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Emotional Competencies Across Adulthood: State of Knowledge and Implications for the Work Context

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ABSTRACT

It has been proposed that emotional competencies are subject to age-related increases and, thus, represent strengths of older workers. However, this assumption is based on limited evidence for positive age differences in one particular emotional competency, namely emotion regulation. Age-related differences in two other key emotional competencies, emotion perception and emotion understanding, have been largely ignored. The present review systematically examines the extant literature on the associations between age and the competencies to perceive, understand, and regulate emotions. For each competency, we further distinguish whether it concerns own emotions or those of others. We identified 195 studies that met our inclusion criteria. Overall, we found moderate support for the proposed age-related advantage in emotional competencies. Regarding the working lifespan, findings suggest that older workers generally function equally well as, or slightly better than young workers on most emotional competencies (i.e., perceiving, understanding and regulating own emotions, and understanding others' emotions). For perceiving others' emotions, there was robust evidence of lower performance beyond age 65, yet deficits did not show consistently for middle-aged adults (i.e., most older workers). For regulating others' emotions, evidence was too limited to draw conclusions. We discuss implications of age differences in emotional competencies for work processes and outcomes and outline future research directions.

Emotional competencies refer to individual differences in knowledge, skills, and abilities to effectively deal with own and others' emotions (Brasseur, Gregoire, Bourdu, & Mikolajczak, 2013; Mayer, Salovey, & Caruso, 2008). The most widely studied emotional competencies are emotion perception, emotion understanding, and emotion regulation (Joseph & Newman, 2010). Importantly, these competencies have been shown to substantially impact a variety of positive work outcomes such as job performance, job satisfaction, and leader and teamwork effectiveness (Farh, Seo, & Tesluk, 2012; O'Boyle, Humphrey, Pollack, Hawver, & Story, 2011; Sy, Tram, & O'Hara, 2006). Several researchers and journalists have asserted that emotional competencies improve with age and therefore represent potential strengths of older workers (e.g., Anwar, 2010; Cappelli & Novelli, 2010). This positive portrayal of older workers' emotional competencies is in stark contrast to the pattern of decline found in other domains of functioning, especially in physiological flexibility and fluid cognitions (Maertens, Putter, Chen, Diehl, & Huang, 2012; Salthouse, 2012).

A closer look at the extant literature reveals, however, that current evidence for the assumption of age-related gains in emotional competencies is far from conclusive. First, this assumption is mainly based on evidence for age differences in one particular emotional competency, namely emotion regulation (e.g., Kanfer, Beier, & Ackerman, 2013). Age-related changes in the other two key emotional competencies, emotion perception and emotion understanding, have been largely ignored. Second, even research on age differences in emotion regulation has revealed mixed findings (Consedine & Mauss, 2014). For instance, while a number of studies suggest that older adults use adaptive emotion regulation strategies more often and implement them more successfully than young adults (e.g., Dahling & Perez, 2010; Lohani & Isaacowitz, 2014), some studies have found the reverse pattern (e.g., Tucker, Feuerstein, Mende-Siedlecki, Ochsner, & Stern, 2012). Yet other studies have found no age differences in strategy effectiveness (e.g., Kunzmann, Kupperbusch, & Levenson, 2005). This mixed evidence suggests that some, but not all, aspects of emotion regulation may show improvements with age. Past research has not systematically

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distinguished among subdimensions of emotional competencies, including the distinction between self-related (concerning own emotions) and other-related competencies (concerning emotions of others).

The present article provides a systematic review of the state of knowledge on age differences in the competencies to perceive, understand, and regulate own and others' emotions. We review evidence from two streams of literature—the lifespan developmental literature and the organizational literature. It is important to note that both streams differ in terms of the age cutoffs that define when people are considered "older." In the lifespan literature age 60 or 65 is often used as a cutoff for when old age begins (Baltes & Smith, 2003). In the organizational literature, however, the "older worker" is typically conceived as 40 years or older, based on the Age Discrimination in Employment Act of 1967 in the United States (United States Equal Employment Opportunity Commission, 2015), or 50 years and older, though these definitions vary considerably across studies (Kooij, de Lange, Jansen, & Dikkers, 2008). Definitions of older workers therefore correspond more strongly to the operationalization of middle-age (40–60 years) than old age in the lifespan literature. When reviewing the literature, we provide the definitions of older workers used, whenever possible. By systematically examining the evidence for associations between age and emotional competencies, we aim to investigate to what extent the propositions of age-related gains in these competencies indeed hold.

In the following, we first define emotion perception, emotion understanding, and emotion regulation, including their self-related and other-related components, and illustrate their relevance for work outcomes. Second, we review available measures. Third, we present the theoretical foundation for links between age and emotional competencies. Fourth, we review the current evidence for age differences in emotional competencies. Fifth, we critically evaluate the current state of knowledge and discuss implications of age differences in emotional competencies for work outcomes. We conclude by describing avenues for future research.

DEFINITIONS OF EMOTIONAL COMPETENCIES AND RELATIONSHIPS WITH WORK OUTCOMES

Emotional competencies are defined as individual differences in the knowledge, skills, and abilities to effectively deal with own and others' emotions (Mayer et al., 2008). The conceptual origin of emotional competencies lies in the emotional intelligence framework (Mayer & Salovey, 1997). The emotional intelligence literature has distinguished different approaches to conceptualize emotional intelligence, including an ability and a mixed approach (Zeidner, Matthews, & Roberts, 2004). While the ability approach focuses on specific emotion-related abilities which are assessed with maximum performance on emotional intelligence tests, the mixed-approach defines emotional intelligence as a combination of competencies and other dispositions such as personality and attitudes which are assessed with self-report measures (Ashkanasy & Daus, 2005). The latter has been widely criticized regarding its broad conceptualization and low discriminant validity as it has strong overlap with other established psychological constructs (e.g., emotional stability; Ashkanasy & Daus, 2005; Côté, 2014). In fact, a recent meta-analysis has illustrated that the positive relationship between mixed emotional intelligence and job performance becomes nonsignificant after controlling for several psychological constructs such as emotional stability and self-efficacy (Joseph, Jin, Newman, & O'Boyle, 2015). Based on this criticism, many researchers have advocated using the ability approach. Within this approach, Joseph and Newman (2010) have introduced the cascading model of emotional intelligence, proposing that there are three emotional competencies—emotion perception, emotion understanding, and emotion regulation that predict job outcomes. These competencies are related, yet distinct with meta-analytic intercorrelations ranging from .30 to .60.

Each competency can further be divided into self- and other-related subcompetencies (Brasseur et al., 2013; Côté, 2014). People with strong emotional competencies may, for instance, be aware of their *own* emotions, but are also able to accurately perceive *others'* emotions. They are able to understand and regulate their own emotions, but also those of others. In this review, we therefore categorize the literature into self-related and other-related emotional competencies.

Emotion Perception

Emotion perception—sometimes also labeled emotion recognition, emotion identification, empathic accuracy, cognitive empathy, or clarity of feelings—refers to the competency to accurately identify own emotions from inner states and others' emotions from facial expressions, postures, voices, stories, or other stimuli (Mayer, Salovey, & Caruso, 2004). In the work context, this for instance involves that call-center employees have the ability to accurately identify anger in the voice of a customer and that they notice when they are becoming irritated by a customer. There is some research showing that self-related emotion perception is positively related to indicators of work motivation and job performance (Durán, Extremera, & Rey, 2004; Greenidge, Devonish, & Alleyne, 2014). Studies have moreover indicated that perception of own emotions is positively related to indicators of occupational well-being, such as job satisfaction (Greenidge et al., 2014; Weng et al., 2011; Wong & Law, 2002). In addition, accumulating evidence suggests that perception of others' emotions is positively associated with work outcomes. A meta-analysis of 18 studies has revealed a positive relationship with job performance, with an average effect size of .20 (Elfenbein, Foo, White, Tan, & Aik, 2007). In this study, they further found that emotion perception predicts negotiation success, which the authors attribute to better comprehension of subtle communication cues among those high in emotion perception. Other research has indicated that emotion perception competency within teams (i.e., how accurate team members perceive each other's emotions) predicts team performance 1 year later (Elfenbein, Polzer, & Ambady, 2007). There is further initial evidence that emotion perception can buffer against the negative effects of emotional labor. A micro-longitudinal study over 4 weeks found that the competency to perceive others' emotions accurately can alleviate the adverse effects of emotional labor on work engagement (Bechtoldt, Rohrmann, De Pater, & Beersma, 2011).

Emotion Understanding

Emotion understanding involves understanding the differences between emotions, their causes and consequences for self and others, and emotion-outcome links in context (Mayer & Salovey, 1997). Examples in the work context are when employees know that they can be more creative when in a good mood, or when supervisors know that employees' frustration about working conditions can result in negative

affective responses, which over time may translate into aggressive work behavior (Fox & Spector, 1999).

One meta-analysis has shown that understanding others' emotions is positively related to job performance, but only in jobs with high emotional labor demands (Joseph & Newman, 2010). For jobs with low emotional labor demands, emotion understanding was unrelated to job performance. To our best knowledge, there are no studies to date linking self-related emotion understanding with work outcomes.

Emotion Regulation

Emotion regulation pertains to knowledge about and one's effectiveness in influencing the experience and expression of own and others' emotions (Gross, 2002). This competency has been examined within different lines of research, including the literature that is based on Gross' (1998) process model of emotion regulation, emotional intelligence (where it is often labeled emotion management; Mayer et al., 2008), and emotional labor (Grandey, 2000). An example in the work context is when employees can effectively suppress their negative feelings toward their supervisor or that a supervisor can reduce his or her employees' negative feeling toward organizational change by highlighting the positive aspects (i.e., reappraising the situation).

Numerous studies have demonstrated that the competency to regulate emotions positively impacts work outcomes. Effective emotion regulation of own emotions has been found to be related to higher occupational well-being (e.g., Liu, Prati, Perrewé, & Brymer, 2010; Scheibe, Spieler, & Kuba, 2016) and better performance in jobs with high emotional labor demands (Joseph & Newman, 2010). A recent study by Hülsheger, Lang, Schewe, and Zijlstra (2015) with a sample of waiters and taxi drivers revealed that the use of deep acting, an adaptive emotion regulation strategy, and automatic emotion regulation, was positively related to customer tips. Other research has suggested that emotion regulation is positively associated with organizational citizenship behavior, but negatively with deviant work behavior (Kluemper, DeGroot, & Choi, 2013). Effective emotion regulation of own emotions was also found to buffer against the detrimental effects of negative work events on job strain (Niven, Sprigg, & Armitage, 2013; Prati, Liu, Perrewé, & Ferris, 2009). With respect to regulation of others' emotions, there is experimental evidence that leaders can reduce their followers' stress levels in response to a negative event by regulating their own emotions, particularly when using a combination of empathy and suppression (Thiel, Griffith, & Connelly, 2015). In sum, all three emotional competencies enhance positive worker outcomes and reduce negative worker outcomes, including both performance and well-being related outcomes.

MEASURES OF EMOTIONAL COMPETENCIES

While there is considerable consensus regarding the definitions of the three emotional competencies, their assessment has been rather diverse. In the following, to illustrate this diversity, we discuss a number of measures employed by studies on age and emotional competencies included in the present review. Three broad types of measures of emotional competencies have generally been used, including self-report, other-report, and test-based measures. Among those, some measures have more often been used in worker samples, while others have been more often used in student and community samples.

Self-Report Measures

In these measures respondents are typically asked to estimate their own competencies by indicating their agreement with descriptive statements (e.g., "Most of the time I understand why people feel the way they do"; Brasseur et al., 2013). Two self-report measures that have been used to investigate age differences in multiple emotional competencies are the Wong and Law Intelligence Scale (WLEIS; Wong & Law, 2002) and the Profile of Emotional Competence (PEC; Brasseur et al., 2013). The WLEIS has been developed and widely used in the work context, although it has rarely been employed in studies that had age as a focal variable (see Hur, Moon, & Han, 2014, for an exception). This measure includes four subscales: appraisal and expression of own emotions (which we classified as self-related emotion perception), appraisal and recognition of others' emotions (which we classified as other-related emotion perception), regulation of own emotions, and use of emotions to facilitate performance. The latter was excluded from this review because research has demonstrated its conceptual redundancy (i.e., limited construct validity; Joseph & Newman, 2010) and it is not well-studied in the aging context. Research has supported the WLEIS' reliability and validity in predicting life satisfaction and job performance (Law, Wong, & Song, 2004).

Recently, Brasseur and colleagues (2013) introduced the PEC, which assesses all three emotional competencies, as well as two additional competencies, expression (i.e., the ability to describe and explain feelings) and utilization (i.e., the ability to use emotions to facilitate performance). Notably, this measure consistently distinguishes the five competencies in terms of whether they concern own or others' emotions, yielding 10 subscales. Initial evidence has demonstrated the reliability and validity of the PEC in relation to its factor structure and job criteria (Brasseur et al., 2013). More specifically, this study showed that PEC overall scores were positively related with job performance in a subsample of seasonal charity employees.

In addition to measures assessing multiple emotional competencies, a number of self-report scales have been employed that measure either emotion perception or emotion regulation in isolation. With regard to perception of own emotions, the emotion clarity subscale of the difficulties in emotion regulation scale (DERS; Gratz & Roemer, 2004) has been used, including items such as "I know exactly how I am feeling." Moreover, the clarity subscale of the Trait Meta Mood Scale (TMMS; Salovey, Mayer, Golman, Turvey, & Palfai, 1995) has been employed. To our knowledge both scales have never been used to investigate age differences in emotion perception in the work context, but some studies show the relevance of the concept for occupational well-being (Donoso, Demerouti, Hernández, Monreno-Jiménez, & Cobo, 2015).

