA also constitutes the best studied aspect in the broader realm of interpersonal accuracy, which reflects "the ability to accurately assess others' emotions, personality, intentions, motives, and thoughts" (Palese & Schmid Mast, 2020, p. 307). Like in the ability EI field, interpersonal accuracy research posits that higher ERA is crucial for understanding social interaction partners and then adapting one's behavior accordingly to achieve social goals (Palese & Schmid Mast, 2020).

In both conceptualizations, ERA is measured using performance-based tests that involve identifying emotions from pictures or videos of human faces or bodies displaying nonverbal emotion expressions (Bänziger, 2016). Importantly, the measurement approach in ERA and ability EI research (consisting of items with correct and incorrect responses, akin to measures of cognitive intelligence) is distinct from self-report questionnaires in which participants rate their socio-emotional skills, including how well they think they can read others' emotions (e.g., "trait" EI questionnaires (Petrides et al., 2016)). Ability and trait EI measures are moderately correlated at best (Hall et al., 2009; Joseph et al., 2015; Joseph & Newman, 2010; Murphy & Lilienfeld, 2019) and tap into different constructs, with ERA/ ability EI representing a cognitive ability and trait EI overlapping strongly with personality traits like self-esteem (Joseph et al., 2015).

Although ERA is considered beneficial for interpersonal outcomes, evidence on its association with mental health and subjective well-being is mixed. ERA is impaired in a wide range of mental disorders (e.g., major depression (Cotter et al., 2018; Dalili et al., 2015)) and is discussed to play an important role in their onset and maintenance (Penton-Voak et al., 2017). However, a small meta-analysis of cross-sectional studies (Schlegel, 2020) and a recent daily diary study (Sommer & Schlegel, 2024) found no significant relationship between ERA and subjective well-being in typically-functioning adults. For instance, individuals with higher ERA did not experience more positive affect or report higher life satisfaction (He & Côté, 2023; Schlegel, 2020; Sommer & Schlegel, 2024). Nevertheless, another meta-analysis of non-clinical samples linked higher ERA to lower depressive symptoms (Hall et al., 2009), and a study conducted during a COVID-19 lockdown found that while individuals with higher ERA did not report more positive affect, they reported less negative affect and felt less burdened (Schlegel et al., 2021). This suggests that being good at reading other people's emotions does not make people happier, but that it could protect them from developing mental health issues related to depression, anxiety, or burnout by buffering the negative effects of stress.

An important mediator in this regard may be the availability of social support. Individuals with higher ERA are often seen as more likable and popular and report better social relationships (Hall et al., 2009; He & Côté, 2023; Schlegel et al., 2018; Wang et al., 2019). They might thus be better at building meaningful and reliable social networks that can provide more opportunities to receive emotional and practical support during stressful work-related or other challenges (Colonnello et al., 2021). This may in turn help preventing negative effects on well-being and mental health, in line with previous research (Kawachi & Berkman, 2001). For example, Cohen and Wills (1985) theorized that perceived social support leads to an appraisal of enhanced capacities to deal with stress, thereby buffering its negative effects on mental health. This is supported by meta-analyses on the benefits of perceived social support for the prevention of burnout in students (Kim et al., 2018) and for mental health in samples of first responders, e.g., police officers or emergency medical professionals that experience heightened levels of stress (Prati & Pietrantoni, 2010). Thus, it can be hypothesized that higher ERA predicts higher perceived availability of social support, which in turn may lead to fewer mental health issues like depression, anxiety, or burnout.

To our knowledge, this hypothesis has not yet been directly tested using mediation analysis and/ or longitudinal designs. However, supporting this idea, a cross-sectional study found that higher ability EI, assessed with an instrument including ERA items, was linked to better mental health, fully mediated by social support (Zeidner & Matthews, 2016). Interestingly, in another study by Zeidner and colleagues (2016) no direct correlation between overall ability EI or ERA and mental health was found, but all three variables were related to social support (a mediation was not formally tested). These findings illustrate that ERA may predict mental health through perceived social support even without an overall effect. Of note, there are some studies in which subjective well-being and mental health were predicted by self-rated trait EI, and this relationship was mediated by social support (Kong et al., 2019; Kornas-Biela et al., 2023). However, given that trait EI questionnaires (assessing how people see themselves and what they typically do) are largely unrelated to performance-based ability EI tests (assessing what people can do), such findings cannot readily be transferred to people's emotional abilities.

The present study thus closes an important gap by examining whether medical students' ability to accurately decode emotional cues (ERA) predicts lower mental health issues and burnout over a one-year time period (H1), and whether perceived availability of social support mediates this relationship (H2) in a large sample of medical students. Medical students show

more depression and anxiety symptoms compared to the general population and burnout levels increase during medical school (Carrard, Berney, et al., 2024). Thus, they are a high-stress group where ERA and social support may protect mental health. Moreover, it is important to address mental health issues and burnout during undergraduate medical education since these issues can impair students' ability to learn essential clinical skills and could persist into their medical practice if left untreated.

2. Method

2.1. Study Design and Participants

This is a secondary analysis of data collected within the ETMED-L project, a four-year longitudinal study investigating medical students' interpersonal competence and mental health with an open-cohort design (Berney et al., 2021). From 2021 to 2024, all medical students from curriculum year 1 to 6 registered in the University of Lausanne (Switzerland), except external academic exchange students, were invited to fill in a 60-minute online questionnaire annually. They received CHF50 (≅USD50) for each completed yearly questionnaire. At each time point, participants completed an ERA performance test, questionnaires on perceived availability of social support, stress, anxiety, depression, and burnout symptoms, and other measures that were not used in the present analysis (e.g., empathy) (Carrard, Bourquin, et al., 2024). The ETMED-L project was approved by the Human Research Ethics Committee of the Canton de Vaud (protocol number 2020-02474), all procedures were performed in accordance with the declaration of Helsinki, and all participants gave written informed consent. An overarching power analysis for the whole project was conducted using Monte Carlo simulation, which suggested a sample size of 525 participants (35% response rate in 1500 potential participants) to find small longitudinal effects (Berney et al., 2021).

After excluding 110 participants due to failed attention checks or technical issues, data from 1881 medical students were available. From this sample, 871 students who did not participate for at least two consecutive years were excluded, along with 16 students missing ERA or social support data and 8 students with implausibly low ERA scores (more than 3 standard deviations below the mean). The final sample included 986 medical students with complete data on all variables. Mean age of the final sample was 21.69 years (range: 16-49); see further sample descriptives in Table 1. For this study, participants' ERA scores and demographics were taken from their first participation year (T1), and all other variables from the assessment one year later

(T2). For students who participated more than two consecutive years, data from their two first participations were used as T1 and T2.

Table 1.

Sample descriptives at first participation (T1).

Variables	Categories	N	%
Gender Identification	Male	310	31.44
	Female	670	67.95
	Non-binary	6	0.61
Curriculum Year	1	289	29.31
	2	217	22.01
	3	201	20.39
	4	147	14.91
	5	130	13.18
	6	2	0.20
Number of Participations	2	388	39.35
	3	360	36.51
	4	238	24.14
Mother's Education	Mandatory school	227	23.02
	High School	62	6.29
	College	141	14.30
	University	522	52.94
	No answer	34	3.45
Father's Education	Mandatory school	224	22.72
	High School	86	8.72
	College	208	21.10
	University	438	44.42
	No answer	30	3.04
Mother Tongue	French	805	81.64
	Italian	50	5.07
	English	30	3.04
	Portuguese	22	2.24
	German	22	2.23
	Spanish	9	0.9
	Other	48	4.88
Family Origin	Switzerland	758	76.88
	Neighboring countries	109	11.05
	Other European countries	54	5.46
	Non-European countries	49	4.99
	Unknown	16	1.62

2.2. Measures

Emotion Recognition Ability. ERA at T1 was assessed with the Geneva Emotion Recognition Test Short form (GERT-S) (Schlegel & Scherer, 2016), a performance-based test with 42 short video clips featuring ten actors expressing one of 14 emotions through a standard pseudo-linguistic sentence. Participants selected the expressed emotion after each clip, resulting in a total score reflecting the percentage of correctly recognized emotions. The video stimuli contain multiple modalities (face, voice, and body) and a wide range of emotions. A meta-

analysis showed that the GERT had the highest average reliability and correlation with other ERA tests (Schlegel et al., 2017), and several studies support its construct and predictive validity (Schlegel et al., 2017, 2020).

Social Support. Two items adapted from the Swiss Household Panel study (Tillmann et al., 2016) measured perceived availability of emotional and practical social support at T2: “To what extent do you have someone in your circle who can be available in case of need and show understanding, by talking with you, for example?” and “If necessary, to what extent can someone in your circle provide you with practical help, that is, concrete help or useful advice?”. Both items were rated on a Likert-scale from 0 ("not at all") to 10 ("a great deal").

Mental Health Issues. Depression symptoms at T2 were assessed with the validated French version of the Center for Epidemiological Studies-Depression (CES-D) measuring the experience of symptoms associated with depression over the past week (Lewinsohn et al., 1997; Radloff, 1977). Anxiety symptoms were assessed at T2 with the validated French version (Gauthier & Bouchard, 1993) of the trait subscale of the State-Trait Anxiety Inventory (STAI), which measures the level of anxiety that participants “generally feel” (Spielberger et al., 1983). Stress at T2 was measured with a single item assessing general stress level: “Globally, how would you evaluate your current stress level?” on a Likert scale from 1 ‘none’ to 10 ‘extreme’.

Burnout. Burnout was measured at T2 with the validated French version (Faye-Dumanget et al., 2017) of the Maslach Burnout Inventory Student-Survey (MBI-SS) (Maslach et al., 2001), which evaluates the three dimensions of Emotional Exhaustion, Cynicism, and Academic Efficacy (reversed dimension).