With regard to regulation of own emotions, several self-report measures assess the habitual use of particular strategies that people typically select to regulate their emotional experiences, such as the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003), and in the work setting emotional labor scales (Brotheridge & Lee, 2003; Diefendorff, Croyle, & Gosserand, 2005). These scales measure emotion regulation competencies indirectly by assessing whether people use adaptive strategies more often than maladaptive strategies. The categorization of adaptive versus maladaptive strategies is based on robust meta-analytic evidence that some strategies generally have positive consequences for well-being and social relationships, while others

have negative consequences (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Hülsheger & Schewe, 2011; Wagner & Heatherton, 2014). Specifically, the ERQ measures people's tendencies to use cognitive reappraisal, a generally adaptive strategy, and expressive suppression, a generally maladaptive strategy, to regulate emotional experience (Gross & John, 2003). The ERQ has been used several times to investigate age difference in emotion regulation in the occupational context (e.g., Bal & Smit, 2012; Yeung & Fung, 2012), but less often than scales assessing emotional labor (e.g., Cheung & Tang, 2009; Dahling & Perez, 2010). Emotional labor scales measure the habitual tendency to use deep acting (i.e., cognitively modify emotions, a generally adaptive strategy) and surface acting (i.e., suppressing actual and fake desired emotions, a generally maladaptive strategy) to regulate own emotions in workplace interactions. Some studies have further used subscales of coping scales (e.g., Nolen-Hoeksema & Aldao, 2011), such as the positive reinterpretation (i.e., reappraisal) scale and the active coping (i.e., problem solving) scale from the COPE inventory (Carver, Scheier, & Weintraub, 1989), which assess strategies used in order to regulate own emotions. These scales have rarely been employed to examine age differences in emotional coping in the work context (for an exception, see Hertel, Rauschenbach, Thielgen, & Krumm, 2015).

Other-Report Measures

Other-report measures assess emotional competencies by asking people who interacted with the focal participant, such as co-workers, supervisors, or clients, to rate the participant's emotional competencies. This type of measure can overcome some limitations of self-reports such as self-serving biases, which are thought to distort the accurate assessment of emotional competencies (Côté, 2014). To our knowledge, other-report measures have only been used once to investigate age differences in emotional competencies in the work context (Davis, Krais, & Capobianco, 2009). Recent research has illustrated the predictive validity of other-source ratings of emotional competencies for task performance (Elfenbein, Barsade, & Eisenkraft, 2015).

Test-Based Measures

Test-based measures assess emotional competencies based on performance in a testing situation, such as choosing the correct answer on multiple-choice tests or implementing an emotional competency in an emotional situation. One of the most popular test-based measures in research on age and emotional competencies is the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT; Mayer, Salovey, Caruso, & Sitarenios, 2003) and its predecessor, the Multifactor Emotional Intelligence Scale (MEIS; Mayer, Caruso, & Salovey, 1999). This measure assesses other-related emotion perception and understanding, emotion regulation knowledge, as well as an additional competency, using emotions to facilitate thought. The MSCEIT is the only available test-based measure capturing all three emotional competencies and previous research has demonstrated its validity and reliability (Kong, 2014; Mayer, Salovey, & Caruso, 2002). It offers two types of consensus scoring; either consensus among experts or among the majority of test-takers. Although the MSCEIT has often been used in worker samples (e.g., Côté & Miners, 2006), studies testing age differences in emotional competencies with this measure were usually not conducted in the work context (e.g., Extremera, Fernández-Berrocal, & Salovey, 2006).

There are further test-based measures that assess only one of the three competencies in isolation. Emotion perception tasks usually require participants to accurately identify (or label) others' emotions from stimuli such as facial expressions, voices, or body postures (Ruffman, Henry, Livingstone, & Phillips, 2008). This also includes a number of similar tasks assessing empathic accuracy (Wieck & Kunzman, 2015). Self-related emotion understanding tasks typically assess affective forecasting accuracy, that is, the extent to which people are able to accurately predict their emotional response to future events (Scheibe, Mata, & Carstensen, 2011), decisions (Löckenhoff, O'Donoghue, & Dunning, 2011), or negative stimuli (Pearman, Andreoletti, & Isaacowitz, 2010). Self-related emotion regulation competencies have frequently been assessed by the extent to which people are able to reduce their emotion experience or expression in response to negative stimuli, such as pictures (Emery & Hess, 2011) or film clips (Lohani & Isaacowitz, 2014), through application of certain emotion regulation strategies.

To our knowledge, except for the MSCEIT, the test-based measures discussed above have not yet been employed to study age differences in emotional competencies in work settings. We further note that when using self-report or test-based measures one potential concern is that they may not be measurement invariant across age. We will return to this issue in the discussion.

THEORETICAL BACKGROUND: AGE DIFFERENCES IN EMOTIONAL COMPETENCIES

Lifespan theories have postulated that adult age differences in emotional competencies can be attributed to changes in cognition, physiology, and motivation across adulthood (Scheibe & Zacher, 2013). In the following, we briefly discuss the role of these different mediating factors.

Role of Cognition

Lifespan theories generally draw on dual-component models of cognition (Cattell, 1943) and multi-directional age trajectories of fluid cognition (processing efficiency) and crystallized cognition (or knowledge; Baltes, Lindenberger, & Staudinger, 2006) to explain relationships between age and emotional competencies. Overall, *fluid cognitions* such as working memory and processing speed tend to decline with age (Salthouse, 2010). This type of cognition, however, is critical in processing emotional information and regulating emotional responses (Morgan & Scheibe, 2014; Suzuki & Akiyama, 2013). That is, to accurately perceive others' emotions, people must encode facial, bodily, and vocal expressions and categorize them; tasks that draw on fluid cognitions (Suzuki & Akiyama, 2013). A service worker, for instance, must first correctly read a customer's negative expressions and integrate multiple cues from the customer's face, gestures, and voice to identify his or her anger. In order to regulate emotions, people must recruit strategies that override initial emotional responses; tasks that require executive control (Ochsner & Gross, 2005). The service worker, for instance, must form a goal to hide his or her upcoming anger in response to the customer and then use cognitive control to execute the emotion-regulatory goal. Age-related declines in fluid cognitions are therefore thought to impede accurate emotion perception and the implementation of emotion regulation strategies.

In contrast, accumulating experience and expertise in dealing with emotional situations (*crystallized cognition*) with age are claimed to enhance emotional competencies (e.g., Charles, 2010; Morgan & Scheibe, 2014). According to differential emotions theory (Izard, 1977), with cognitive maturation and expertise, older adults should become more skilled in the social expression of emotions, for example, during workplace interactions (Magai, Consedine, Krivoshekova, Kudadjie-Gyamfi, & McPherson, 2006). Similarly, it has been assumed that with age, knowledge about emotions becomes more complex and differentiated (Labouvie-Vief, 2003). Based on these developments, emotion understanding is expected to increase with age, and adaptive emotion regulation strategies may increasingly be used over maladaptive ones. Additionally, emotion regulation is thought to become more automatized through repetition, requiring less cognitive effort (Morgan & Scheibe, 2014). For the work-context this implies that older workers may better understand their own, their co-workers', and their clients' emotions. They may furthermore use more adaptive emotion regulation strategies at work (e.g., deep acting) than maladaptive ones (e.g., suppression), which in turn may help them to more effectively deal with emotional job demands.

Role of Physiology

In addition to gains and losses in cognition, changes in *physiology* have been proposed to contribute to age-related changes in emotional competencies. For instance, some age-related changes in the brain are thought to affect emotional competencies. More specifically, it has been suggested that the amygdala becomes less responsive to negative stimuli with age (Cacioppo, Berntson, Bechara, Tranel, & Hawkley, 2011). Reductions in amygdala activation, in turn, might make it more difficult for older adults to perceive negative emotions accurately (see Ruffman et al., 2008, for a review). Moreover, declines in some regions of the prefrontal cortex that are involved in implementing effortful emotion regulation strategies are subject to age-related decline, while those involved in automatic emotion regulation remain largely intact (Mather, 2012). Thus, older workers may experience some difficulties in, for instance, perceiving their co-workers' negative emotions accurately, but they may be equally competent as their younger co-workers in regulating their emotions.

Furthermore, aging is accompanied by losses in the cardiovascular and neuroendocrine systems resulting in lower physiological flexibility and, accordingly, stronger physiological reactivity to highly arousing stimuli (Charles & Luong, 2013). According to the model of strength and vulnerability integration (Charles, 2010), older adults need more time and resources to downregulate physiological responses to high-arousal emotional situations than young adults. In a similar vein, dynamic integration theory (Labouvie-Vief, 2003) posits that processing and regulating emotions in emotion-laden situations that cannot easily be avoided, or are highly novel, severe, or complex (i.e., affective events with high emotion-regulatory load) might be more taxing for older than young adults. Regulating such events may challenge and sometimes overpower older adults' physiological capacity (Wrzus, Müller, Wagner, Lindenberger, & Riediger, 2012). This suggests that older workers have more difficulties than young workers regulating their emotions in work situations that are highly negative, for instance, when police officers or firefighters are called to an emergency situation.

Physiological changes with age may not only have negative consequences for emotional competencies. Declines in sensory and executive functions may reduce physiological reactivity to low or moderately arousing situations (Cacioppo, Berntson, Klein, & Foehlmann, 1997). Accordingly, older adults might be better in dealing with slightly or moderately arousing emotional situations (Charles, 2010), which are common in daily work life (e.g., feeling annoyed or confused about a work task). Moreover, they may excel at using anticipatory regulatory strategies that avoid or quickly defuse emotional arousal (e.g., situation selection, distraction, reappraisal), but not at online regulatory strategies that act after emotional arousal has already developed (e.g., suppression; Consedine & Mauss, 2014; Scheibe, Wisse, & Schulz, 2015).

Role of Motivation

Beyond changes in cognition and physiology, *motivational changes* are thought to affect age-related changes in emotional competencies. Socioemotional selectivity theory (Carstensen, 2006) postulates that perceptions of remaining time in life, termed future time perspective, affect people's goals and cognitive processing. At a young age, people typically perceive their time left in life as expansive, leading them to prioritize future-oriented goals such as knowledge acquisition over present-oriented, more hedonic goals. As people age, however, they begin to perceive their time as more limited leading them to increasingly prioritize hedonic (e.g., maintain positive affect) and emotionally meaningful goals over future-related goals. A consequence of this motivational shift is a positivity effect in older adults' information processing, such that positive information is prioritized over negative information in attention, memory, and decision making (Reed & Carstensen, 2012). In an attempt to maximize affective well-being, older adults thus might be more motivated to perceive positive emotions in self and others, to avoid developing a deep understanding of negative situations, and to downregulate their negative emotions. Consequently, older adults may show better emotional competencies in positive or personally meaningful situations, as compared to situations that are negative or lack personal meaning. With regard to the workplace, older workers may display better emotional competencies when interacting with a co-worker that is close to them, or when negotiating about a project that means a lot to them than when interacting with new colleagues, or negotiating about a project they are less committed to.

It is noteworthy that theories of emotional aging have so far not considered the distinction between self- and other-related emotional competencies. Therefore, it is not possible to predict differential effects of the aforementioned age-related mechanisms on emotional competencies related to the self and related to others.

Interactions Among Mechanisms

Changes in cognition, physiology, and motivation across adulthood can also be expected to interact with each other. Dynamic integration theory (Labouvie-Vief, 2003), for example, predicts that whereas emotional competencies are negatively affected by reductions in fluid cognitions at older age, gains in crystallized cognitions can mitigate this negative age trend to some extent. Thus, deficits in reductions in emotional competencies might be particularly evident in situations that are cognitively demanding and complex (e.g., dealing with multiple new clients or patients at the same time), therefore depending

strongly on fluid cognitions, but less in situations in which older adults can draw on their accumulated emotional knowledge (e.g., dealing with long-term clients individually; Labouvie-Vief, 2003; Labouvie-Vief, Gilet, & Mella, 2014). In a similar vein, the model of strength and vulnerability integration predicts that enhanced crystallized cognitions and an increased motivation to maintain positive affect improve emotion regulation at older age, but only in situations of moderate physiological arousal (Charles, 2010). In high-arousal situations such as a crisis at work, however, decreases in physiological flexibility outweigh age-related gains in crystallized cognition and motivation, impairing effective emotion regulation. According to this, an older worker might show better emotional competencies than a young worker when, for instance, dealing with an annoyed or frustrated client but not when encountering an emergency situation at work.

Another lifespan theory that focuses on emotion regulation and considers interactions between changes in cognitions and physiology, as well as motivation, is the selection, optimization, and compensation with emotion regulation framework (Urry & Gross, 2010). This framework builds on Baltes and Baltes' (1990) selection, optimization, and compensation model and maintains that effective emotion regulation hinges on three factors, namely to select emotion regulation strategies that match available resources, to spend sufficient time and effort to implement and optimize these strategies, and to use different strategies when declines in resources hamper successful regulation with previously used strategies. This framework further suggests that relative to young adults, older adults are better at regulating their emotions to the extent that they select strategies that draw on resources that are maintained or increase with age (Urry & Gross, 2010).

Interestingly, integrating both positive and negative age trends of emotional competencies suggests an age advantage for older workers. That is, roughly between the ages of 40 and 65, both deficits and advantages associated with age may reach an optimal balance (Lachman, Teshale, & Agrigoroaei, 2015). Whereas declines in fluid cognitions and physiological flexibility have started to emerge but are not yet severe, crystallized cognitions and motivational shifts are on the rise. Thus, whereas older workers' emotional competencies are not yet strongly impeded by fluid cognitive decline, they might already be enhanced by the shift in motivation that begins to emerge, and the knowledge that has been accumulated.

In sum, lifespan theories predict that, on one hand, age-related declines in fluid cognitions and physiology may negatively affect the ability to effectively deal with own and others' emotions, particularly in highly arousing contexts. On the other hand, accumulated experience and knowledge and an increased motivation to maintain affective well-being may benefit emotional competencies at older age, particularly in positive and personally meaningful contexts. For older *workers*, who are at a life stage between young and old *adults* as defined in the lifespan literature, these age trends may intersect in a way that benefits emotional competencies.

REVIEW OF EMPIRICAL EVIDENCE

Literature Search

We conducted a systematic literature review searching the PsychINFO and Web of Science databases. We used the following key words: *emotional intelligence, emotional competencies, emotion perception,* *emotion recognition, empathic accuracy, emotion understanding, affective forecasting, emotion regulation, emotional labor, surface acting, deep acting, reappraisal,* or *distraction*, combined with the keywords *aging, age differences, older adults, older workers,* or *aging employees*. We also included relevant articles that were known to the researchers and conducted a cross-reference search in PsychINFO. We searched for empirical articles published (online) until December 2015. Studies were included if (a) articles were in English, (b) the sample consisted of healthy adults, who were free from psychopathology, (c) the competency assessed could be clearly classified as capturing one of the subdimensions of emotion perception, understanding, or regulation, and (d) the study was not included in an existing meta-analysis (in which case we report meta-analytic results only). Specifically, we found one meta-analysis on age differences in emotion perception, which included 28 data sets from 15 studies (Ruffman et al., 2008). In addition, we identified 194 individual studies.

Table 1 shows the distribution of subdimensions and type of measures across all studies, and across the subset of studies conducted in the work context. The literature search revealed a large volume of studies on age differences in emotion perception and emotion regulation, but a relatively small amount of studies on age differences in emotion understanding. Moreover, it appears that most studies on emotion perception concern others' emotions, while almost all studies on emotion regulation concern own emotions. The use of measures also varies strongly according to the competency under investigation, such that the majority of studies on age differences in emotion perception have utilized test-based measures, whereas a large amount of the studies investigating age differences in emotion regulation have utilized self-report measures. It is furthermore remarkable that almost all studies on age differences in emotional competencies in *worker* samples have relied on self-report measures. Finally, note that except for one study (Diehl et al., 2014), all studies were cross sectional.

Age and Emotion Perception

We found one meta-analysis and 99 individual studies on age-related differences in emotion perception, which are summarized in Table A.1 in the Appendix. The vast majority of these studies examined age differences in other-related emotion perception and stem from the lifespan literature. There were only seven studies that were conducted in the work context.

Perception of own emotions

We identified seven studies that investigated how age is related to perception of own emotions. All studies utilized self-report measures. Five studies reported positive age trends in perception of own emotions (e.g., Mankus et al., 2016; Zacher et al., 2013). For instance, two studies that used the WLEIS (Wong & Law, 2002) found small positive relationships between age and self-related emotion perception in a sample of flight attendants (Hur et al., 2014) and in a heterogeneous worker sample (Zacher et al., 2013). Another study that assessed own emotion perception with the PEC reported a positive age trend in one large and age diverse sample (Brasseur et al., 2013). Two studies, however, did not replicate the positive age pattern. One study that employed the WLEIS found that age was unrelated to perception of own emotions in a sample of internists (Weng et al., 2011). A negative age trend emerged in a study including 6,688 adults between 50 and

Table 1. Number of Studies on Age and Emotional Competencies Targeting Self-Report, Other-Report, or Test-Based Measures

EC Targeting	Measure	Emotion Perception	Emotion Understanding	Emotion Regulation[a]
Self	Self-report	7 (3)	2 (0)	74 (30)
	Other-report	0	0	1 (1)
	Test-based	0	6 (0)	19 (0)
Others	Self-report	7 (4)	2 (0)	2 (0)
	Other-report	0	0	0
	Test-based	90 (3)	7 (1)	0

Note. EC = Emotional competency. Number of studies conducted in the work context are reported in brackets. Some studies included measures targeting both the self and others or multiple subcompetencies. Therefore, the total number of studies does not correspond to the total number of studies included in the review.
[a]For emotion regulation, we identified a further category, emotion regulation knowledge, which can apply to both self- and other-related dimensions; 6 (1) studies fell in this additional category.

80 years (Fantini-Hauwel & Mikolajczak, 2014). Even though the total number of studies is small, the majority of available studies suggest a positive age trend in the perception of own emotions.

Perception of others' emotions

We identified 96 studies and one meta-analysis that investigated age differences in emotion perception of others' emotions, usually in laboratory studies with test-based measures. These can be organized in terms of whether they used static or dynamic stimuli, the age of the target, and the relevance of the stimuli to older adults.

Static stimuli. Early studies that used static stimuli such as pictures of static facial expressions have repeatedly found that, compared to young adults, older adults less accurately perceive five of the six basic emotions (anger, sadness, fear, surprise, happiness) in others. Consistent with the motivational perspective, in particular the positivity effect (Reed & Carstensen, 2012), age-related deficits were strongest for anger, sadness, and fear (medium effects), and smaller for happiness and surprise (small effects; see the meta-analysis by Ruffman et al., 2008). No age group differences were observed with regard to perceptions of disgust. In a similar vein, older adults were less accurate than young adults in identifying emotions, particularly negative ones, from auditory stimuli such as speeches (Paulmann, Pell, & Kotz, 2008), and vocal expressions (Halberstadt et al., 2011; Hunter et al., 2010; Ruffman et al., 2008). In addition, studies have reported that older adults are less accurate in perceiving emotions from body movements and postures than young adults (Ruffman et al., 2008; Insch et al., 2012). In sum, there is robust evidence that older adults perform worse than young adults on emotion perception tasks using static stimuli, particularly when asked to identify negative emotions.

While most of the abovementioned studies have used extreme-group designs, comparing young with older adults, studies including middle-aged adults (who correspond to the age group of older workers) have revealed a less clear pattern. A number of studies, that either included age as a continuous variable, or included middle-aged adults in group comparisons, replicated the generally negative age trend in emotion perception that has been observed in extreme-group designs (e.g., Cabello et al., 2014; Kessels et al., 2014; Paulman et al., 2008). For instance, one large study by Mill and colleagues (2009) involving 607 adults between 18 and 84 years indicated that deficits in emotion perception accuracy of anger and sadness from faces and voices were evident among those

older than 30 years. Deficits in disgust and surprise perception from faces and happiness perception from both types of stimuli showed deficits among adults older than 60 years compared to young participants. Similarly, another study found a negative age trend for emotion perception from faces among those 30 years and older, and a steeper negative age trend for prosodic emotion perception among participants 50 years and older (Demenescu et al., 2014). Effect sizes in these studies were on average moderate. In addition, two studies that were conducted in the work context reported small negative relationships between employees' age and emotion perception (Hurley et al., 2014; Momm et al., 2015).

A comparable number of studies, however, have found that middle-aged adults perceive emotions as accurately as young adults, including several workplace studies (e.g., Hur et al., 2014; Weng et al., 2011). Studies that for instance used the emotion perception task of the MSCEIT (Mayer et al., 2003) or the self-report measure WLEIS (Wong & Law, 2002) found that age was unrelated to emotion perception in heterogeneous worker samples (e.g., Weng et al., 2011; Zacher et al., 2013). Together, these studies suggest that negative age trends tend to only emerge at old age, rather than at middle age.

Complicating the picture even further, three studies with large sample sizes suggest a peak in emotion perception for middle-aged adults. More specifically, L. M. Williams and colleagues (2009) found an inverted U-shaped pattern of emotion perception from age 6 to 91. Consistent with views of an age-advantage in emotional competencies at middle age, this study found that emotion perception was highest for adults between 20 and 49 years and lower for adults older than 50 years. Effect sizes ranged between small and moderate, with effects being strongest for fear and anger. Another study similarly found that perception of emotions from facial expressions was highest at middle age (40–64 years), and lowest at old age for fear, sadness, and happiness (medium effect size; Horning et al., 2012). Furthermore, this study revealed that emotion perception of anger, disgust, and surprise showed no age difference. Finally, a recent online study involving more than 10,000 participants aged 16–89 testing emotion perception from only the eye region of the face observed that those between the ages of 40 and 60 showed the best emotion perception accuracy, relative to those who were younger or older (effect sizes were not reported; Hartshorne & Germine, 2015).

Taken together, while there is consistent evidence that older adults are less accurate than young adults in perceiving others' emotions from

static stimuli, particularly negative ones, the evidence is less conclusive regarding levels of emotion perception at middle-age. Considering the mixed evidence, it is unlikely that older workers, who mostly belong to the group of middle-aged adults, are already strongly affected by the negative age trend in emotion perception that has been found in adults aged 65 and older in emotion perception tasks using static stimuli. However, older adults working beyond retirement age probably show some deficits in emotion perception.

Dynamic stimuli. Studies using static stimuli have been criticized for their limited ecological validity as real-life situations are multimodal and dynamic (Isaacowitz & Stanley, 2011; Phillips & Slessor, 2011). In response to that, a number of more recent studies have investigated age differences in emotion perception employing dynamic stimuli, although none of these studies has been conducted in an organizational context.

Using video clips, several studies have not been able to replicate negative relationships between age and emotion perception typically found by studies employing static stimuli. One study using short video clips for instance revealed that older adults are as accurate as young adults in identifying global emotions (i.e., positive versus negative; Krendl & Ambady, 2010). Another study showed that cognitive empathy (knowing what the other person is feeling), assessed with context-rich stimuli, is preserved in older age (Ze et al., 2014). Murphy and colleagues (2010) observed that older adults were better than young adults in discriminating between posed and spontaneous smiles from video clips. This is particularly interesting considering that studies using static stimuli found no age differences in discrimination ability between posed and genuine smile (Slessor et al., 2010).

Other studies, however, suggest that although age-related deficits in emotion perception might be reduced with dynamic stimuli, they are not eliminated. One study using videos clips, for instance, found linear negative relationships between age and emotion perception, except for disgust perception (Lambrecht et al., 2012).

Interestingly, some studies have directly compared age differences in emotion perception in static versus dynamic stimuli. One study showed that older adults were less accurate in recognizing emotions from faces or voices alone, but equally accurate as young adults when recognizing emotions from congruent audio and visual stimuli (Richter et al., 2010). In addition, Sze and colleagues (2012) found that while older adults performed worse in perceiving emotions from static images, they were better than young adults at perceiving emotions from dynamic multimodal stimuli, with middle-aged adults falling in-between. In a recent study, static and dynamic stimuli were matched such that the only difference between the two stimuli was their format. Results showed that middle-aged and older adults' accuracy slightly improved when presented with dynamic as opposed to static stimuli, but only for subtle emotions that were low in intensity (Grainger et al., 2015). Importantly, deficits in older adults' emotion perception were evident even for dynamic stimuli. Young and middle-aged adults did not differ in overall accuracy.

In sum, it appears that dynamic stimuli attenuate negative age differences for some emotions in most studies. On average, studies with dynamic stimuli that included middle-aged adults found that they performed equally well as young adults. Given that the workplace is a dynamic setting, these findings lend further support to the conclusion that older workers are unlikely to be strongly affected by the negative age trend in emotion perception observed in emotion perception tasks with static stimuli.

Age of the target and relevance of stimuli. Apart from the distinction between static and dynamic, stimuli used to assess age differences in emotion perception have also varied in terms of age of the target and relevance (see Isaacowitz & Stanley, 2011, for a review). So far, studies investigating how perception accuracy is affected by the *age of the target* have revealed no clear picture. While some studies have suggested that older adults are not better than young adults at identifying emotions from older faces (Hühnel et al., 2014), other research has found evidence for an own-age advantage in older adults' emotion perception. One study, for instance, found that older adults' deficits in identifying emotions from accompanying smiles were reduced when rating expressions of older faces (Riediger et al., 2014). Another study found that older adults were better than young adults in perceiving emotions in older faces (Murphy et al., 2010).

With regard to *relevance*, it has been suggested that age effects might be attenuated when using stimuli relevant to older adults. Consistent with the motivational perspective predicting that older adults prefer personally meaningful interactions (Carstensen, 2006), age-related deficits in emotion perception disappeared when older adults were primed with closeness (Zhang et al., 2013) and when the target person discussed a topic relevant to older adults (Richter & Kunzmann, 2011). Similarly, a recent study has demonstrated that age-related deficits in empathic accuracy disappeared when the content of a film clip was highly relevant to older adults (Wieck & Kunzmann, 2015). Taken together, when stimuli are more relevant to older adults, negative age differences tend to be attenuated.

Combining all evidence regarding the perception of others' emotions, the available studies suggest deficits in emotion perception among older adults relative to young adults. However, the relatively few studies that included middle-aged adults call into question whether negative age trends in emotion perception are linear; some studies even found a peak in emotion perception in midlife. Moreover, age deficits tend to be attenuated for positive emotions, for dynamic stimuli, and for stimuli that are relevant to older adults—all features that are characteristic of real-life work situations. For the work context, this means that older workers, who mainly fall into the group of middle-aged adults, are unlikely to show notable deficits in emotion perception relative to young workers. Yet, those working beyond retirement (usually >65 years) might be less accurate in perceiving others' emotions than their younger co-workers.