2.3. Statistical Analyses

Two mediation models were estimated: one testing the mediation role of social support in the link between ERA and mental health issues and the other testing the mediation role of perceived social support in the link between ERA and burnout. Mental health issues (including depression symptoms, anxiety symptoms, and stress) and burnout (emotional exhaustion, cynicism, and academic efficacy) were estimated as latent constructs loading on their specific indicators to handle multidimensionality and measurement errors. This approach was chosen due to theoretical (burnout as a distinct construct measured with a single questionnaire) and empirical considerations (high intercorrelations within burnout and mental health scales but lower intercorrelations between these constructs; see Table 2). Social support was also estimated as a latent construct indicated by emotional and practical support items. Students' gender (male vs.

female/non-binary) and age at T1 were included as control variables. Models were fitted with robust standard errors to account for potential deviations from normal distribution. Model fit was evaluated using the Comparative Fit Index (CFI > .95), Root Mean Square Error of Approximation (RMSEA < .06), and Standardized Root Mean Square Residual (SRMR < .08) (Hu & Bentler, 1999). The mediation role of social support was tested using the Monte Carlo Test for Mediation by Zhao and colleagues(2010). All analyses were conducted in STATA version 18 (StataCorp, 2023).

Table 2.

Bivariate correlations.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Emotion Recognition	1.00									
(2) Emotional Support	0.12	1.00								
(3) Practical Support	0.04	0.61	1.00							
(4) Depression Symptoms	0.01	-0.29	-0.29	1.00						
(5) Anxiety Symptoms	0.05	-0.24	-0.25	0.75	1.00					
(6) Stress	0.03	-0.15	-0.14	0.60	0.56	1.00				
(7) Burnout: Emotional Exhaustion	0.03	-0.18	-0.20	0.62	0.57	0.51	1.00			
(8) Burnout: Cynicism	0.07	-0.17	-0.15	0.44	0.35	0.23	0.47	1.00		
(9) Burnout: Academic Efficacy	-0.04	0.21	0.25	-0.47	-0.48	-0.32	-0.46	-0.50	1.00	
(10) Gender Identification	-0.15	-0.09	-0.07	-0.23	-0.26	-0.19	-0.19	-0.06	0.05	1.00
(11) Age	0.03	0.01	-0.01	-0.07	-0.04	-0.05	-0.10	0.07	0.01	0.08

Note. Gender Identification: Female / nonbinary = 0, male = 1.

3. Results

3.1. Mediation Models

Bivariate correlations and descriptive statistics of the variables of interest are displayed in Tables 2 and 3. Figure 1 depicts the structural equation model of the mediation effect of ERA on mental health issues through perceived social support. The model demonstrated a good fit. There was no significant total effect of ERA on mental health issues; however, the indirect effect via perceived social support was significant with a small effect size. The direct effect of ERA shifted from negative to positive with the inclusion of the mediation path but remained non-significant. This means that although higher ERA did not directly predict lower mental health issues one year later, it increased perceived social support which in turn decreased mental health issues, suggesting a “hidden path” through which ERA affected mental health.

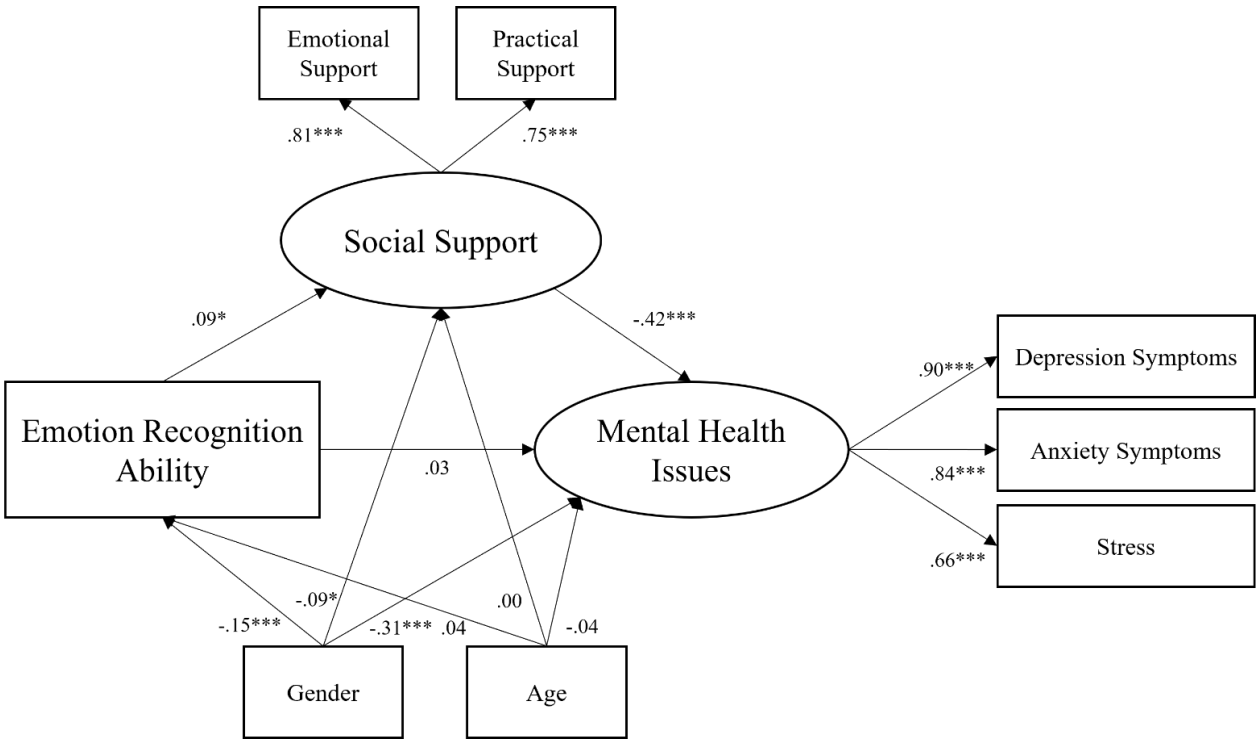
Table 3.

Descriptive statistics.

Variables	Time point	M	SD	Min	Max	Cronbach's alpha	Skewness	Kurtosis
Emotion Recognition	T1	0.71	0.09	0.43	0.95	0.53	-0.27	2.95
Emotional Support	T2	8.59	1.97	0	10	NA	-1.84	6.44
Practical Support	T2	7.72	2.31	0	10	NA	-1.16	3.92
Depression Symptoms	T2	18.48	11.05	0	58	0.92	0.69	3.02
Anxiety Symptoms	T2	44.67	11.72	20	80	0.93	0.11	2.48
Stress	T2	5.41	2.19	1	10	NA	-0.19	1.95
Burnout: Emotional Exhaustion	T2	16.76	5.07	5	30	0.87	0.17	2.82
Burnout: Cynicism	T2	9.74	4.48	4	24	0.86	0.86	3.27
Burnout: Academic Efficacy	T2	24.13	4.55	6	36	0.77	-0.14	2.94

Figure 1

Longitudinal mediation effect of social support (T2) on the link between emotion recognition ability (T1) and mental health issues (T2).



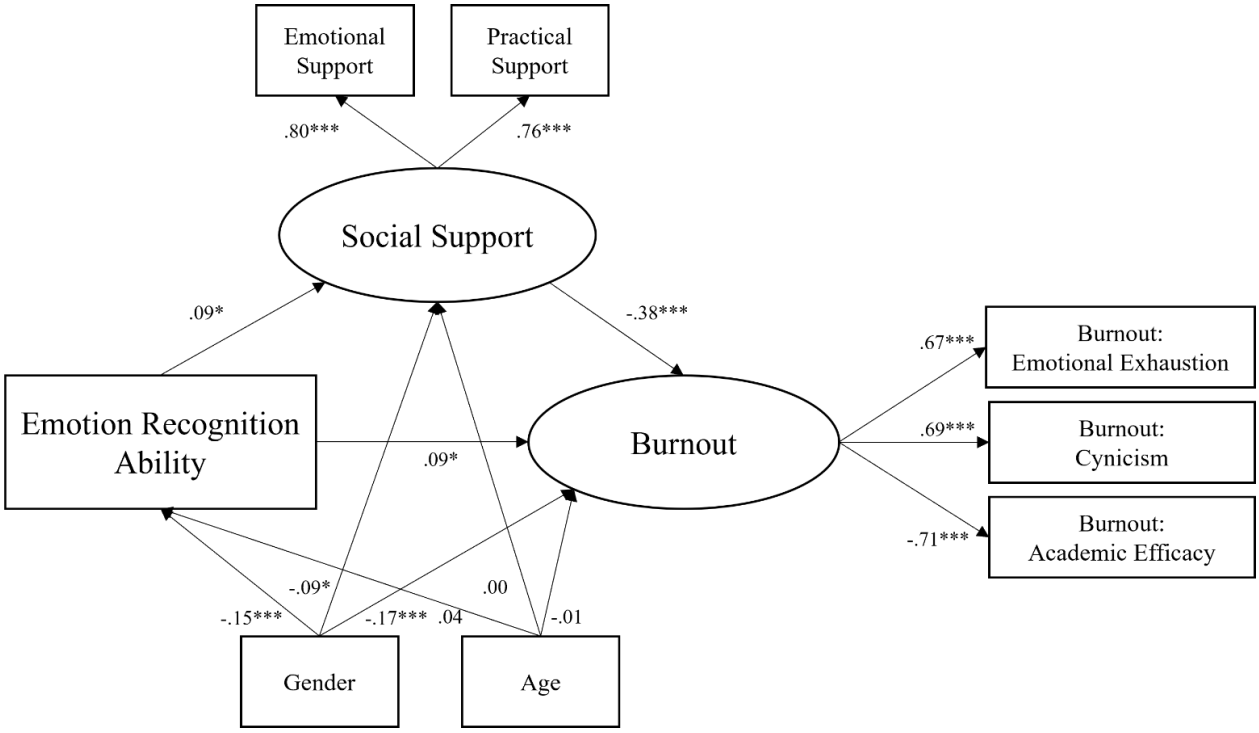
Note. Total Effect of ERA on mental health issues = -.01 (z = -0.21, p = .833). Monte Carlo Test for Mediation (Zhao et al., 2010): Indirect effect = .04 (z = -2.30, p = .019). Model Fit: CFI = .994, RMSEA = .031, SRMR = .018, Chi2 = 25.08 (p =.023). All coefficients are standardized. N = 986.