Age and Emotion Understanding

Compared to the vast literature on emotion perception, studies investigating how age affects emotion understanding are very limited in number. Table A.2 in the Appendix presents an overview of the 15 individual studies we identified. Notably, these studies have used a variety of indexes of emotional understanding, ranging from affective perspective taking to affective forecasting accuracy. A comparable number of studies investigated self-related and other-related emotion understanding. Note that only one of the identified studies was conducted in the work context.

Understanding of own emotions

In line with theoretical predictions of an age advantage in emotional competencies at middle age, some studies indicate a curvilinear age trend of emotion understanding. Early evidence for this pattern stems from a study, in which participants aged 10–77 years described the causes and course of their feelings during four situations in which they felt angry, sad, fearful, or happy (Labouvie-Vief et al., 1989). Middle-aged adults (46–59 years) showed the highest levels of emotional understanding, indicated by a more differentiated description of their emotions, while at young (19–29 years) and old age (>60 years), understanding was slightly lower. Effect sizes ranged from small to moderate. A similar pattern for old age was found by more recent research showing that self-reported understanding of own emotions does not differ between adults at age 50 and 70 but is somewhat lower from approximately age 71 onward (Fantini-Hauwel & Mikolajczak, 2014).

In addition to these findings, a small set of studies has investigated age differences in affective forecasting accuracy—the ability to predict own emotions elicited by future events—which represents an indirect measure of emotion understanding. For example, in a temporal discounting task, older adults understood that immediate and delayed gains produce comparable emotional gratification, whereas young adults erroneously predicted immediate gains would provide more emotional gratification than delayed gains (Löckenhoff et al., 2011). In line with the positivity effect, another study with 20 to 80 year-olds observed that older adults were better able to predict positive affective reactions to an electoral win, whereas there was no age benefit in accuracy of predicting negative affective reactions to an electoral loss (Scheibe et al., 2011). Similarly, another study found no age differences in the ability to accurately predict sadness in response to sad photos (Pearman et al., 2010).

In sum, a number of studies suggest that age positively impacts understanding of own emotions, with highest understanding at middle age, and slight decreases thereafter. At the same time, age-related advantages in emotion understanding appear to be more evident in positive than negative contexts. When positive age effects were found in studies on affective forecasting, the effect sizes were mostly small. Hence, according to some studies older workers (i.e., middle-aged adults) are particularly good at understanding their own emotions and a few studies suggest that this positive age trend extends into old age, benefitting those who work after retirement. However, other studies did not find support for a positive age trend. Thus, at the current state of knowledge, there appears to be a mix of mostly positive and no age trends.

Understanding of others' emotions

More than half of the available studies on age differences in other-related emotion understanding suggest a positive age trend in this competency, with effects being small in magnitude. For instance, three studies have found a positive age trend when assessing understanding of others' emotions with the MSCEIT (Extremera et al., 2006; Gardner & Qualter, 2011; Kafetsios, 2004; Mayer et al., 2003). One study on affective perspective taking found that, in contrast to young adults, older adults were aware of age-related differences in affective dynamics (Sullivan et al., 2010). In this study, older but not young adults showed awareness of the positivity effect, as they used more positive words when retelling a story from the perspective of an older

as opposed to a young person. However, one should note that a few studies observed no age differences (Phillips et al., 2002), or negative age trends in other-related emotion understanding (Cabello et al., 2014; Fantini-Hauwel & Mikolajczak, 2014). The only study that has been conducted in the work context so far found that age is unrelated to understanding others' emotions (Farh et al., 2012). However, the mean age of this sample (28 years) was rather young. With the current state of knowledge, one can cautiously conclude that age is positively associated with emotion understanding, indicating that older workers are better at understanding others' emotions than young workers. Effect size of positive age trends, however, tended to be small.

Age and Emotion Regulation

Evidence for age differences in emotion regulation stems from two streams of research, one concerned with lifespan changes in emotional functioning and the other one concerned with aging effects in the emotional labor process. In fact, emotion regulation is the only emotional competency for which age differences have been systematically studied in the work context. Almost all studies on age differences in this competency, however, have investigated self-related emotion regulation. Moreover, owing to the strong research attention on this competency, the literature is very differentiated, which makes it useful to distinguish different components of regulating own emotions. Table A.3 in the Appendix provides an overview of the 99 studies we found on age and emotion regulation. These can be categorized according to whether they assess emotion regulation knowledge (knowledge about emotion regulation strategies and their effectiveness in altering certain emotional experiences; Côté, DeCelles, McCarthy, Van Kleef, & Hideg, 2011), emotion regulation concerning own emotions or emotion regulation concerning others' emotions. Note emotion regulation knowledge applies to both the regulation of own and others' emotions.

Emotion regulation knowledge

To date emotion regulation knowledge has exclusively been tested with the emotion management subscales of the MSCEIT (Mayer et al., 2003), in which participants are presented with hypothetical scenarios and evaluate different means to regulate emotions in terms of their effectiveness. Four out of six studies found that emotion regulation knowledge is positively related to age (Extremera et al., 2006; Gardner & Qualter, 2011; Kafetsios, 2004; Palmer et al., 2005), which might be attributed to increases in crystallized cognitions with age. However, two other studies observed that age is unrelated to emotion regulation knowledge (Cabello et al., 2014; Farh et al., 2012). In sum, the majority of the available evidence suggests positive age trends in emotion regulation knowledge. The effect sizes were usually small in magnitude for positive age trends. Accordingly, older workers appear to be slightly more knowledgeable about emotion regulation strategies than young workers.

Regulating own emotions

Almost all studies on age-related changes in emotion regulation concern regulation of own emotions. Within this domain, we distinguish between studies on emotional control (one's self-reported global capability to regulate emotions effectively), the use of generally adaptive over maladaptive emotion regulation strategies, and the effective implementation of emotion regulation strategies.

Emotional control.   We identified 12 studies that examined emotional control. Several studies found that older adults report higher levels of emotional control than young adults (e.g., Gross et al., 1997; Kessler & Staudinger, 2009; Lawton et al., 1992). In a similar vein, older adults were found to report greater access to emotion regulation strategies (Orgeta, 2009). Interestingly, a recent study has demonstrated that self-related emotion regulation is the only emotional competency, in which a positive age trend was observed within a sample of older adults between 50 and 80 years (Fantini-Hauwel & Mikolajczak, 2014). Not all studies, however, revealed positive age trends in this subcompetency. Three studies that were conducted in the work context and used the WLEIS (Wong & Law, 2002), for example, indicated that age is unrelated to emotional control (Hur et al., 2014; Weng et al., 2011; Zacher et al., 2013). Nevertheless, the majority of studies show that self-reported emotional control appears to be higher at older compared to younger ages. Effect sizes ranged between small and medium.

Strategy use. We identified a total of 66 studies that investigated age differences in the use of emotion regulation strategies that are generally adaptive or maladaptive; almost all used self-report measures. Note that there is a recent discussion in the emotion regulation literature pointing out that emotion regulation strategies are not adaptive or maladaptive per se, but their adaptiveness depends on personal and situational context characteristics (Aldao, 2013; Gross, 2015). For example, reappraisal has been found to be adaptive for uncontrollable stressors, but maladaptive for controllable stressors (Troy, Shallcross, & Mauss, 2013). Nevertheless, there is robust meta-analytic evidence that the habitual use of certain strategies is linked to positive outcomes, whereas the habitual use of other strategies is linked to negative outcomes (Aldao et al., 2010; Hülsheger & Schewe, 2011). Based on this categorization, we will review age differences in four adaptive strategies (problem solving, reappraisal, deep acting, acceptance) and four maladaptive strategies (suppression, surface acting, rumination, avoidance). Although there are more studies investigating age differences in further emotion regulation strategies, these are not clearly adaptive or maladaptive (e.g., some types of situation selection and modification; Gross, 2015; or the positivity effect; Reed & Carstensen, 2012). These studies will be disregarded in this review as they offer no unequivocal insight into emotion regulation competence.

Research on age differences in use of adaptive emotion regulation strategies shows a mixed pattern of either positive or no age trends, while negative age trends are rarely observed. Various studies have investigated age differences in *problem solving*, which pertains to efforts to solve a problem in order to alleviate the accompanying negative emotions. The majority of these studies suggest that older and middle-aged adults report using more problem solving than young adults, with effect sizes being small on average (e.g., Blanchard-Fields et al., 2007; De Minzi & Sacchi, 2005; Trouillet et al., 2011). However, a smaller number of studies found no support for this pattern, showing either negative age trends (e.g., Shimanoe et al., 2014; Yeung et al., 2012) or no age differences in problem solving (e.g., Blanchard-Fields & Coats, 2008; Trouillet et al., 2009). The two studies that used worker samples revealed inconsistent findings, with one study suggesting a positive association between age and problem solving (Hertel et al., 2015) but the other indicating no age differences in use of this type of coping

(Johnson et al., 2013). In sum, one can cautiously conclude a positive age trend in the use of problem solving.

Another adaptive strategy is *reappraisal*, which involves changing the meaning of negative situations through reinterpretation. Research on age differences in reappraisal has revealed mixed findings. While some studies have shown a small positive age trend, suggesting that older adults use reappraisal more often than young adults (e.g., Diehl et al., 1996; John & Gross, 2004; Yeung et al., 2011), an approximately equal number of studies have found no consistent age trend (e.g., Bal & Smit, 2012; Brummer et al., 2014; Kafetsios & Loumakou, 2007). Only a small amount of studies reported negative age trends (Nolen-Hoeksema & Aldao, 2011; Orgeta, 2011; Shimanoe et al., 2014). Thus overall, the majority of studies suggest either no or weak positive age trends in reappraisal use.

A similar age pattern emerged in studies with worker samples assessing the use of *deep acting*, an adaptive strategy that involves changing feelings so that they align with emotional displays required by the organization. While several studies found positive age trends (e.g., Cheung & Tang, 2010; Dahling & Perez, 2010; Sliter et al., 2013), others found that age is unrelated to deep acting (e.g., Biron & van Veldhoven, 2012; Bozionelos & Kiamou, 2008; Song & Liu, 2010). A negative age trend was found in only one study (Lee & Brotheridge, 2011). In sum, the evidence points toward either no age difference or more use of deep acting in older than young workers; if positive age trends were observed they were typically small in magnitude.

Acceptance is another generally adaptive emotion regulation strategy and involves the tendency to openly receive one's emotions and associated cognitions, including negative ones. To date, very few studies have examined age differences in acceptance and the available evidence is inconclusive. While Shallcross and colleagues (2013) and Kuba and Scheibe (2016) found that age is positively related to use of acceptance, a study by Nolen-Hoeksema and Aldao (2011) found age to be negatively related to acceptance.

The evidence for age differences in strategies that are generally maladaptive is mixed. One well-studied maladaptive strategy in the aging context is *suppression*, defined as inhibition to express certain emotions. While a small majority of studies suggest that age is unrelated to use of suppression (e.g., Kafetsios & Loumakou, 2007; Hess et al., 2010; Yeung & Fung, 2012), there is also evidence for positive (e.g., Brummer et al., 2014; Diehl et al., 1996) or negative associations with age (e.g., English & John, 2013; John & Gross, 2004). When age trends were observed, effect sizes were usually small. Interestingly, a four-wave longitudinal study across 12 years found a nonlinear age trend, indicating that use of suppression increased from adolescence to early old age, and remained stable thereafter (Diehl et al., 2014).

Research on *surface acting*—the suppression of genuine emotions while faking emotions required by the job—across the adult working lifespan suggests a mixed pattern of negative and no age trends. That is, most studies either indicated that older workers report less use of surface acting than young workers (e.g., Dahling & Perez, 2010; Sliter et al., 2013) or that young and older adults use surface acting to a similar extent (e.g., Bal & Smit, 2012; Cheung & Tang, 2010). When negative age trends were observed, the effects were between small and moderate in magnitude. Importantly, there were only two studies observing small positive age trends in surface acting (Hur et al., 2014; Walsh & Bartikowski, 2013).

Regarding *rumination*, another maladaptive emotion regulation strategy that involves repetitively thinking about the causes and consequences of a negative situation, the four available studies found either no age trend (Hofer et al., 2015) or a negative age trend (Bruine de Bruin et al., 2014; Sütterlin et al., 2012). One study, for example, found that age was negatively related to use of rumination in the work, time/planning, and social domains, but unrelated to rumination in the family, environment, and health domains (Graf et al., 2015), suggesting that age differences in this strategy are context dependent. None of the studies, however, found a positive age trend for rumination.

A number of studies have examined age differences in *avoidance*, which involves disengagement and distraction from situations or thoughts in order to avoid certain emotions. More than half of these studies found positive associations with age, suggesting that older adults use more avoidance than young adults (e.g., Coats & Blanchard-Fields, 2008; Scheibe, Sheppes, et al., 2015; Yeung et al., 2012). A smaller number of studies reported either no age trends (Hofer et al., 2015; Luong & Charles, 2014), suggesting no age differences in use of avoidance, or negative age trends, suggesting that older adults use less avoidance than young adults (Hertel et al., 2015; Kim & Agrusa, 2011; Shimanoe et al., 2014).

In sum, research on age differences in strategy use has found a mix of no age differences and positive age trends for use of four adaptive strategies (problem solving, reappraisal, deep acting, and acceptance). Thus, older workers are likely to use adaptive strategies at least as often as young workers. For two maladaptive strategies, surface acting and rumination the evidence suggests either no or negative relationships with age. Accordingly, older workers may use no more or less surface acting and rumination than young workers. Evidence for age differences in suppression has been inconsistent. Interestingly, avoidance appears to be the only maladaptive strategy for which the majority of studies found a positive relationship with age. It is important to note, however, that theoretical and initial empirical evidence suggest that several maladaptive strategies, including avoidance and suppression, may become more adaptive at older age (e.g., Blanchard-Fields et al., 2007; Blanchard-Fields & Coats, 2008; Yeung, Fung, & Chan, 2015). For example, Yeung and Fung (2012) found that suppression was associated with lower intensity of negative affect and higher productivity among older, but not among young workers. Similarly, Scheibe, Sheppes, et al. (2015) reported that the relative preference for avoidance over reappraisal was linked to higher levels of momentary affective well-being among older but not young adults.

Strategy effectiveness. We identified 17 studies that have tested age differences in the effective implementation of emotion regulation strategies in laboratory contexts, typically comparing young and older adults. A handful of these studies have examined *reappraisal effectiveness* and yielded mixed findings. There is some evidence that older adults are better in implementing positive reappraisal (focusing on the positive aspects of a negative situation) than young adults (Lohani & Isaacowitz, 2014; Shiota & Levenson, 2009), with middle-aged adults falling between young and older adults (Shiota & Levenson, 2009). However, this pattern could not be replicated for all types of reappraisal. That is, two studies found that older adults were less successful in implementing unspecified reappraisal (changing the meaning of a stimulus) in order to reduce negative emotional responses to stimuli (Opitz et al., 2012; Tucker et al., 2012). Yet another study sug-

gests that unspecified reappraisal success is unrelated to age (Opitz et al., 2014). In addition, two studies have examined age differences in implementing detached reappraisal (reinterpreting the situation as "fake") and found older adults to be less successful than young adults in using this strategy effectively (Shiota & Levenson, 2009; Winecoff et al., 2011).

With regard to *suppression* of emotional experience or expression, the majority of studies found no age differences in implementation effectiveness (Kunzmann et al., 2005; Lohani & Isaacowitz, 2014; Phillips et al., 2008; Shiota & Levenson, 2009). However, one study suggests that older adults are better able to inhibit their facial expression of emotions via suppression than young adults (Magai et al., 2006). Interestingly, although suppression ability may not be enhanced at older ages, it has been shown to be less cognitively demanding for older compared to young adults (Emery & Hess, 2011). A few studies have tested age differences in effectiveness of using *avoidance*. While three studies found that older adults are better able than young adults to reduce their negative affect using avoidance (Beadel et al., 2013; Lohani & Isaacowitz, 2014; Phillips et al., 2008), another study observed no age differences in avoidance effectiveness (Tucker et al., 2012).

Overall, with regard to self-related emotion regulation, we conclude that older adults tend to have higher emotional control, but do not show as clear advantages over young adults when it comes to strategy use and effectiveness. The evidence overwhelmingly shows no or positive age trends, while negative age trends are rarely observed. One exception is a higher use and effectiveness of avoidance with age, which is generally categorized as a maladaptive strategy but may have affective benefits for older adults. For the work context this means that older workers regulate their own emotions as effectively as, or even more effectively than young workers. When positive trends occur they can be expected to be small. Only two studies (Magai et al., 2006; Shiota & Levenson, 2009) allow for inferences regarding older workers' emotion regulation strategy effectiveness, as none of the other studies included middle-aged adults.

Regulating others' emotions

So far, only two studies have investigated age differences in the ability to regulate others' emotions; both using the PEC in large samples (Brasseur et al., 2013). Whereas one study found positive links between age and controlling others' emotions (Brasseur et al., 2013), another study testing older adults aged 50–80 found no age difference (Fantini-Hauwel & Mikolajczak, 2014). The effect size of the positive age trend in Brasseur and colleagues' (2013) study was small. In sum, very little is known about age differences in regulating others' emotions, and the little existing evidence is inconclusive.

DISCUSSION

Against the backdrop of the aging workforce, it has been proposed that emotional competencies represent a domain in which workers improve as they get older, in contrast to the decline typically found in fluid cognitive and physical competencies with age. In order to assess whether this proposition indeed holds, the purpose of the present review was to systematically examine the empirical evidence on age differences in emotional competencies (perception, understanding, and regulation), including its subdimensions. Figure 1 shows the overall pattern
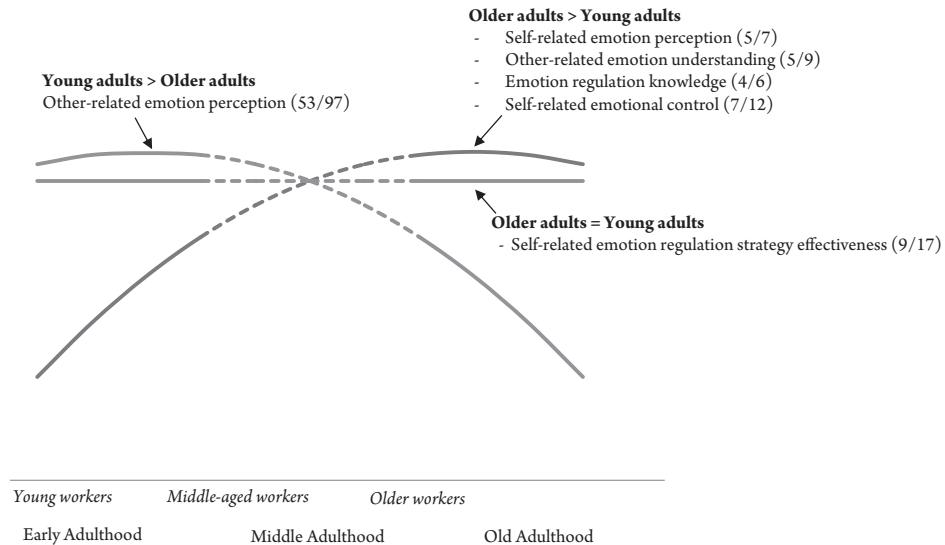
Figure 1. Overall pattern of emotional competencies across adulthood. Numbers in brackets indicate the number of studies clearly showing the depicted age trend out of the total number of studies on that subcompetency. Generally negative age trends were observed for other-related emotion perception, no age differences were observed for self-related emotion regulation strategy effectiveness, and generally positive age trends were observed for self-related emotion perception, other-related emotion understanding, emotion regulation knowledge, and self-related emotional control. There was insufficient evidence to infer a general age trend for other-related emotion regulation, and mixed evidence of positive age trends and no age differences for self-related emotion understanding and emotion regulation strategy use. Dashed lines indicate that the identified age trends for middle-aged adults are preliminary due to the limited evidence for this age period.

of age-related differences in nine emotional subcompetencies we identified. These nine subcompetencies were derived by distinguishing between self-related and other-related dimensions, as well as further differentiations within the emotion regulation branch due to the varied literature on the topic. Specifically, within emotion regulation, we distinguished emotion regulation knowledge (which can refer to own *and* others' emotions), three facets of self-related emotion regulation (emotional control, strategy use, strategy effectiveness), and other-related emotion regulation. Overall, we found evidence for a mixed pattern of positive and no age differences in those emotional subcompetencies for which sufficient evidence is available. One exception is other-related emotion perception, which was negatively related to age although this latter effect was robust only for older adults beyond 65 years of age. The available evidence on other-related emotion regulation was too limited to draw conclusions.

More specifically, the evidence suggests that compared to young adults, older adults are better at perceiving own emotions, understanding others' emotions, report higher levels of emotional control and have superior emotion regulation knowledge. Furthermore, the review indicates that older adults are generally as effective as young adults in regulating their emotions. A mixed pattern of positive age trends and no age differences was observed for self-related emotion understanding and emotion regulation strategy use. The only negative age trend emerged for perception of others' emotions, although several studies that included middle-aged adults (i.e., 40–60 years) suggest that emotion perception peaks in mid-life. For the working lifespan, we can safely conclude that older workers generally function equally well as young workers on most emotional competencies, and in some areas slightly better (i.e., regulating one's own emotions and understanding

others' emotions). For those working beyond retirement age, the evidence suggests similar trends, except for some deficits in other-related emotion perception that may become apparent in workers above age 65. In light of age-related declines in physiological and cognitive capacities, these age trends suggest that on the whole, emotional competencies indeed represent a resource of older workers.

Critical Evaluation of the Empirical Evidence

Although it is possible to identify some general patterns with regard to age differences in emotional competencies, the available evidence is not without limitations. First, it is somewhat difficult to compare the available studies as they use different age ranges and often exclude middle-aged adults. Many studies used extreme group contrasts, comparing young (usually younger than age 30) with older adults (usually older than age 60). While these findings increase our understanding of emotional competencies in older adults who continue working past retirement age, they offer no insight on middle-aged adults (40–60 years), who comprise the majority of the older workforce. This is especially troublesome as both lifespan theories and the little available research on middle-aged adults hint at the possibility that emotional competencies may not follow a linear age trajectory (e.g., Hartshorne & Germine, 2015; Horning et al., 2012). Rather, midlife may be a period where emotional competencies peak. Another concern in this context is the lack of longitudinal studies, which are required to distinguish between age and cohort effects, and to control for selection effects.

Second, research has usually not systematically distinguished self- versus other-related subdimensions of each competency but instead focused on one subdimension only. For instance, while an

extensive body of research has focused on age and perception of *others'* emotions, there are only few studies assessing age differences in *own* emotion perception. The reverse pattern holds for emotion regulation, where the majority of research addressed self-related emotion regulation and almost no research addressed other-related emotion regulation. Thus, little is known about how well older adults' perceive their own emotions and regulate the emotions of others. However, both aspects of emotional competence might be critical for the work setting and may vary with age. The present review therefore did not only provide a thorough overview of the current state of knowledge but also identified important gaps in the literature that need attention.

Third, for most competencies the evidence suggests maintenance of competencies across the (working) lifespan or only small positive age trends. This may raise the question of the meaningfulness of age differences in emotional competencies for work outcomes. It is important to note, however, that even maintenance of, or slight gains in emotional competencies with age is an important conclusion, given the robust negative age trends found in other domains, such as fluid cognitions (Salthouse, 2012). The findings of the present review are in stark contrast to the predominant portrayal of age as a period of decline that has manifested in negative age stereotypes, diminishing older workers' employability, motivation, and performance (Ng & Feldman, 2012; Hertel & Zacher, in press). The persistence of these negative age stereotypes suggest that older workers' emotional competencies are neither sufficiently acknowledged nor fully exploited in occupational settings.

Fourth, while empirical findings are largely in line with explanatory mechanisms for age and emotional competency linkages, these remain to be tested more directly. Specifically, as multiple explanations are likely to account for age-related differences in emotional competencies (fluid cognition, crystallized cognition, physiological flexibility, and motivation), research should test multiple explanations simultaneously, as well as their interactions. This would also allow specifying the relative impact of each explanatory mechanism.

Fifth, with regard to the large body of evidence on older adults' deficits in emotion perception from static stimuli, it is important to note that these studies lack ecological validity, limiting their practical relevance (Isaacowitz & Stanley, 2011). Research using dynamic and multimodal stimuli that are more ecological valid hence reflects age differences in emotion perception in daily work life more accurately. Importantly, this line of research, on average, points to smaller or even no age differences in emotion perception, especially during midlife.

Finally, the identified positive age trend in own- and other-related emotion understanding should be regarded as preliminary due to the small number of studies available. Furthermore, it was difficult to compare the limited evidence because studies assessed different constructs serving as proxy for emotion understanding. Clearly, more research is needed to further qualify whether older adults are as good as or better than young adults in emotion understanding. More specifically, studies using comprehensive measures of emotion understanding that assess various underlying skills rather than focusing on one particular skill, such as affective forecasting, would help to increase our knowledge on age differences in emotion understanding (Castro, Cheng, Halberstadt, & Grühn, 2015). As more research accumulates, conclusions about age differences in emotion understanding may need to be reconsidered.

Implications for the Work Context

Age, emotional competencies, and performance

Our review suggests that, overall, older workers should be at least as capable as young workers to perceive emotions of others in naturalistic work settings (where stimuli are typically dynamic and multimodal), and might be even better at understanding and regulating emotions at work. In contrast to declines in physiological flexibility and fluid cognitions with increasing age (Salthouse, 2012), emotional competencies thus may positively contribute to older workers' job performance. In fact, age differences in emotional competencies may help explain meta-analytic evidence that age is unrelated to job performance (Ng & Feldman, 2008), which goes against widely held negative stereotypes of older workers as being less productive (Posthuma & Campion, 2009). So far, different explanations have been put forward for this finding. For instance, it has been proposed that age-related increases in crystallized cognition can compensate for declines in fluid cognition in such a way that job performance is maintained (Salthouse, 2012). In addition to this compensatory effect of crystallized cognition, our review points at the possibility that age-related changes in emotional competencies may also counteract declines in physiology and fluid capacities, thereby preventing reductions in performance at higher worker ages. This would be consistent with evidence that strong emotional competencies tend to compensate for the negative effect of low cognitive competencies on task performance (Côté & Miners, 2006).