* p < .05. ** p < .01. *** p < .001.

Figure 2 shows the structural equation model of the mediation effect of ERA on burnout through perceived social support. The model demonstrated a good fit, except for the RMSEA, which was close to the recommended threshold of .06 (Hu & Bentler, 1999). Again, there was no significant total effect of ERA on burnout but the indirect effect via perceived social support was significant. Interestingly, when accounting for the mediation, the direct effect of ERA was positive and significant, indicating a suppression effect: When the mediation path through social support was considered, ERA predicted higher burnout.

Figure 2

Longitudinal mediation effect of social support (T2) on the link between emotion recognition ability (T1) and burnout (T2).



Note. Total Effect of ERA on mental health issues = .05 (z = 1.34, p = .182). Monte Carlo Test for Mediation (Zhao et al., 2010): Indirect effect = -.04 (z = -2.17, p = .030). Model Fit: CFI = .952, RMSEA = .069, SRMR = .033, Chi2 = 73.27 (p <.001). All coefficients are standardized. N = 986.

* p < .05. ** p < .01. *** p < .001.

Taken together, H1 was rejected: ERA did not directly predict lower mental health issues or burnout overall one year later. However, H2 was supported: ERA indirectly predicted lower mental health issues and burnout through increased social support. Additionally, when accounting for this mediation path, the direct effects of ERA on mental health issues and burnout became more positive (and significant for burnout). This means that, aside from social support, there may be another factor at play through which ERA increases mental health issues and that cancels out the positive path through social support.

3.2. Post-Hoc Analyses

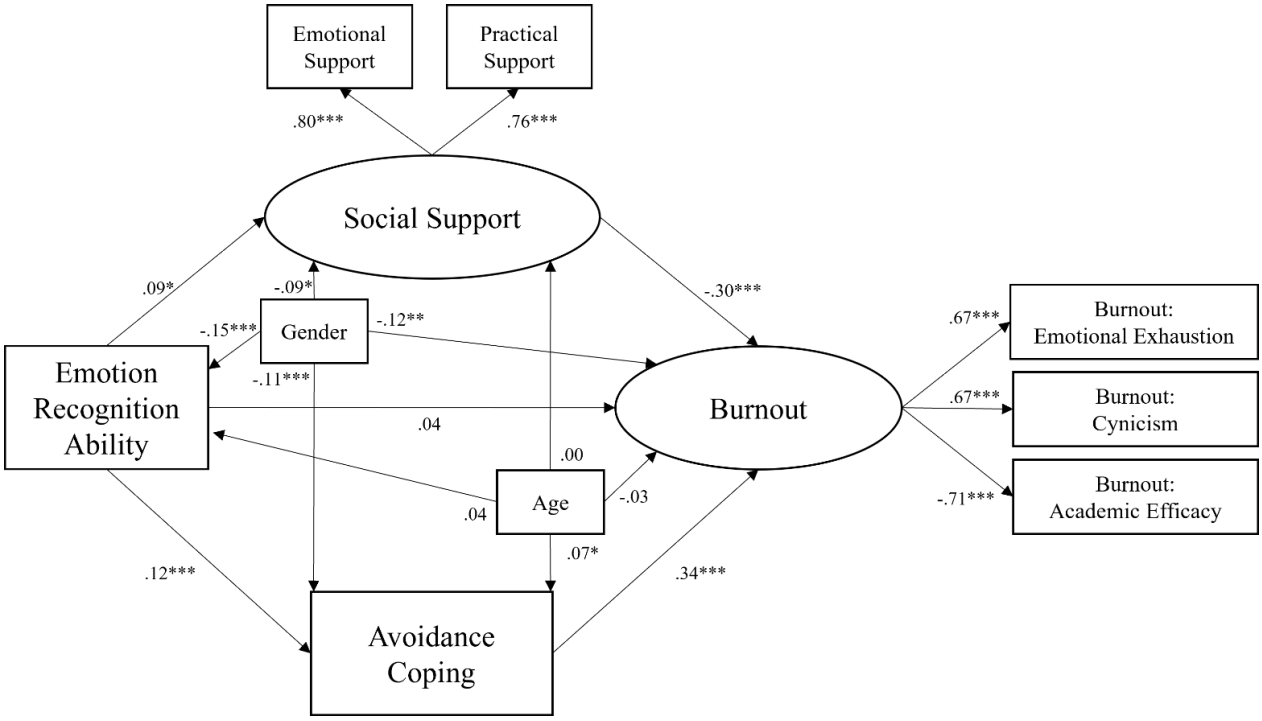
Post-hoc analyses were conducted to explore possible negative pathways between ERA and mental health. One possibility is that higher ERA involves a stronger reactivity to negative emotional situations, which can adversely affect mental health. Previous studies have found that

individuals with higher ERA were more reactive to public speaking stress (Bechtoldt & Schneider, 2016), appraised negative events as more relevant and negative (Scherer, 2020), and reported a higher tendency for ruminative emotion regulation (Sommer & Schlegel, 2024). Therefore, a secondary mediation path via coping mechanisms was explored using items from the coping section of the Euronet questionnaire, which measures habitual reactions to difficulties (Berney et al., 2021; Perrin et al., 2014). Due to the debatable factor structure and reliability of the original scale (Perrin et al., 2014), three items were selected from the T2 assessment to represent different coping mechanisms: (1) problem-focused ("I analyze the situation and try to solve/overcome the problem"), (2) emotion-focused ("I cry"), and (3) avoidance coping ("I withdraw and hide"). These items were rated on a scale from 0 ("not at all usual for me") to 3 ("very usual for me"). Descriptives and bivariate correlations with the other variables are provided in Supplementary Tables S1 and S2.

In a series of structural equation models, each coping item was added separately as a secondary mediator to the two models predicting mental health issues and burnout shown in Figures 1 and 2. As an example, Figure 3 shows the secondary mediation of avoidance-coping on burnout (see Supplementary Figures S1 to S5 for all other models). Results showed that increased avoidance coping mediated the effect of ERA on both mental health issues (Figure S5) and burnout (Figure 3). The mediation effects via problem-focused and emotion-focused coping on mental health issues and burnout were non-significant (Figures S1 to S4). All models showed acceptable to good fit (CFI: .915 - .990; RMSEA: .039 - .086; SRMR: .021 - .058). Including the mediation path via avoidance coping alongside the path via social support reduced the direct effects of ERA on mental health issues and burnout. This indicates that ERA had both beneficial effects (via higher social support) and detrimental effects (via higher avoidance in response to difficulties) on mental health and burnout.

Figure 3

Longitudinal double-mediation effect of social support (T2) and avoidance coping (T2) on the link between emotion recognition ability (T1) and burnout (T2).



Note. Total Effect of ERA on burnout = .05 (z = 1.31, p = .189). Monte Carlo Tests for Mediation (Zhao et al., 2010): Indirect effect via social support = -.03 (z = -2.03, p = .042); Indirect effect avoidance coping = .04 (z = 3.41, p = .001). Model Fit: CFI = .915, RMSEA = .086, SRMR = .058, Chi2 = 139.47 (p < .001). All coefficients are standardized. N = 986.

* p < .05. ** p < .01. *** p < .001.

4. Discussion

The present study investigated whether and how the ability to accurately judge other people's emotions contributes to better intrapersonal functioning by reducing mental health issues such as stress, depression, anxiety, and burnout in a large sample of medical students. These findings are particularly relevant in light of their high prevalence of mental health issues and burnout, which may extend into their future healthcare practice. The first notable finding was in line with previous studies in which ERA failed to show direct effects on well-being in non-clinical samples (Sommer & Schlegel, 2024): Medical students with higher ERA scores did not report fewer mental health issues and lower burnout one year later. Given the longitudinal design, large sample, and multifaceted measurement of mental health issues in the present study, this

finding adds to the evidence that there is no direct benefit of ERA to mental health and subjective well-being (Schlegel, 2020; Sommer & Schlegel, 2024). However, the results also showed that although a direct link was missing, higher ERA increased the perceived availability of social support, which in turn reduced mental health issues. Additionally, post-hoc analyses revealed that ERA was linked to more avoidance coping in difficult situations, which in turn increased mental health issues. Taken together, these results highlight the complex pathways through which ERA may be linked to mental health in future healthcare professionals.

The finding that ERA was linked to mental health issues and burnout through perceived social support aligns with the notion that accurately interpreting other people's emotions helps in building meaningful, reliable, and stable relationships, or generally, high relationship quality (Hall et al., 2009). According to theories on ability EI (Mayer & Salovey, 1997) and interpersonal accuracy (Palese & Schmid Mast, 2020), ERA facilitates the adaptive use of other socio-emotional competences in social interactions and relationships (e.g., managing others' emotions to increase cooperation and trust). This results in greater availability of practical and emotional social support when needed and may help high ERA individuals to better manage stressful life situations and prevent declines in mental health. The beneficial interpersonal pathway between ERA and mental health, found despite the absence of an overall link, suggests that similar pathways may have been at play in previous studies with overall null findings, which typically only tested the direct link (Sommer & Schlegel, 2024). Taken together, these results suggest that ERA may indirectly support healthcare professionals' mental health through enhanced interpersonal resources, potentially mitigating the effects of high-pressure work environments.