Importantly, the compensatory effect of emotional competencies is likely dependent on the extent to which (a) the type of job requires emotional competencies (e.g., whether or not it is an emotional labor job), and (b) the type of performance within a job benefits from emotional competencies (e.g., task performance vs. extra role behavior). With regard to the former, older adults are expected to perform well overall in emotional labor jobs since this type of job strongly depends on emotional competencies in addition to job experience (Diefendorff, Stanley, & Gabriel, 2015; Joseph & Newman, 2010). Age differences in overall job performance may be less favorable in jobs outside the emotional labor domain since emotional competencies are less relevant to performance in these types of job (Warr, 1993). With regard to the latter, even within the same job, those indicators of job performance that rely heavily on emotional competencies, such as organizational citizenship behavior and refraining from counterproductive work behaviors, should show more consistent positive age differences than other indicators of job performance that rely less heavily on emotional competencies, such as core task performance. In fact, this assumption is consistent with meta-analytic evidence that organizational citizenship behavior and refraining from counterproductive work behaviors are positively related to age whereas core task performance is unrelated to age (Ng & Feldman, 2008). One task for future research is to systematically test whether type of job and type of performance indeed moderate relationships between age, emotional competencies, and performance.

Age, emotional competencies, and motivation

Lifespan researchers have proposed that age differences in emotional competencies, in combination with job demands, impact work motivation (Kanfer & Ackerman, 2004). Work motivation is a set of energetic forces needed to initiate work-related behavior and to determine its direction, intensity, and persistence (Pinder, 1998). Maintaining work

motivation is dependent on workers' ability to maintain or regain positive affect in the context of work requirements (Bledow, Schmitt, Frese, & Kühnel, 2011; Seo, Barrett, & Bartunek, 2004), which is facilitated by emotional competencies. Older workers may focus more on positive events, reappraise situations in a more positive way, and tend to avoid negative work stressors more than young workers (Diefendorff et al., 2015; Johnson et al., 2013). These competencies, in turn, may help them to maintain or even increase their work motivation even when emotional demands are high. Similar to job performance, age differences in emotional competencies may explain positive relationships between age and different indicators of work motivation (Ng & Feldman, 2012).

Age, emotional competencies, and occupational well-being

Emotional competencies are also fundamentally important to occupational well-being, buffering against the negative impact of job stressors (Bechtoldt et al., 2011; Niven et al., 2013; Prati et al., 2009). Therefore, positive age trends in many aspects of emotional competencies are thought to benefit older workers' occupational well-being. This could potentially explain meta-analytic findings that workers' age is related to lower levels of emotional exhaustion (Ng & Feldman, 2010). However, research has only recently begun to directly investigate age-related differences in emotional competencies as underlying mechanism of the positive associations between age and occupational well-being. One study by Hertel and colleagues (2015), for example, showed that higher use of adaptive emotion regulation strategies (in this case, active problem-focused coping) accounted for the negative association between age and job strain. Similarly, a study by Scheibe and colleagues (2016) revealed an indirect positive effect of age on after-work emotions through increased use of adaptive emotion regulation strategies and decreased use of maladaptive strategies.

As for job performance, the extent to which age-related differences in emotional competencies affect occupational well-being likely depend on the nature of the job and the associated emotional job demands. One sector where emotional job demands are particularly high is the service sector, including sales, health care, education, and law enforcement (Glomb, Kammeyer-Mueller, & Rotundo, 2004). Scheibe, Stamov-Roßnagel, and Zacher (2015) investigated age differences in links between emotional job demands and occupational well-being in workers from the healthcare sector and found age differences to depend on type of demand. In line with the results of our systematic review, older workers were less negatively affected than young workers by neutral display demands, whose fulfillment requires emotion regulation. However, they were more negatively affected by emotional sensitivity demands, whose fulfillment requires emotion perception. More research is needed to investigate effects of age differences in emotional competencies on occupational well-being, and the moderating role of emotional job demands.

Age, emotional competencies, and personnel decisions

Although emotional competencies are a domain in which older workers in many respects outperform young workers, they are rarely included as predictors for selection or advancement. Instead, existing instruments rely heavily on fluid cognitions, which decline with age. This can lead to systematic disadvantages for older adults in personnel decisions, or the potential for age-related adverse impact, which can be very costly for organizations (Klein, Dilchert, Ones, & Dages, 2015). The inclusion of measures of emotional competencies holds promise as a means to decrease this age disadvantage and avoid adverse impact in relation to age. Especially for jobs that require high emotional competencies it should also allow for more accurate predictions of performance in the job.

Avenues for Future Research
Extending and testing theory

Our review shows that age differences in emotional competencies have been widely studied by lifespan researchers, yet they remain to be tested explicitly in the work context. Age differences in emotion perception and understanding, in particular, have received little research attention in the work context. However, both competencies have been shown to predict important work outcomes (Durán et al., 2004; Elfenbein, Foo, et al., 2007). Thus, an important task for future research is to investigate whether and in which contexts age-related differences in emotional competencies predict age variations in work outcomes (Scheibe, Wisse, & Schulz, 2015).

Although lifespan theories are relatively clear about the mechanisms underlying age differences in emotional competencies, these have rarely been investigated directly. Besides that, lifespan theory has so far not addressed the distinction between self-related and other-related emotional competencies. In general, the mechanisms of age-related changes in emotional competencies should apply to both of these subdimensions, but perhaps to a different degree. One can speculate, for instance, that age-related decline in fluid cognition diminishes other-related emotion perception more strongly than self-related emotion perception. Perceiving others' emotions requires constantly processing incoming emotional cues from the environment, whereas perceiving own emotions only requires processing own bodily signals (Ruffman et al., 2008).

Apart from that, emotional competencies have usually either been investigated separately or researchers have computed overall scores but not different combinations or profiles of emotional competencies. The pattern of age differences in emotional competencies, however, suggests that various aspects of competencies might be differently affected by aging. Consequently, an intriguing research question is how various age profiles of emotional competencies relate to work outcomes. The emotional labor literature has just begun to look at profiles and provided initial evidence that emotional labor profiles are differentially related to work outcomes (Gabriel, Daniels, Diefendorff, & Greguras, 2015). We recommend extending these research efforts to profiles of emotional competencies and the role of age differences.

In addition to examining how age differences in emotional competencies affect work-related outcomes, future research might also address reverse influences. It is possible that the work context shapes emotional competencies across the lifespan. So far, the lifespan literature has largely neglected how changes in context throughout life affect emotional development (Brose, Scheibe, & Schmiedek, 2013). However, changes in context and in the career-developmental context in particular, are likely to affect the development of emotional competencies. For example, people who work in the service industry likely have more opportunities than blue collar workers to improve their emotional knowledge and competencies through training and frequent exposure to client interactions. Whereas influences of work

design on fluid cognitions across the lifespan have already been demonstrated (Schooler, Mulatu, & Oates, 1999), they remain to be tested for emotional competencies. Longitudinal studies are needed to clarify whether age-related change in emotional competencies shape work experiences, or vice versa.

Conceptual refinement

The concept of emotional competencies could be further refined. For example, other-related emotional competencies could be further distinguished as to whether they concern well-known others or strangers (Castro et al., 2015). We would expect that age differently affects these two types of competencies. The finding that age deficits in emotion perception are reduced when identifying emotions from familiar partner, or even disappear when perceived closeness is primed (Zhang et al., 2013), indicates that older adults are likely to be as good as young adults in identifying emotions from well-known others. However, older adults might be less able to perceive, understand, and regulate emotions of strangers, when perception accuracy depends more heavily on fluid cognition. This suggests that older workers' emotional competencies might be better utilized when working with colleagues or longer-term clients (as in healthcare), rather than in short interactions with frequently changing clients (as in sales).

Additionally, there might be more components of each particular competency than currently considered. For instance, Côté (2014) has recently included adaptive emotion regulation goal setting as an additional emotional competency, which pertains to the ability to determine whether current emotions help to achieve one's objectives in a given situation and if not, set goals to adjust emotions. Particularly, low consensus exists with regard to the components of emotional understanding (Castro et al., 2015). This is also partly reflected in the diversity of constructs used as a proxy for emotion understanding in the aging literature.

Extending methodology

The field of age and emotional competencies does not only require further theoretical advancement, but also an extension and refinement of its methodology. For instance, almost all studies included in this review employed a cross-sectional design. In contrast to the multiple long-term longitudinal studies on cognitive aging (Baltes & Mayer, 1999; Schaie, 2005; Schooler et al., 1999), there was a striking absence of longitudinal data on age trajectories of emotional competencies. Cohort-sequential designs are, however, needed to differentiate between cohort and aging effects (Baltes et al., 2006; Zacher, 2015). These designs can further help to exclude that selection bias ("healthy worker effects"), such that only employees with particularly good health and emotional competencies remain in the workforce, drive age differences in emotional competencies (Scheibe & Zacher, 2013). The effects of aging on emotional competencies through changes in basic capacities and motivation, and their consequences for work outcomes, might therefore be best studied with multi-wave longitudinal designs.

Additionally, we found that a remarkable number of studies on other-related emotion perception and self-related emotion regulation strategy effectiveness failed to include middle-aged adults. Including the group of middle-aged adults is not only important in order to gain a full understanding of age differences in emotional competencies, but particularly relevant in the work context, as this group usually captures an age-span that represents older workers. It is risky to

assume that middle-aged adults simply function at intermediate levels on emotional competencies between young and older adults. Instead, evidence on midlife development shows numerous curvilinear relationships and suggests that some emotional competencies peak during this period of life (Lachman et al., 2015).

Furthermore, research on age and emotional competencies has only employed a limited number of measures, largely disregarding some well-validated available instruments such as the Geneva Emotion Recognition Test (Schlegel et al., 2014). In this context, some recent theoretical developments in refining the concept of emotional competencies, such as introducing the distinction between self- and other-related emotional competencies also need to trickle down into the development of comprehensive measures. As noted, current measures usually fail to consistently assess subdimensions of emotional competencies and when they do so, scores are usually combined to gain one overall score per competency.

Finally, scholars should consider the age invariance of the measures they use to ensure that effects are indeed due to age differences and not rooted in differences in the meaning of certain items for young and older adults. It is important to note that this issue should always be considered when comparing age groups (Hertel & Zacher, in press; Vandenberg & Lance, 2000). With regard to emotional competencies, age invariance has been established for some measures such as the MSCEIT or the PEC (Fantini-Hauwel & Mikolajczak, 2014; Gardner & Qualter, 2011), but remains to be demonstrated for others.

CONCLUSIONS

There is no doubt that emotional competencies are beneficial for work outcomes, and it has been assumed that they represent strengths of older workers. In the present review, we systematically examined the state of knowledge on age differences in three core emotional competencies (perception, understanding, and regulation) in terms of their self- and other-related expressions. Due to further differentiation in the domain of emotion regulation, we identified a total of nine relevant subcompetencies. For seven subcompetencies, the present review suggests a mix of positive or no age differences. For one subcompetency (other-related emotion perception), there was a negative age trend, yet it was only robust beyond the typical retirement age. For other-related emotion regulation, the limited evidence did not allow drawing definite conclusions. On the whole then, emotional competencies appear to be well developed in older workers. Relative to domains such as fluid cognition and physical functions in which age is associated with declines, emotional competencies seem to represent a domain in which older adults are as good as or even superior compared to young adults. Future research with refined measures and using worker samples is required to test age differences in emotional competencies in the occupational setting, and to investigate explanatory mechanisms and boundary conditions.

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APPENDIX

Table A.1. Studies on Age Differences in Emotion Perception

Study	Sample (Age Range, M_{Age}, SD_{Age})	Type of Sample (1 = Worker, 2 = Community/ Student)	Type of Measure	Description of Measure	Overall Age Difference[a]	Main Findings
Perceiving own emotions						
1. Orgeta (2009)	40 young (17–37, M = 20.08, SD = 3.17) and 40 older adults (61–81, M = 69.83, SD = 4.89)	2	SR	Emotion clarity subscale of the DERS	+	Older adults reported higher levels of emotional clarity than young adults
2. Weng and colleagues (2011)	110 internists (M = 40.78, SD = 6.91)	1	SR	Self-emotion appraisal subscale of the WLEIS	0	Age was unrelated to emotion perception of own emotions
3. Brasseur and colleagues (2013)	4,307 participants (15–84)	2	SR	Intrapersonal emotion identification subscale of the PEC	+	Age was positively related to self-reported ability to identify own emotions
4. Zacher, McKenna, and Rooney (2013)	*Sample 2* 400 employees (16–74, M = 31.6, SD = 12.51)	1	SR	Self-emotion appraisal subscale of the WLEIS	+	Age was positively related to emotion perception of own emotions
5. Fantini-Hauwel and Mikolajczak (2014)	6,688 older adults (50–80, M = 62.62, SD = 7.01)	2	SR	Intrapersonal emotion identification subscale of the PEC	–	Age was negatively related to self-reported identification of own emotions between age 50 and 70. Deficits were particularly evident at old age (70–80)
6. Hur and colleagues (2014)	256 flight attendants (21–45, M = 29.7, SD = 5.17)	1	SR	Self-emotion appraisal subscale of the WLEIS	+	Age was positively related to emotion perception of own emotions
7. Mankus, Boden, and Thompson (2016)	919 adults (18–79, M = 35.4, SD = 13.1)	2	SR	Clarity subscale of the TMMS and the Difficulty Identifying Feelings subscale of the TAS-20	+	Age was positively related to emotion perception of own emotions
Perceiving others' emotions						
1. Malatesta, Izard, Culver, and Nicolich (1987)	10 young (25–40, M = 34.5, SD = 3.3), 10 middle-aged (45–60, M = 51.6, SD = 4.9), and 10 older adults (65–80, M = 71.8, SD = 4.8)	2	TB	Facial emotion perception task with videos without sound	–	Older adults were less accurate in perceiving emotions than middle-aged and young adults. Accuracy was higher for each group when perceiving emotions from same-aged faces
2. Moreno, Borod, Welkowitz, and Alpert (1993)	30 young (21–39), 30 middle-aged (40–59), and 30 older adults (60–81)	2	TB	Facial emotion perception task	0	No overall age difference in emotion perception
3. Grunwald and colleagues (1999)	28 young (20–39, M = 29.6, SD = 6.1), 28 middle-aged (40–59, M = 49.8, SD = 5.7), and 28 older adults (60–85, M = 69.9, SD = 6.8)	2	TB	Emotional lexical perception task	–	Older adults were less accurate than young and middle-aged adults in emotion perception

Study	Sample (Age Range, M_{Age}, SD_{Age})	Type of Sample (1 = Worker, 2 = Community/ Student)	Type of Measure	Description of Measure	Overall Age Difference[a]	Main Findings
4. Montepare, Koff, Zaitchik, and Albert (1999)	41 young (18–22, M = 18.7) and 41 older adults (65–89, M = 76.5)	2	TB	Emotion perception task with short videos showing emotions through body movements and gestures	–	Older adults were less accurate than young adults in perceiving sad and angry expressions, but did not differ in accuracy for happy and neutral expressions
5. Borod and colleagues (2000)	100 adults (21–81, M = 48.8, SD = 17.5)	2	TB	Emotional lexical perception task (facial emotion, prosodic emotion, and lexical emotion)	–	Age was negatively related to emotion perception and discrimination from facial, prosodic, and lexical stimuli
6. Gunning-Dixon and colleagues (2003)	8 young (19–29, M = 25.8, SD = 3.1) and 8 older adults (57–79, M = 72.3, SD = 7.6)	2	TB	Facial emotion discrimination task with pictures	–	Older adults were less accurate than young adults in discriminating between positive and negative emotional expressions
7. Kafetsios (2004)	239 adults (19–66, M = 38.7, SD = 13.05)	2	TB	Perceiving emotions branch of the MSCEIT	0	Age was unrelated related to performance on tasks of the perceiving emotions branch
8. Palmer, Gignac, Manocha, and Stough (2005)	450 participants (18–79, M = 37.39, SD = 14.13)	2	TB	Perceiving emotions branch of the MSCEIT	–	Age was negatively related to performance on one subtask of the perceiving emotions branch
9. Chapman and Hayslip (2006)	308 young (M = 20.0, SD = 2.2) and 256 middle-aged adults (M = 49.0, SD = 5.4)	2	SR	Emotion appraisal subscale of the SSEIT	0	Age was unrelated to emotion perception
10. Extremera and colleagues (2006)	946 adults (16–58, M = 19.78, SD = 5.6)	2	TB	Perceiving emotions branch of the MSCEIT	+	Age was positively related to performance on tasks of the perceiving emotions branch
11. Roring, Hines, and Charness (2006)	20 young (M = 23.0, SD = 4.1), 20 middle-aged (M = 49.0, SD = 3.3), and 20 older adults (M = 71.0, SD = 5.1)	2	TB	Facial emotion perception task with pictures	–/0	Older adults were less accurate than young and middle-aged adults in perceiving sad, fearful, and surprised expressions, but did not differ in accuracy for happy, angry and disgusted expressions. There were no differences in perception between young and middle-aged adults

Study	Sample (Age Range, M_{Age}, SD_{Age})	Type of Sample (1 = Worker, 2 = Community/ Student)	Type of Measure	Description of Measure	Overall Age Difference[a]	Main Findings
19. Stanley and Blanchard-Fields (2008)	171 young ($M = 20.6$, $SD = 1.55$) and 193 older adults ($M = 70.72$, $SD = 5.36$)	2	TB	Facial emotion perception task (MSFDE; Beaupre et al., 2000)	−	Older adults performed more poorly on a facial perception task than young adults. The negative relationship between age and crime deceit was mediated by perception of fear and shame
20. Ebner and Johnson (2009)	32 young (18–22, $M = 19.3$, $SD = 1.34$) and 24 older adults (65–84, $M = 74.8$, $SD = 4.78$)	2	TB	Facial emotion perception task with pictures	−/0	Older adults were less accurate than young adults in perceiving angry expressions but did not differ in accuracy for happy and neutral facial expressions
21. Mill, Allik, Realo, and Valk (2009)	607 adults (18–84, $M = 32.6$, $SD = 14.9$)	2	TB	Facial (pictures) and vocal emotion perception task	−	Older adults were less accurate in perceiving emotions, especially negative ones. Deficits in perception of sadness and to a smaller extent anger from facial and vocal expressions started at age 30
22. Ruffman and colleagues (2009)	*Study 2*: 30 young (18–22, $M = 19.0$) and 30 older adults (62–85, $M = 69.0$)	2	TB	Facial emotion perception task with pictures	−	Older adults were less accurate than young adults overall. One exception was perception of happy faces where older adults were better than young adults
23. Schaffer and colleagues (2009)	60 participants (20–79, $M = 49.0$, $SD = 16.7$)	2	TB	CATS	−/0	Age was unrelated to performance on a lexical and facial emotion perception task, but was negatively associated with emotion perception of prosody and cross-modal tasks. Effects were independent of age-related declines in fluid ability
24. L. M. Williams and colleagues (2009)	974 participants (6–91, $M = 40.74$, $SD = 23.10$)	2	TB	Emotion Perception and Identification Test of the WebNeuro test battery (Silverstein et al., 2007)	∩	The relationship between emotion perception accuracy and age followed an inverted u-shape function (moderate effect size). Emotion perception was highest between age 20–49, and decreased between age 50–91

Table A.1. *Continued*

Study	Sample (Age Range, M_{Age}, SD_{Age})	Type of Sample (1 = Worker, 2 = Community/ Student)	Type of Measure	Description of Measure	Overall Age Difference[a]	Main Findings
25. Hunter, Phillips, and MacPherson (2010)	*Study 1:* 25 young (18–40, $M = 22.64$, $SD = 5.86$) and 25 older adults (60–79, $M = 66.69$, $SD = 6.10$)	2	TB	FEEST, Vocal emotion perception task and audiovisual perception task pairing both stimuli	−/0	While older adults were less accurate in recognizing emotions from faces and voices alone, they were as accurate as young adults in recognizing emotions when congruent audio and visual stimuli were presented simultaneously
	Study 2: 20 young (18–23, $M = 20.00$, $SD = 1.48$) and 20 older adults (63–78, $M = 70.55$, $SD = 4.12$)					
26. Krendl and Ambady (2010)	*Study 1*: 36 young ($M = 19.8$) and 42 older adults ($M = 75.8$)	2	TB	Performance on DANVA-2 (static pictures) and the PONS (video clips)	−/0	There were no age differences in emotion perception accuracy of global emotions for dynamic images of faces. Older adults were less accurate in recognizing discrete negative emotions from static facial images and this effect was exacerbated by declines in executive functioning
	Study 2: 36 young ($M = 19.5$, $SD = 1.2$) and 44 older adults ($M = 75.5$, $SD = 5.9$)					
27. Murphy, Lehrfeld, and Isaacowitz (2010)	*Study 1*: 41 young (18–43, $M = 21.71$, $SD = 4.88$) and 33 older adults (59–89, $M = 70.85$, $SD = 8.24$)	2	TB	Task assessing ability to discriminate between posed and spontaneous smiles from multimodal stimuli (videotaped smiles)	+/0	Older adults were better than young adults at distinguishing between posed and spontaneous smiles of both young as well as older targets. There were no age differences in perception when only judging smiles of young adults
	Study 2: 23 young (18–22, $M = 19.83$, $SD = 1.44$) and 26 older adults (60–90, $M = 71.88$, $SD = 7.34$)					
28. Murphy and Isaacowitz (2010)	41 young (18–28, $M = 19.34$, $SD = 1.74$) and 23 older adults (62–86, $M = 72.04$, $SD = 6.11$)	2	TB	DANVA-2-AF	−	Older adults were less accurate than young adults in perceiving anger, fear, and sadness, but did not differ in accuracy for happy expressions

Study	Sample (Age Range, M_{Age}, SD_{Age})	Type of Sample (1 = Worker, 2 = Community/ Student)	Type of Measure	Description of Measure	Overall Age Difference[a]	Main Findings
29. Orgeta (2010)	40 young (17–48, M = 22.35, SD = 6.06) and 40 older adults (60–82, M = 69.73, SD = 4.58)	2	TB	Facial emotion perception task	−/0	Age differences in emotion perception were moderated by task difficulty. Older adults were only poorer than young adults in perceiving sadness and fear when presented with four or six labels to choose from (vs. 2)
30. Richter, Dietzel, and Kunzmann (2010)	48 young (19–31, M = 23.33, SD = 3.38) and 35 older women (61–94, M = 70.37, SD = 8.83)	2	TB	Emotion perception task, using film clips with sound (context-rich) or without sound (context-poor)	−	Older women were less accurate than young women in perceiving sadness, anger, and happiness. Age differences in perceiving happiness (but not anger and sadness) were attenuated in context-rich tasks
31. Ruffman and colleagues (2010)	60 young (18–35) and 61 older adults (60–85)	2	TB	Emotion perception from faces and bodily expression (pictures), and vocal stimuli	−	Older adults were less accurate than young adults in perceiving emotions
32. Ryan, Murray, and Ruffman (2010)	40 young (17–29, M = 21.63) and 40 older adults (60–84, M = 65.60)	2	TB	Emotion-matching task, matching emotions in faces with voices or label emotions in faces or voices	−	Older adults were less accurate than young adults in perceiving emotions from faces or voices in isolation, and matching voices and faces. Effects were independent of age differences in fluid cognition
33. Sasson and colleagues (2010)	7,320 adults	2	TB	Penn emotion recognition task (Kohler et al., 2003)	−	Older adults were less accurate in perceiving emotions, particularly fear and anger
34. Slessor, Miles, Bull, and Phillips (2010)	39 young (17–36, M = 21.3, SD = 4.2) and 35 older adults (65–81, M = 74.0, SD = 5.1)	2	TB	Task assessing ability to discriminate genuine from faked smiles	0	There were no age differences in the ability to discriminate genuine and faked smiles
35. Ebner, He, and Johnson (2011)	46 young (18–30, M = 22.3, SD = 2.9) and 33 older adults (63–92, M = 74.9, SD = 7.8)	2	TB	Facial emotion perception task with pictures with pictures	0	There were no age differences in overall accuracy in a sample with valid gaze data
36. Gardner and Qualter (2011)	258 young (18–31, M = 25.09, SD = 4.02) and 262 older adults (32–79, M = 43.12, SD = 8.46)	2	TB	Perceiving emotions branch of the MSCEIT	0	There were no age differences in performance on tasks of the perceiving emotions branch

Table A.1. *Continued*

Study	Sample (Age Range, M_{Age}, SD_{Age})	Type of Sample (1 = Worker, 2 = Community/ Student)	Type of Measure	Description of Measure	Overall Age Difference[a]	Main Findings
37. Halberstadt, Ruffman, Murray, Taumoepeau, and Ryan (2011)	60 young (18–35, M = 20.5) and 61 older adults (60–85, M = 70.5)	2	TB	Emotion perception from faces, vocal expression, bodily expressions from pictures	–	Older adults were less accurate than young adults in perceiving emotions. Older adults' deficits in emotion perception explained age-related declines in the ability to discriminate between appropriate behavior and faux pas
38. Lima and Castro (2011)	40 young (18–30) and 40 middle-aged adults (40–60)	2	TB	Emotions perception from prosody (tone of voice in emotionally neutral sentences)	–/0	Middle-aged adults were less accurate than young adults in perceiving disgust and fear, but did not differ in accuracy for happy, sad, and surprised expressions
39. McCubbin and colleagues (2011)	106 adults (21–92, M = 52.6, SD = 14.6)	2	TB	Faces subtask of the Perception of Affect Test (Lane et al., 1996)	–	Age was negatively related to perception of emotions from faces
40. Mitchell, Kingston, and Barbosa Boucas (2011)	45 young (18–35, M = 20.1, SD = 2.40) and 45 older (60–85, M = 70.6, SD = 5.01)	2	TB	Emotion perception from prosody	–	Older adults were less accurate than young adults in perceiving sadness (larger effects) and happiness from prosody
41. Richter and Kunzman (2011)	80 young (21–44, M = 32.1, SD = 7.2) and 73 older adults (46–71, M = 58.6, SD = 7.1)	2	TB	Emotion perception from film clips in which targets either talk about their thoughts/feelings regarding social loss or life transition	–/0	Older adults were less accurate than young adults in perceiving emotions when the target talked about topics of low relevance to older people There were no age differences when the target person discussed topics relevant to older people
42. Riediger, Voelkle, Ebner, and Lindenberger (2011)	52 young (20–31), 51 middle-aged (44–55), and 51 older (70–81) adults	2	TB	Facial expression perception task, with pictures	–	Older adults were less likely than young adults to attribute expression of anger, disgust and fear, and sadness to poses expressing these emotions. They also more often falsely attributed happiness and neutrality to target faces. Middle-aged adults were only less accurate than young adults when perceiving disgust and sadness