The "hidden" positive effect of ERA suggests that ERA may simultaneously impact mental health through negative pathways that cancel each other out. Our post-hoc analyses revealed another "hidden" path: High ERA predicted more avoidance coping, i.e., the tendency to react to difficulties with withdrawal, which correlated with higher self-reported burnout symptoms. Previous studies have linked ERA, particularly the GERT used here, to higher neuroticism and rumination (Schlegel et al., 2019; Sommer & Schlegel, 2024). Furthermore, individuals with higher ERA tend to perceive negative events as more severe, relevant, and difficult to manage (Scherer, 2020). Schlegel (Schlegel, 2020) suggested that individuals with high ERA may be more attuned to negative emotions around them, especially in stressful situations. Medical students, who regularly encounter stress in academic and clinical settings, might be particularly sensitive to negative emotional cues in others. Taken together, ERA appears

to have both positive and negative impacts on medical students' mental health, through interpersonal (e.g., social support) and intrapersonal (e.g., emotional reactivity) pathways. Such "bright" and "dark" sides have been previously hypothesized for both overall EI (Davis & Nichols, 2016) and ERA specifically (Schlegel, 2020). The results of this study further support this hypothesis, which may be a relevant aspect to consider when training ERA in healthcare professionals (Döllinger et al., 2023).

The present study has several strengths, but also some limitations. A clear strength is the longitudinal design, which expands previous research and indicates temporal, though not strictly causal, effects of ERA. Additionally, the large sample of medical students made it possible to detect small effects in a sample at risk of developing mental health issues. However, it remains an open question whether these findings generalize to other, broader samples (e.g., other age groups and professions). Also, the reported focal indirect and total effects of ERA on mental health showed small effect sizes, which may limit practical implications. Nevertheless, small effect sizes when predicting outcomes are common in EI and interpersonal accuracy research (Hall et al., 2009). A further limitation is the relatively low internal consistency of the ERA measure (GERT-S) in the present study, potentially due to the higher mean performance and slightly lower variability in this sample compared to original validation studies (Schlegel et al., 2019; Schlegel & Scherer, 2016). Lastly, the post-hoc mediation analyses were exploratory and encompassed coping mechanisms measured only with single items, and therefore need replication in future studies.

To conclude, the present study showed that being more accurate at reading others does not directly impact mental health. However, the study demonstrated that ERA can simultaneously improve mental health in medical students through interpersonal processes and impair it through intrapersonal pathways. These findings imply that future studies in the domains of ERA, ability EI, and interpersonal accuracy in healthcare workers should go beyond the examination of direct links with well-being and consider the underlying mechanisms in much more detail. To this end, future research should develop a comprehensive theoretical framework to map these intrapersonal and interpersonal pathways and further explore ERA's potential in supporting resilience among healthcare professionals.

Data Availability

The data that support the findings of this study are openly available on zenodo at http://doi.org/10.5281/zenodo.12517444

CRediT Authorship Contribution Statement

Nils R. Sommer: Conceptualization, Writing – original draft, Writing – review & editing. **Valerie Carrard:** Conceptualization, Formal analysis, Methodology, Investigation, Project administration, Data curation, Writing – review & Editing. **Céline Bourquin:** Funding acquisition, Writing - review & editing. **Alexandre Berney:** Funding acquisition, Project administration, Supervision, Writing - review & editing. **Katja Schlegel:** Writing – review & editing, Supervision, Conceptualization.

Declaration of Generative AI in Scientific Writing

The authors used ChatGPT (https://chatgpt.com/) in order to improve the concision of the manuscript in some sections. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

Declaration of Competing Interest

The authors have no competing interests to declare.

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References

Abargil, M., & Tishby, O. (2022). How therapists' emotion recognition relates to therapy process and outcome. *Clinical Psychology & Psychotherapy*, *29*(3), 1001–1019. https://doi.org/10.1002/cpp.2680

Bänziger, T. (2016). Accuracy of judging emotions. In J. A. Hall, M. Schmid Mast, & T. V. West (Eds.), *The social psychology of perceiving others accurately* (pp. 23–51). Cambridge University Press.

Bechtoldt, M. N., & Schneider, V. K. (2016). Predicting stress from the ability to eavesdrop on feelings: Emotional intelligence and testosterone jointly predict cortisol reactivity. *Emotion*, *16*(6), 815–825. https://doi.org/10.1037/emo0000134

Berney, A., Carrard, V., Berney, S., Schlegel, K., Gaume, J., Gholam, M., Bart, P.-A., Preisig, M., Wac, K., Mast, M. S., & Bourquin, C. (2021). Study protocol for the ETMED-L project: Longitudinal study of mental health and interpersonal competence of medical students in a Swiss university using a comprehensive framework of empathy. *BMJ Open*, *11*(12), e053070. https://doi.org/10.1136/bmjopen-2021-053070

Carrard, V., Berney, S., Bourquin, C., Ranjbar, S., Castelao, E., Schlegel, K., Gaume, J., Bart, P.-A., Mast, M. S., Preisig, M., & Berney, A. (2024). Mental health and burnout during medical school: Longitudinal evolution and covariates. *PLOS ONE*, *19*(4), e0295100. https://doi.org/10.1371/journal.pone.0295100

Carrard, V., Bourquin, C., & Berney, A. (2024, August 22). *Questionnaires for the ETMED-L project*. Zenodo. https://zenodo.org/records/13361385

Carrard, V., Bourquin, C., Berney, S., Schlegel, K., Gaume, J., Bart, P.-A., Preisig, M., Schmid Mast, M., & Berney, A. (2022). The relationship between medical students' empathy, mental health, and burnout: A cross-sectional study. *Medical Teacher*, *44*(12), 1392–1399. https://doi.org/10.1080/0142159X.2022.2098708

Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin*, *98*, 310–357. https://doi.org/10.1037/0033-2909.98.2.310

Colonnello, V., Carnevali, L., Russo, P. M., Ottaviani, C., Cremonini, V., Venturi, E., & Mattarozzi, K. (2021). Reduced recognition of facial emotional expressions in global burnout and burnout depersonalization in healthcare providers. *PeerJ*, *9*, e10610. https://doi.org/10.7717/peerj.10610

Cotter, J., Granger, K., Backx, R., Hobbs, M., Looi, C. Y., & Barnett, J. H. (2018). Social cognitive dysfunction as a clinical marker: A systematic review of meta-analyses across 30 clinical conditions. *Neuroscience & Biobehavioral Reviews*, *84*, 92–99. https://doi.org/10.1016/j.neubiorev.2017.11.014

Dalili, M. N., Penton-Voak, I. S., Harmer, C. J., & Munafò, M. R. (2015). Meta-analysis of emotion recognition deficits in major depressive disorder. *Psychological Medicine*, *45*(6), 1135–1144. https://doi.org/10.1017/S0033291714002591

Davis, S. K., & Nichols, R. (2016). Does emotional intelligence have a "dark" side? A review of the literature. *Frontiers in Psychology*. https://www.frontiersin.org/article/10.3389/fpsyg.2016.01316

Döllinger, L., Högman, L. B., Laukka, P., Bänziger, T., Makower, I., Fischer, H., & Hau, S. (2023). Trainee psychotherapists' emotion recognition accuracy improves after training: Emotion recognition training as a tool for psychotherapy education. *Frontiers in Psychology*, *14*. https://doi.org/10.3389/fpsyg.2023.1188634

Faye-Dumanget, C., Carré, J., Le Borgne, M., & Boudoukha, Pr. A. H. (2017). French validation of the Maslach Burnout Inventory-Student Survey (MBI-SS). *Journal of Evaluation in Clinical Practice*, *23*(6), 1247–1251. https://doi.org/10.1111/jep.12771

Gauthier, J., & Bouchard, S. (1993). Adaptation canadienne-française de la forme révisée du State–Trait Anxiety Inventory de Spielberger. [A French-Canadian adaptation of the revised version of Spielberger's State–Trait Anxiety Inventory.]. *Canadian Journal of Behavioural Science / Revue Canadienne Des Sciences Du Comportement*, *25*(4), 559–578. https://doi.org/10.1037/h0078881

Hall, J. A. (2011). Clinicians' accuracy in perceiving patients: Its relevance for clinical practice and a narrative review of methods and correlates. *Patient Education and Counseling*, *84*(3), 319–324. https://doi.org/10.1016/j.pec.2011.03.006

Hall, J. A., Andrzejewski, S. A., & Yopchick, J. E. (2009). Psychosocial correlates of interpersonal sensitivity: A meta-analysis. *Journal of Nonverbal Behavior*, *33*(3), 149–180. https://doi.org/10.1007/s10919-009-0070-5

Hall, J. A., Ship, A. N., Ruben, M. A., Curtin, E. M., Roter, D. L., Clever, S. L., Smith, C. C., & Pounds, K. (2015). Clinically relevant correlates of accurate perception of patients' thoughts and feelings. *Health Communication*, *30*(5), 423–429. https://doi.org/10.1080/10410236.2013.865507

He, J. C., & Côté, S. (2023). Are empathic people better adjusted? A test of competing models of empathic accuracy and intrapersonal and interpersonal facets of adjustment using self- and peer reports. *Psychological Science*, *34*(9), 955–967. https://doi.org/10.1177/09567976231185127

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Joseph, D. L., Jin, J., Newman, D. A., & O'Boyle, E. H. (2015). Why does self-reported emotional intelligence predict job performance? A meta-analytic investigation of mixed EI. *Journal of Applied Psychology*, *100*(2), 298–342. https://doi.org/10.1037/a0037681

Joseph, D. L., & Newman, D. A. (2010). Emotional intelligence: An integrative meta-analysis and cascading model. *Journal of Applied Psychology*, *95*(1), 54–78. https://doi.org/10.1037/a0017286

Kawachi, I., & Berkman, L. F. (2001). Social ties and mental health. *Journal of Urban Health*, *78*(3), 458–467. https://doi.org/10.1093/jurban/78.3.458

Kim, B., Jee, S., Lee, J., An, S., & Lee, S. M. (2018). Relationships between social support and student burnout: A meta-analytic approach. *Stress and Health*, *34*(1), 127–134. https://doi.org/10.1002/smi.2771

Kong, F., Gong, X., Sajjad, S., Yang, K., & Zhao, J. (2019). How Is Emotional Intelligence Linked to Life Satisfaction? The Mediating Role of Social Support, Positive Affect and Negative Affect. *Journal of Happiness Studies*, *20*(8), 2733–2745. https://doi.org/10.1007/s10902-018-00069-4

Kornas-Biela, D., Martynowska, K., & Zysberg, L. (2023). 'With a Little Help from My Friends': Emotional Intelligence, Social Support, and Distress during the COVID-19 Outbreak. *International Journal of Environmental Research and Public Health*, *20*(3), Article 3. https://doi.org/10.3390/ijerph20032515

Lewinsohn, P. M., Seeley, J. R., Roberts, R. E., & Allen, N. B. (1997). Center for Epidemiologic Studies Depression Scale (CES-D) as a screening instrument for depression among community-residing older adults. *Psychology and Aging*, *12*(2), 277–287. https://doi.org/10.1037/0882-7974.12.2.277

Maslach, C., Schaufeli, W. B., & Leiter, M. P. (2001). Job Burnout. *Annual Review of Psychology*, *52*(Volume 52, 2001), 397–422. https://doi.org/10.1146/annurev.psych.52.1.397

Mayer, J. D., & Salovey, P. (1997). What is emotional intelligence? In P. Salovey & D. J. Sluiter (Eds.), *Emotional development and emotional intelligence: Educational implications* (pp. 3–31). Basic Books.

Murphy, B. A., & Lilienfeld, S. O. (2019). Are self-report cognitive empathy ratings valid proxies for cognitive empathy ability? Negligible meta-analytic relations with behavioral task performance. *Psychological Assessment*, *31*(8), 1062–1072. https://doi.org/10.1037/pas0000732

Palese, T., & Schmid Mast, M. (2020). Interpersonal accuracy and interaction outcomes: Why and how reading others correctly has adaptive advantages in social interactions. In R. J. Sternberg & A. Kostić (Eds.), *Social intelligence and nonverbal communication* (pp. 305–331). Springer International Publishing. https://doi.org/10.1007/978-3-030-34964-6_11

Penton-Voak, I. S., Munafò, M. R., & Looi, C. Y. (2017). Biased facial-emotion perception in mental health disorders: A possible target for psychological intervention? *Current Directions in Psychological Science*, *26*(3), 294–301. https://doi.org/10.1177/0963721417704405

Perrin, M., Vandeleur, C. L., Castelao, E., Rothen, S., Glaus, J., Vollenweider, P., & Preisig, M. (2014). Determinants of the development of post-traumatic stress disorder, in the general population.

Social Psychiatry and Psychiatric Epidemiology, *49*(3), 447–457. https://doi.org/10.1007/s00127-013-0762-3

Petrides, K. V., Mikolajczak, M., Mavroveli, S., Sanchez-Ruiz, M.-J., Furnham, A., & Pérez-González, J.-C. (2016). Developments in trait emotional intelligence research. *Emotion Review*, *8*(4), 335–341. https://doi.org/10.1177/1754073916650493

Prati, G., & Pietrantoni, L. (2010). The relation of perceived and received social support to mental health among first responders: A meta-analytic review. *Journal of Community Psychology*, *38*(3), 403–417. https://doi.org/10.1002/jcop.20371

Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, *1*(3), 385–401. https://doi.org/10.1177/014662167700100306

Scherer, K. R. (2020). Evidence for the existence of emotion dispositions and the effects of appraisal bias. *Emotion*, *21*, 1224–1238. https://doi.org/10.1037/emo0000861

Schlegel, K. (2020). Inter- and intrapersonal downsides of accurately perceiving others' emotions. In R. J. Sternberg & A. Kostić (Eds.), *Social intelligence and nonverbal communication* (pp. 359–395). Springer International Publishing. http://link.springer.com/10.1007/978-3-030-34964-6_13

Schlegel, K., Boone, R. T., & Hall, J. A. (2017). Individual differences in interpersonal accuracy: A Multi-level meta-analysis to assess whether judging other people is one skill or many. *Journal of Nonverbal Behavior*, *41*(2), 103–137. https://doi.org/10.1007/s10919-017-0249-0

Schlegel, K., Fontaine, J. R. J., & Scherer, K. R. (2019). The nomological network of emotion recognition ability: Evidence from the Geneva Emotion Recognition Test. *European Journal of Psychological Assessment*, *35*(3), 352–363. https://doi.org/10.1027/1015-5759/a000396

Schlegel, K., Gugelberg, H. M. von, Makowski, L. M., Gubler, D. A., & Troche, S. J. (2021). Emotion recognition ability as a predictor of well-being during the COVID-19 pandemic. *Social Psychological and Personality Science*, *12*(7), 1380–1391. https://doi.org/10.1177/1948550620982851

Schlegel, K., Mehu, M., van Peer, J. M., & Scherer, K. R. (2018). Sense and sensibility: The role of cognitive and emotional intelligence in negotiation. *Journal of Research in Personality*, *74*, 6–15. https://doi.org/10.1016/j.jrp.2017.12.003

Schlegel, K., Palese, T., Mast, M. S., Rammsayer, T. H., Hall, J. A., & Murphy, N. A. (2020). A meta-analysis of the relationship between emotion recognition ability and intelligence. *Cognition and Emotion*, *34*(2), 329–351. https://doi.org/10.1080/02699931.2019.1632801

Schlegel, K., & Scherer, K. R. (2016). Introducing a short version of the Geneva Emotion Recognition Test (GERT-S): Psychometric properties and construct validation. *Behavior Research Methods*, *48*(4), 1383–1392. https://doi.org/10.3758/s13428-015-0646-4

Schreckenbach, T., Ochsendorf, F., Sterz, J., Rüsseler, M., Bechstein, W. O., Bender, B., & Bechtoldt, M. N. (2018). Emotion recognition and extraversion of medical students interact to predict their empathic communication perceived by simulated patients. *BMC Medical Education*, *18*(1), 237. https://doi.org/10.1186/s12909-018-1342-8

Sommer, N. R., & Schlegel, K. (2024). Beyond mean levels and linear relationships: The complex association between emotion recognition ability and well-being. *Journal of Research in Personality*, *109*, 104467. https://doi.org/10.1016/j.jrp.2024.104467

Spielberger, C. D., Gorsuch, R. L., Lushene, R., Vagg, P. R., & Jacobs, G. A. (1983). *Manual for the State-Trait Anxiety Inventory.* Consulting Psychologists Press.

StataCorp. (2023). *Stata Statistical Software: Release 18.* [Computer software]. StataCorp LLC.

Tillmann, R., Voorpostel, M., Kuhn, U., Lebert, F., Ryser, V.-A., Lipps, O., Wernli, B., & Antal, E. (2016). The Swiss Household Panel Study: Observing social change since 1999. *Longitudinal and Life Course Studies*, *7*(1), Article 1. https://doi.org/10.14301/llcs.v7i1.360

Wang, Y., Hawk, S. T., Tang, Y., Schlegel, K., & Zou, H. (2019). Characteristics of emotion recognition ability among primary school children: Relationships with peer status and friendship quality. *Child Indicators Research*, *12*(4), 1369–1388. https://doi.org/10.1007/s12187-018-9590-z

Weinberg, A., & Creed, F. (2000). Stress and psychiatric disorder in healthcare professionals and hospital staff. *The Lancet*, *355*(9203), 533–537. https://doi.org/10.1016/S0140-6736(99)07366-3

Zeidner, M., & Matthews, G. (2016). Ability emotional intelligence and mental health: Social support as a mediator. *Personality and Individual Differences*, *99*, 196–199. https://doi.org/10.1016/j.paid.2016.05.008

Zeidner, M., Matthews, G., & Shemesh, D. O. (2016). Cognitive-social sources of wellbeing: Differentiating the roles of coping style, social support and emotional intelligence. *Journal of Happiness Studies*, *17*(6), 2481–2501. https://doi.org/10.1007/s10902-015-9703-z

Zhao, X., Lynch, J. G., Jr., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and truths about mediation analysis. *Journal of Consumer Research*, *37*(2), 197–206. https://doi.org/10.1086/651257

Zulman, D. M., Haverfield, M. C., Shaw, J. G., Brown-Johnson, C. G., Schwartz, R., Tierney, A. A., Zionts, D. L., Safaeinili, N., Fischer, M., Thadaney Israni, S., Asch, S. M., & Verghese, A. (2020). Practices to foster physician presence and connection with patients in the clinical encounter. *JAMA*, *323*(1), 70–81. https://doi.org/10.1001/jama.2019.19003

9.3.2 Supplementary Material

Table S1.

Descriptive Statistics of reactions to difficulties items.

Variables	Time point	M	SD	Min	Max	Skewness	Kurtosis
(12) Problem-Focused Coping	T2	2.29	0.65	2.29	0.65	-0.60	3.32
(13) Emotion-Focused Coping	T2	1.33	1.08	1.33	1.08	0.14	1.72
(14) Avoidance Coping	T2	0.93	0.97	0.93	0.97	0.61	2.19

Table S2.

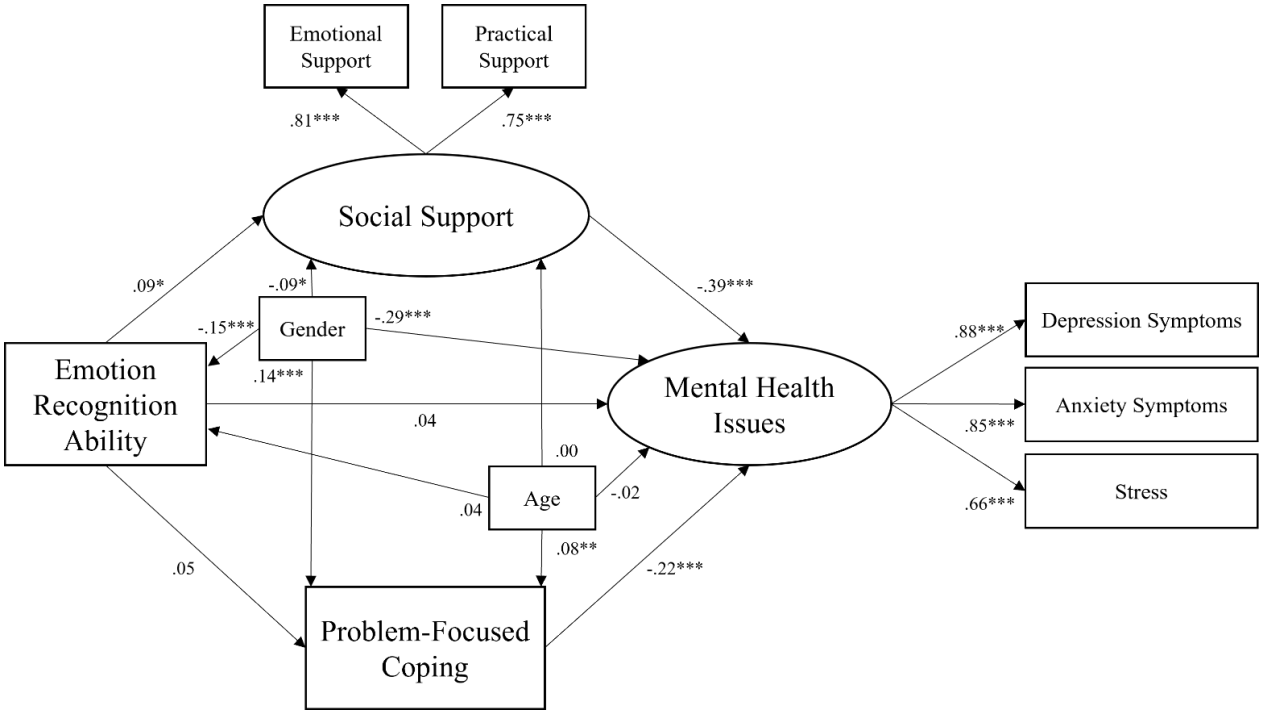
Extended bivariate correlations including reactions to difficulties.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) Emotion Recognition	1.00												
(2) Emotional Support	0.12	1.00											
(3) Practical Support	0.04	0.61	1.00										
(4) Depression Symptoms	0.01	-0.29	-0.29	1.00									
(5) Anxiety Symptoms	0.05	-0.24	-0.25	0.75	1.00								
(6) Stress	0.03	-0.15	-0.14	0.60	0.56	1.00							
(7) Burnout: Emotional Exhaustion	0.03	-0.18	-0.20	0.62	0.57	0.51	1.00						
(8) Burnout: Cynicism	0.07	-0.17	-0.15	0.44	0.35	0.23	0.47	1.00					
(9) Burnout: Academic Efficacy	-0.04	0.21	0.25	-0.47	-0.48	-0.32	-0.46	-0.50	1.00				
(10) Gender Identification	-0.15	-0.09	-0.07	-0.23	-0.26	-0.19	-0.19	-0.06	0.05	1.00			
(11) Age	0.03	0.01	-0.01	-0.07	-0.04	-0.05	-0.10	0.07	0.01	0.08	1.00		
(12) Problem-Focused Reactions	0.04	0.12	0.11	-0.22	-0.33	-0.18	-0.18	-0.13	0.28	0.14	0.10	1.00	
(13) Sadness Reactions	0.13	0.10	0.06	0.28	0.35	0.21	0.24	0.13	-0.11	-0.58	-0.07	-0.22	1.00
(14) Avoidance Reactions	0.14	-0.20	-0.19	0.46	0.42	0.27	0.29	0.24	-0.31	-0.13	0.06	-0.16	0.15

Note. Gender Identification: Female / nonbinary = 0, male = 1.

Figure S1

Longitudinal double-mediation effect of social support (T2) and problem-focused coping (T2) on the link between emotion recognition ability (T1) and mental health issues (T2).

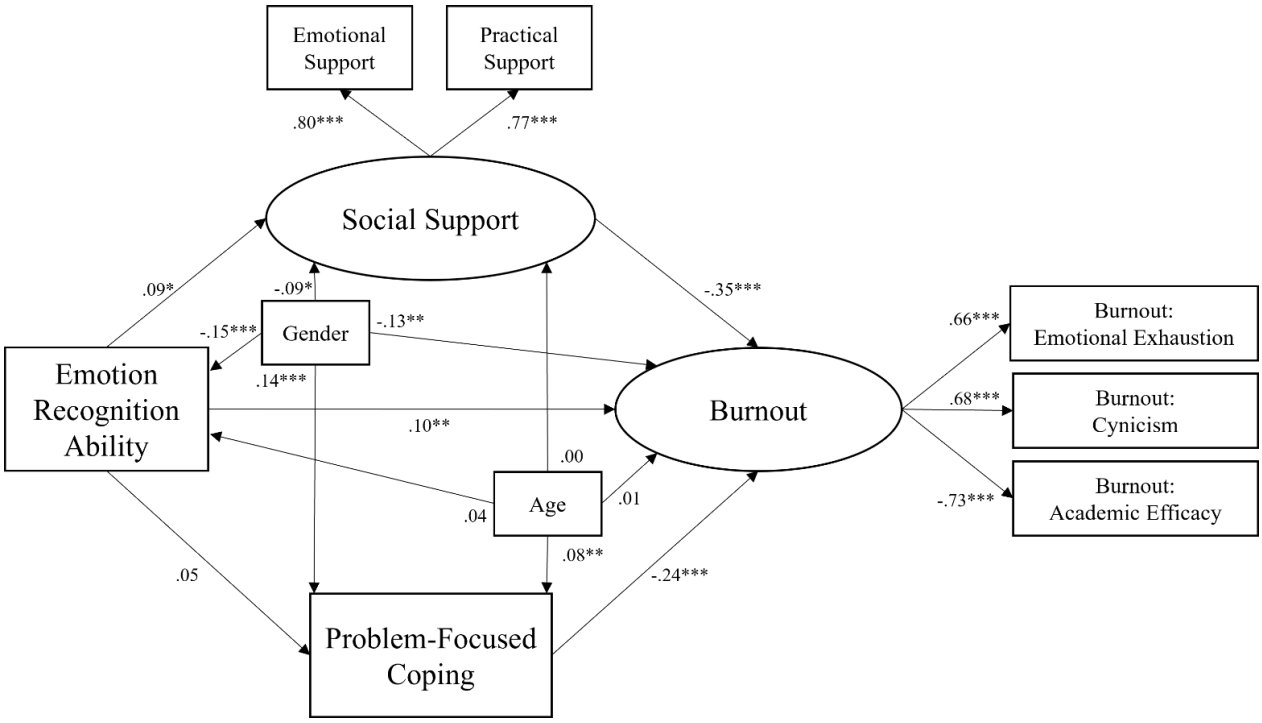


Note. Total Effect of ERA on mental health issues = -.005 (z = -0.14, p = .887). Monte Carlo Tests for Mediation (Zhao et al., 2010): Indirect effect via social support = -.04 (z = -2.34, p = .020); Indirect effect via problem-focused coping = -.01 (z = 0.01, p = .093). Model Fit: CFI = .971, RMSEA = .060, SRMR = .035, Chi2 = 77.84 (p <.001). All coefficients are standardized. N = 986.

* p < .05. ** p < .01. *** p < .001.

Figure S2

Longitudinal double-mediation effect of social support (T2) and problem-focused coping (T2) on the link between emotion recognition ability (T1) and burnout (T2).

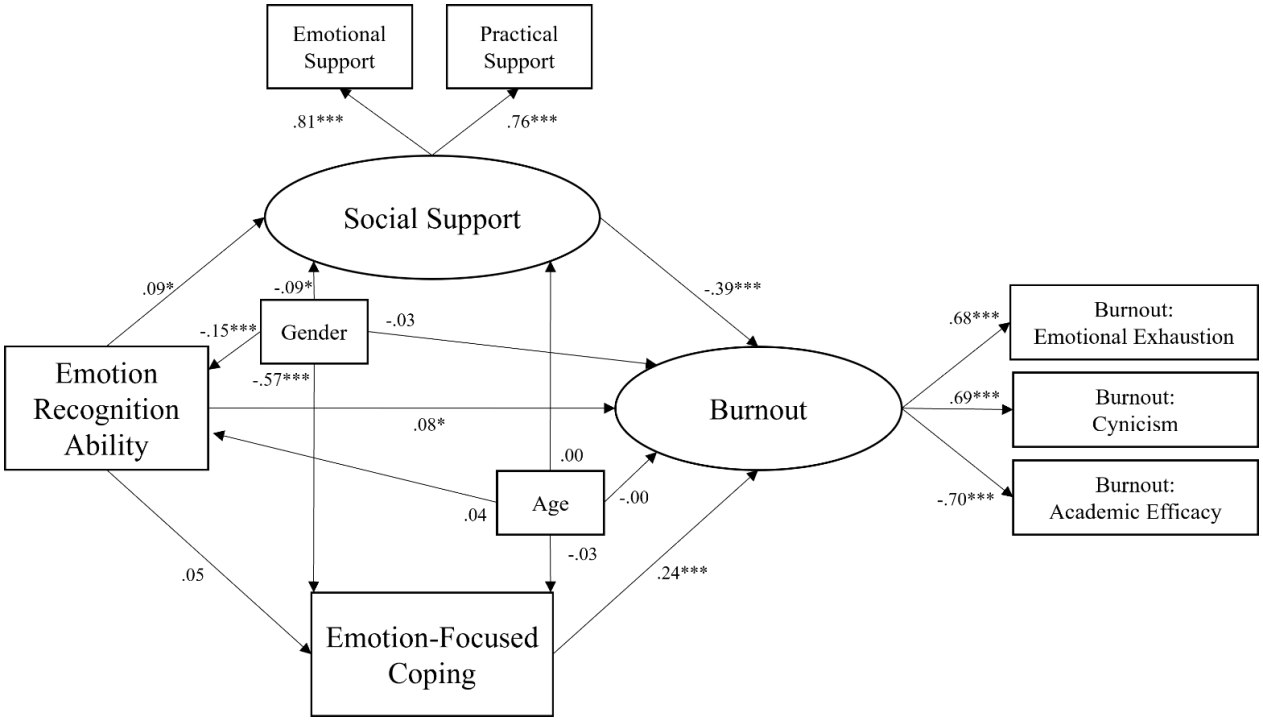


Note. Total Effect of ERA on burnout = .05 (z = 1.33, p = .183). Monte Carlo Tests for Mediation (Zhao et al., 2010): Indirect effect via social support = -.03 (z = -2.12, p = .034); Indirect effect via problem-focused coping = -.01 (z = -1.68, p = .094). Model Fit: CFI = .930, RMSEA = .076, SRMR = .043, Chi2 = 113.376 (p < .001). All coefficients are standardized. N = 986.

* p < .05. ** p < .01. *** p < .001.

Figure S3

Longitudinal double-mediation effect of social support (T2) and emotion-focused coping (T2) on the link between emotion recognition ability (T1) and mental health issues (T2).

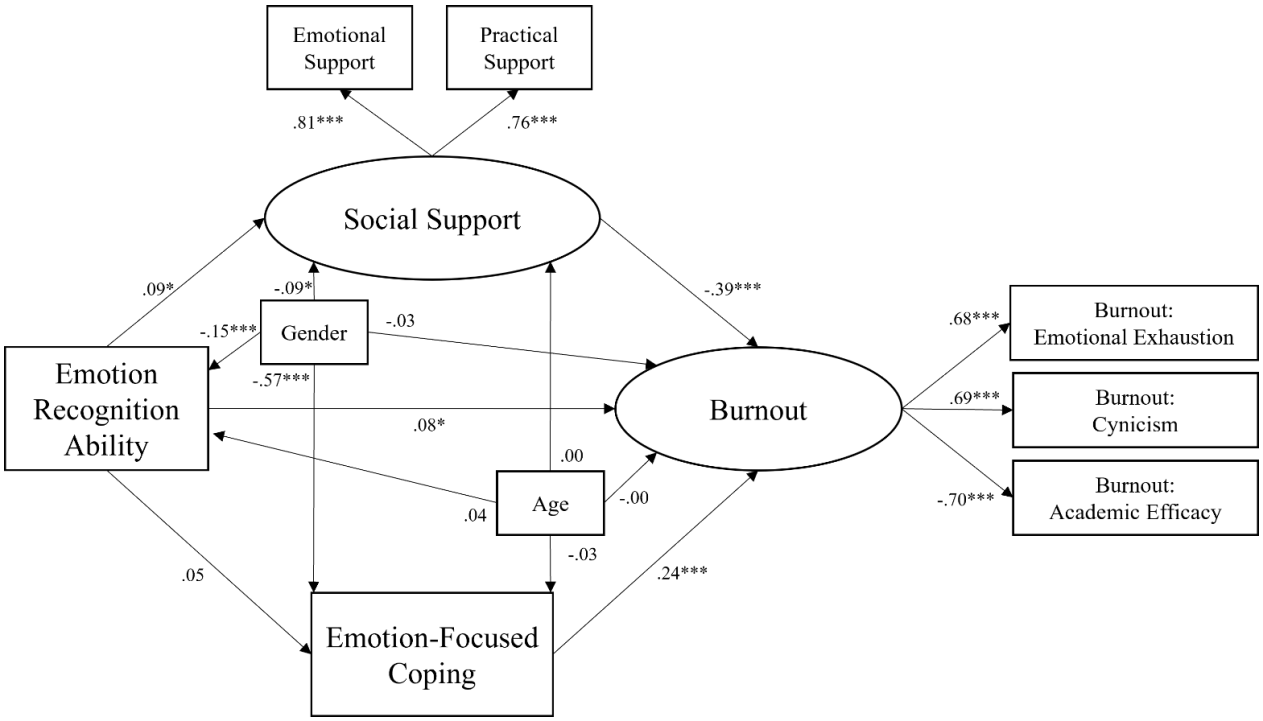


Note. Total Effect of ERA on burnout = .05 (z = 1.32, p = .187). Monte Carlo Tests for Mediation (Zhao et al., 2010): Indirect effect via social support = -.04 (z = -2.25, p = .025); Indirect effect via emotion-focused coping = .01 (z = 1.67, p = .095). Model Fit: CFI = .963, RMSEA = .062, SRMR = .034, Chi2 = 80.95 (p < .001). All coefficients are standardized. N = 986.

* p < .05. ** p < .01. *** p < .001

Figure S4

Longitudinal double-mediation effect of social support (T2) and emotion-focused coping (T2) on the link between emotion recognition ability (T1) and burnout (T2).

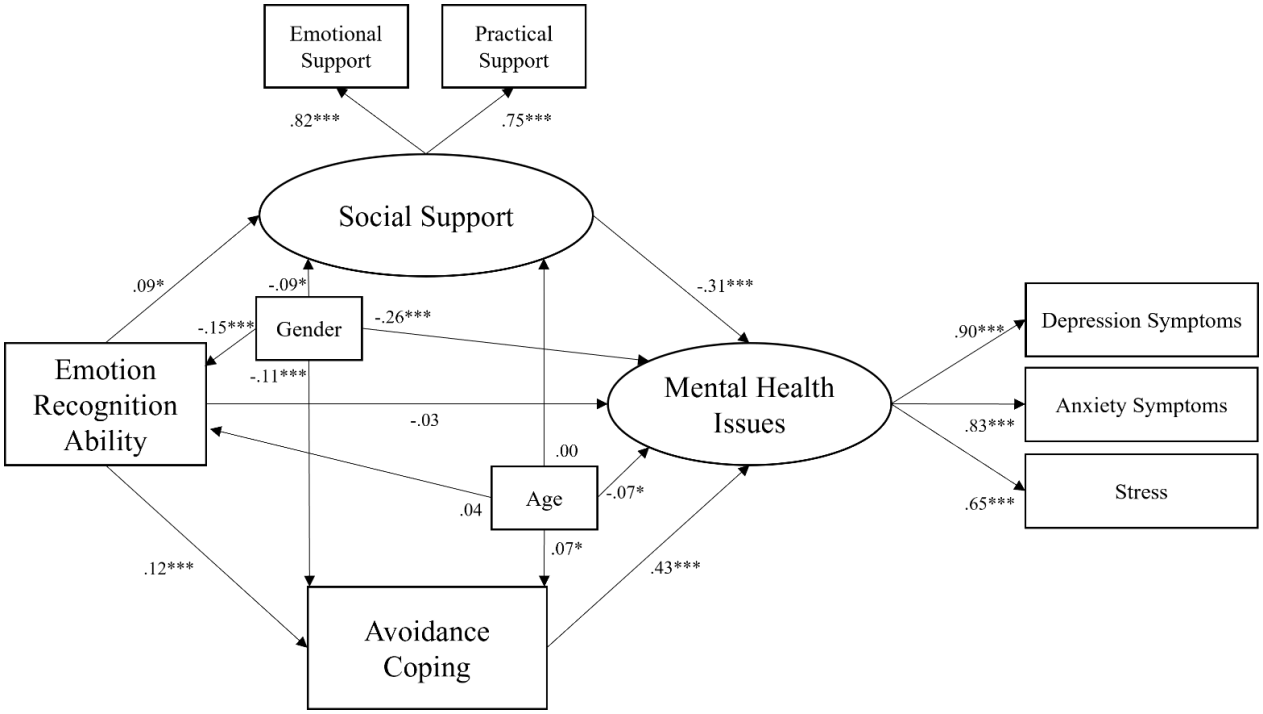


Note. Total Effect of ERA on burnout = .05 (z = 1.32, p = .187). Monte Carlo Tests for Mediation (Zhao et al., 2010): Indirect effect via social support = -.04 (z = -2.25, p = .025); Indirect effect via emotion-focused coping = .01 (z = 1.67, p = .095). Model Fit: CFI = .963, RMSEA = .062, SRMR = .034, Chi2 = 80.95 (p < .001). All coefficients are standardized. N = 986.

* p < .05. ** p < .01. *** p < .001.

Figure S5

Longitudinal double-mediation effect of social support (T2) and avoidance coping (T2) on the link between emotion recognition ability (T1) and mental health issues (T2).



Note. Total Effect of ERA on mental health issues = -.01 (z = -0.24, p = .811). Monte Carlo Tests for Mediation (Zhao et al., 2010): Indirect effect via social support = -.03 (z = -2.27, p = .023); Indirect effect via avoidance coping = .05 (z = 3.60, p < .001). Model Fit: CFI = .967, RMSEA = .067, SRMR = .056, Chi2 = 93.02 (p < .001). All coefficients are standardized. N = 986.

* p < .05. ** p < .01. *** p < .001.

10 Appendix B: Data Preprocessing for Facial Mimicry and Nonverbal Synchrony Analyses

For the facial mimicry analyses, the open-source facial behavior analysis toolkit OpenFace 2.0 was used (Baltrusaitis et al., 2018), which has been shown to reliably assess head pose, facial landmarks (e.g., position of nose, mouth, eyes, etc.), eye gaze direction, and activation of facial action units in frontal video recordings but also from a side angle. OpenFace directly outputs intensity scores for 17 facial action units (AU; Ekman et al., 2002) for each static frame of a video, on a scale from 0 (not present) to 5 (present at maximum intensity), e.g., for AU12 (called Lip Corner Puller) which is often used as an indicator for smiling. These frame-wise scores can then be further analyzed. In the case of the videotapes from Study 2, the videos were cut into two separate recordings by manually separating participants and confederates, and then analyzed by the OpenFace algorithm. The lists with 17 AU's per frame were smoothed with 400 milliseconds windows, i.e., for each frame, the AU scores of the surrounding 10 frames were averaged (at a sampling rate of 25 frames per second, one frame equals 40 milliseconds), whereby frames with a detection confidence (judged by OpenFace) of less than 70% were omitted. For each frame, an average expressiveness score was created by averaging all 17 AU scores.

The 17 AU's from the participant's combined output were then reduced with principal component analysis (PCA). The Kaiser Meyer Olkin index was acceptable for the overall matrix, *KMO* = .68, and ranging between acceptable (.57) and good (.79) for AU scores. The Bartlett test (Bartlett, 1937) was significant, $X^2(136) = 3967713$, $p < .001$, indicating that the data matrix had sufficient underlying intercorrelations for PCA. First, an unrestricted PCA without any rotation was conducted to determine the appropriate number of components. A Parallel Analysis indicated to proceed with six components, and a PCA with oblique rotation and the preset extraction of six components was conducted. The resulting component loadings are presented in Table B1. The resulting six components closely resembled scores obtained from a similar analysis (Stratou et al., 2017) and were thus similarly named: Smile (AUs 6, 12, 14), Tight-Lips (AU 15, 17, 20, 23), Brows-Up (AU 1, 2, 5), Tight-Eyes (AU 4, 7), Mouth-Move (AU 10, 25), and Blink (AU 45). According to Stratou et al. (2017) and Seuss et al. (2023), Smile can be associated with positive valence or joy, while Tight-Eyes and Tight-Lips may be associated with negative valence, goal obstruction, or appeasement. Brows-up appears to represent a surprised expression that may stand for a question mark in general conversation; Mouth-Move and Blink may represent unspecific

movements that are usually elicited in conversations. The component scores per video frame were extracted for participants and confederates separately and were then standardized.

Table B1

Facial expression component loadings of the facial action units measured by OpenFace, extracted with principal component analysis.

Facial action unit	C1: Smile	C2: Tight-Lips	C3: Brows-Up	C4: Tight-Eyes	C5: Mouth-Move	C6: Blink
AU12: Lip corner puller	0.84					
AU14: Dimpler	0.73					
AU6: Cheek raiser	0.62				0.3	
AU15: Lip corner depressor		0.80				
AU20: Lip stretched		0.71				
AU23: Lip tightener		0.63				
AU17: Chin raiser		0.61				
AU2: Outer brow raiser			0.86	0.36		
AU1: Inner brow raiser			0.74			
AU5: Upper lid raiser			0.62			
AU4: Brow lowerer				0.77		
AU7: Lid tightener				0.77		
AU25: Lips part					0.73	
AU10: Upper lip raiser	0.45				0.52	
AU9: Nose wrinkler	0.40				-0.43	
AU26: Jaw drop				-0.33	0.39	
AU45: Blink						0.87

Note. $N = 150$. Components extracted across all video frames of the conversation section of the experiment, with oblique rotation. The number of components was determined with parallel analysis. Component loading < .30 were omitted.

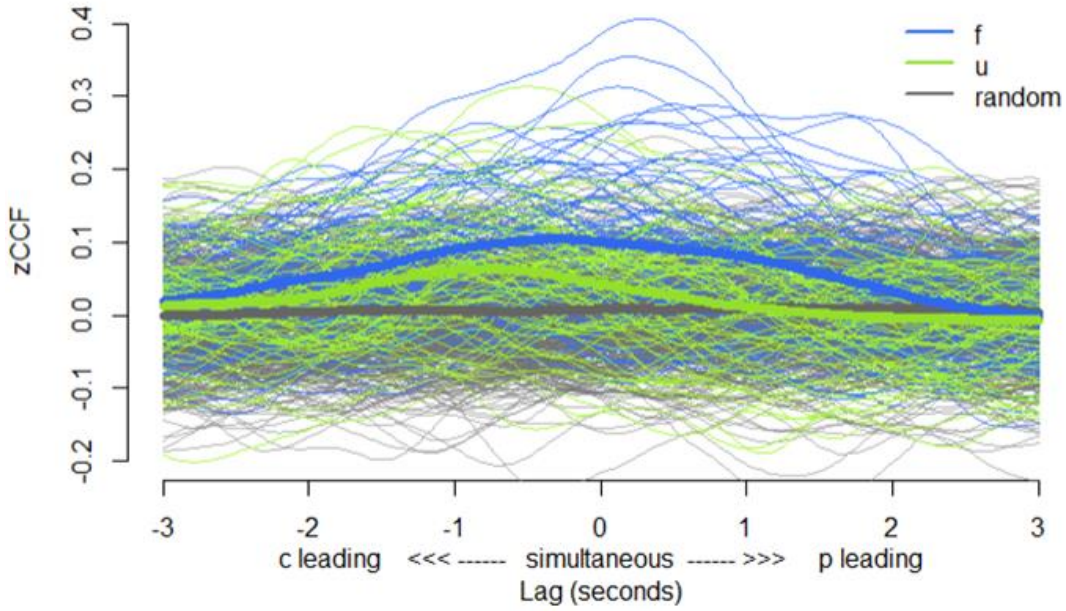
To extract nonverbal synchrony from the videos, the MEA software and the procedure described by Ramseyer (2020) were used. In the first step, regions of interest were manually created to define the areas of movements separately for participants and confederates. Thereafter, the program analyzed the movements in these regions of interest by calculating the differences in pixels between consecutive static video frames and outputting these in a list, with larger values representing more movement. Further analysis could then conveniently be conducted using the R

package rMEA (Kleinbub & Ramseyer, 2021). The movement data was smoothed and standardized with the built-in rMEA functions.

The R package rMEA was used to create both the mimicry scores for the expression components as well as nonverbal synchrony scores, following the guidelines by Kleinbub and Ramseyer (2021). Although created especially for nonverbal synchrony analysis, rMEA's windowed cross-correlation functions can be used also for cross-correlation of facial expression data (see Boker et al., 2002). With this package, windowed and time-lagged cross-correlations were conducted between the participant's and confederate's scores separately for each expression component (except Mouth-Move and Blink, as these were not of interest for the present research), an overall expressiveness score, and for body movement (i.e., nonverbal synchrony). This procedure created correlations between the participant's and confederate's frame-wise scores within moving time windows (one correlation per 30 seconds, with ten seconds increments) and with time-lags of up to ± 3 seconds (i.e., the participant's score is correlated with the confederates score of up to 3 seconds earlier or later). Correlations were Fishers-z transformed, and for nonverbal synchrony (but not for facial mimicry), the absolute movement scores were used (see Kleinbub & Ramseyer, 2021). rMEA then automatically created scores for average mimicry/synchrony across all lags, as well as a score for participant leading (including all lagged correlations where the participant moved before the confederate) and confederate leading (including all lagged correlations where the confederate moved before the participant), separately for each expression component, overall expressiveness, and movement. Figure B1 shows an example of the cross-correlations for the Smile mimicry score.

Figure B1

Cross-correlations for the Smile mimicry score.



Note. The size of the cross-correlations is depicted for the different time-lags (horizontal axis) and experimental conditions (by color). As can be seen, smiling was mimicked substantially more than chance (grey line) and mimicry was more evenly distributed in the friendly condition ("f"), while in the grumpy condition ("g") smiling was mainly mimicked by the participant ("c leading"), but not by the confederate ("p leading").

Selbständigkeitserklärung zur Inauguraldissertation

Emotion Recognition Ability and Well-Being: An Investigation of the Underlying Mechanisms

Ich erkläre hiermit, dass ich diese Arbeit selbständig verfasst und keine anderen als die angegebenen Quellen benutzt habe. Alle Stellen, die wörtlich oder sinngemäss aus Quellen entnommen wurden, habe ich als solche gekennzeichnet. Mir ist bekannt, dass andernfalls der Senat gemäss Artikel 36 Absatz 1 Buchstabe r des Gesetzes über die Universität vom 5. September 1996 und Artikel 69 des Universitätsstatuts vom 7. Juni 2011 zum Entzug des Doktortitels berechtigt ist. Für die Zwecke der Begutachtung und der Überprüfung der Einhaltung der Selbständigkeitserklärung bzw. der Reglemente betreffend Plagiate erteile ich der Universität Bern das Recht, die dazu erforderlichen Personendaten zu bearbeiten und Nutzungshandlungen vorzunehmen, insbesondere die Dissertation zu vervielfältigen und dauerhaft in einer Datenbank zu speichern sowie diese zur Überprüfung von Arbeiten Dritter zu verwenden oder hierzu zur Verfügung zu stellen.

Bern, 8. Oktober 2024 Nils Robin Sommer