Study	Sample (Age Range, M_{Age}, SD_{Age})	Type of Sample (1 = Worker, 2 = Community/ Student)	Type of Measure	Description of Measure	Overall Age Difference[a]	Main Findings
43. Weng and colleagues (2011)	110 internists (M = 40.78, SD = 6.91)	1	SR	Others' emotion appraisal subscale of the WLEIS	0	Age was unrelated to emotion perception
44. Ebner, Johnson, and Fischer (2012)	30 young (20–31, M = 25.1, SD = 3.4) and 32 older adults (65–74, M = 68.2, SD = 2.5)	2	TB	Facial emotion perception task with pictures	0	There were no age differences in emotion perception accuracy but older adults responded slower to happy and angry expression than young adults
45. Farh and colleagues (2012)	212 employees (M = 28.18, SD = 4.54)	1	TB	Perceiving emotions branch of the MSCEIT	0	Age was unrelated to performance on tasks of the perceiving emotions branch
46. Feeney, Gaffney, and O'Mara (2012)	37 young (20–29, M = 24.45, SD = 2.75) and 37 middle-aged adults (40–49, M = 45.0, SD = 2.75)	2	TB	Facial emotion perception task with pictures	0	There were no age differences in emotion perception
47. Horning, , Cornwell, and Davis (2012)	62 children (5–11, M = 8.39, SD = 1.94), 68 adolescents (12–17, M = 14.25, SD = 1.71), 289 young adults (18–39, M = 23.31, SD = 5.61), 151 middle-aged adults (40–64, M = 52.32, SD = 7.35), and 162 older adults (65–89, M = 74.48, SD = 5.71)	2	TB	Facial emotion perception task (Murray, 1999)	∩	Age-differences in emotion perception followed an inverted U-shape pattern, with a peak in middle age. Older adults had poorer perceptions of fear, sadness, and happiness than young and middle-aged adults, but did not differ in perception of anger, disgust. They were more accurate in perceiving surprise than young adults
48. Insch, Bull, Phillips, Allen, and Slessor (2012)	52 young (18–37, M = 25.81, SD = 5.45), 41 middle-aged (40–64, M = 51.80, SD = 8.72), and 34 older adults (65–86, M = 73.56, SD = 5.18)	2	TB	Emotion biological movement perception task	–	Older adults were less accurate than young and middle-aged adults in perceiving emotions from body movements, which was partly explained by age-related differences in visual processing style. Young and middle-aged adults did not differ in perception accuracy

Table A.1. *Continued*

Study	Sample (Age Range, M_{Age}, SD_{Age})	Type of Sample (1 = Worker, 2 = Community/ Student)	Type of Measure	Description of Measure	Overall Age Difference[a]	Main Findings
49. Lambrecht, Kreifelts, and Wildgruber (2012)	84 adults (20–70, M = 44.8)	2	TB	Emotion perception task with videos	–	Age was negatively related to emotion perception, except for disgust perception, which was unrelated to age. Declines in emotion perception with age could not be explained by age differences in sensory and cognitive functioning
50. Ruffman and colleagues (2012)	30 young (17–26, M = 20.96) and 30 older adults (60–89, M = 71.03)	2	TB	Facial emotion perception task with pictures; deception task with videos	–	Older adults were less accurate in perceiving emotions than young adults. This explained older adults' lower lie detection ability
51. Schefter, Knorr, Kathmann, and Werheid (2012)	16 young (M = 24.93, SD = 3.69) and 16 older adults (M = 65.62, SD = 4.41)	2	TB	Facial emotion perception task with pictures	–	Older adults were less accurate than young adults in perceiving emotions
52. Svärd, Wiens, and Fischer (2012)	19 young and 20 older adults	2	TB	Masked and unmasked facial perception task with pictures	–	Older adults were less accurate than young adults in perceiving emotions, but age differences were smaller for happy compared to fearful faces
53. Sze, Goodkind, Gyurak, and Levenson (2012)	76 young (20–30, M = 22.99, SD = 2.62), 73 middle-aged (40–50, M = 44.54, SD = 2.9), and 74 older adults (60–80, M = 66.38, SD = 5.27)	2	TB	FACES test, eyes test (single judgments of static images of eyes), dyads test (judgment of audiovisual stimuli)	–/+	Older adults were less accurate in perceiving emotions from static images and older eyes than young adults, with middle-aged adults in between. However, older adults were better than young adults in perceiving emotions from multimodal, dyadic interactions, with middle-aged adults in-between
54. West and colleagues (2012)	482 adults (20–89)	2	TB	Performance on the AFFECT	–	Age was negatively related to emotion perception in participants 60 years and older. Taking into account processing speed reduced these age effects. Age was unrelated to perception of happy and surprised expressions and positively related to disgust perception

Table A.1. *Continued*

Study	Sample (Age Range, M_{Age}, SD_{Age})	Type of Sample (1 = Worker, 2 = Community/Student)	Type of Measure	Description of Measure	Overall Age Difference[a]	Main Findings
55. Boshyan Zebrowitz, Franklin, McCormick, and Carré (2013)	56 young (18–25, $M = 20.2$, $SD = 1.6$) and 51 older adults (65–90, $M = 75.6$, $SD = 6.4$)	2	TB	Facial emotion perception task assessing perception of aggression with pictures	0	Older adults were as accurate as young adults in perceiving aggressiveness in faces of young men
56. Brasseur and colleagues (2013)	5,676 participants (15–84)	2	SR	Interpersonal emotion identification subscale of the PEC	0	Age was unrelated to emotion perception
57. Circelli, Clark, and Cronin-Golomb (2013)	16 young (18–21, $M = 19.2$, $SD = 1.0$) and 16 older (62–79, $M = 68.9$, $SD = 6.0$)	2	TB	Facial emotion perception task with pictures	0	There were no age differences in perception accuracy of angry, sad, surprised, and neutral faces. Older adults were less accurate than young adults in perceiving fear but more accurate in perceiving disgust
58. Ebner and colleagues (2013)	30 young (20–31, $M = 25.1$, $SD = 3.4$) and 32 older adults (65–74, $M = 68.2$, $SD = 2.5$)	2	TB	Facial emotion perception task with pictures	0	There were no age differences in perceiving happy, angry, and neutral expressions. Older adults were more accurate when perceiving emotions from young as opposed to older faces
59. Johnson and Whiting (2013)	40 young (18–23, $M = 20.1$, $SD = 2.22$) and 39 older adults (61–83, $M = 67.1$, $SD = 5.28$)	2	TB	Emotion discrimination task with stimuli that represented varying degrees of emotion expression	–	Older adults were less accurate than young adult in discriminating angry, happy, or fearful from neutral expressions
60. Leime, Neto, Alves, and Torro-Alves (2013)	21 children (6–8, $M = 7.7$, $SD = 0.7$), 19 young adults (18–25, $M = 20.1$, $SD = 2.0$), and 9 older adults (65–83, $M = 74.7$ $SD = 6.9$)	2	TB	Facial emotion perception task with pictures of different intensities	–	Older adults were less accurate than young adults in perceiving emotions
61. Ma, Li, Niu, Yu, and Yang (2013)	30 young (18–28, $M = 21.37$, $SD = 2.65$), 30 older adults (61–88, $M = 70.3$, $SD = 5.94$)	2	TB	Emotion go/no-go task using faces with emotional expressions	–	Older adults were less accurate than young adults in perceiving happy and sad expressions

Table A.1. *Continued*

Study	Sample (Age Range, M_{Age}, SD_{Age})	Type of Sample (1 = Worker, 2 = Community/ Student)	Type of Measure	Description of Measure	Overall Age Difference[a]	Main Findings
62. Mienaltowski and colleagues (2013)	40 young (18–24, $M = 19.23$, $SD = 1.42$) and 40 older adults (62–76, $M = 66.57$, $SD = 4.36$)	2	TB	Emotion discrimination task with pictures of negative facial expressions of two different intensities	−/0	Older adults were less accurate than young adults in discriminating between negative facial expressions that were low in intensity. There were no age differences in discriminating between anger and sadness
63. Moraitou, Papantoniou, Gkinopoulos, and Nigritinou (2013)	69 young (18–28, $M = 22.7$, $SD = 2.1$), 70 middle-age/new-old adults (50–68, $M = 61.4$, $SD = 6.3$), and 69 older adults (71–86, $M = 77.0$, $SD = 4.1$)	2	TB	Emotion Evaluation Task - Form A, an audio-visual emotion perception task with videos (McDonald et al., 2002)	−	Perception of negative emotions as well as pleasant surprise decreased with age. There were no age differences in perceiving happiness
64. Noh and Isaacowitz (2013)	37 young adults (18–29) and 47 older adults (61–92)	2	TB	Emotion perception task with pictures combined with emotional context	+/−/0	Older adults were better than young adults in perceiving emotions when contextual information was in line with the target face but performed worse, when this information was incongruent with the target face. When contextual information was neutral, there were no age differences in emotion perception
65. Rauers, Blanke, and Riediger (2013)	100 couples: 100 young (20–30, $M = 25.94$, $SD = 2.94$) and 100 older adults (69–80, $M = 74.2$, $SD = 2.89$)	2	TB	Accurate estimation of partners' emotions when partner is either present or absent	−/0	Older adults were less accurate than young adults in perceiving their partner's affect when the partner was present, but equally accurate when the partner was absent
66. Stanley, Zhang, Fung, and Isaacowitz (2013)	*Sample 1*: 87 young (18–29, $M = 20.45$, $SD = 2.32$) and older adults (62–86, $M = 72.87$, $SD = 6.48$) *Sample 2*: 86 young (18–30, $M = 21.0$, $SD = 2.68$), and older adults (60–82, $M = 68.87$, $SD = 6.03$)	2	TB	Facial emotion perception task	−	Older adults were less accurate in perceiving emotions than young adults

Study	Sample (Age Range, M_{Age}, SD_{Age})	Type of Sample (1 = Worker, 2 = Community/ Student)	Type of Measure	Description of Measure	Overall Age Difference[a]	Main Findings
67. Suzuki and Akiyama (2013)	36 young adults (18–32, $M = 21.4$, $SD = 3.3$) and 36 older adults (65–78, $M = 69.4$, $SD = 3.8$)	2	TB	Facial emotion perception task with pictures	–	Deficits in general cognitive ability explained older adults' poorer perception of happiness, surprise, fear and sadness, but not anger and disgust
68. Waaramaa and Leisiö (2013)	250 adults ($M = 33$)	2	TB	Emotion perception from voices, stating emotional nonsense sentences	–	Age was negatively related to emotion perception in a Finnish, Russian, and US subsample, but unrelated to emotion perception in an Estonian and Swedish subsample
69. Zacher and colleagues (2013)	*Sample 2*: 400 employees (16–74, $M = 31.6$, $SD = 12.51$)	1	SR	Others' emotion appraisal subscale of the WLEIS	0	Age was unrelated to perception of others' emotions
70. Zhang, Fung, Stanley, Isaacowitz, and Ho (2013)	*Study 2*: 40 young (18–29, $M = 20.39$, $SD = 2.41$) and 49 older adults (60–82, $M = 69.0$, $SD = 5.69$)	2	TB	Facial emotion perception task with pictures	–/0	Older adults were less accurate than young adults in perceiving emotions. However, when closeness was primed, age differences disappeared
71. Cabello, Bravo, Latorre, and Fernández-Berrocal (2014)	310 adults (18–76, $M = 42.3$, $SD = 17.2$)	2	TB	Perceiving emotions branch of the MSCEIT	–	Age was negatively related to performance on tasks of the perceiving emotions branch
72. Demenescu, Mathiak, and Mathiak (2014)	60 participants from 3 age groups: young (18–35, $M = 25.76$, $SD = 5.18$), middle-aged (36–55, $M = 45.76$, $SD = 5.82$), and older adults (56–75, $M = 63.80$, $SD = 6.63$)	2	TB	Emotion perception from voices and faces (pictures) in a forced-choice paradigm	–	Middle-aged and older adults performed worse than young adults in categorizing emotions. Declines in emotion perception of faces were evident past the age of 30, emotional prosody past the age 50
73. Dodich and colleagues (2014)	132 adults (20–79, $M = 51.11$, $SD = 16.5$)	2	TB	Facial emotion perception task, EK-60F test (Ekman & Friesen, 1976)	–	Age was negatively related to emotion perception

Table A.1. *Continued*

Study	Sample (Age Range, M_{Age}, SD_{Age})	Type of Sample (1 = Worker, 2 = Community/ Student)	Type of Measure	Description of Measure	Overall Age Difference[a]	Main Findings
74. Fantini-Hauwel and Mikolajczak (2014)	6,688 older adults (50–80, $M = 62.62$, $SD = 7.01$)	2	SR	Interpersonal emotion identification sub scale of the PEC	–	Age was negatively related to self-reported perception of own emotions between age 50 and 70. Deficits were particularly evident at old age (70–80)
75. Hühnel, Fölster, Werheid, and Hess (2014)	38 young (18–30, $M = 23.7$, $SD = 2.8$) and 37 older adults (62–85, $M = 71.4$, $SD = 4.3$)	2	TB	Facial emotion perception task with videos	–/0	Older adults were less accurate than young adults in perceiving happiness and sadness. No age differences were found for anger and disgust
76. Hur and colleagues (2014)	256 flight attendants (21–45, $M = 29.7$, $SD = 5.17$)	1	SR	Others' emotion appraisal subscale of the WLEIS	0	Age was unrelated to perception of others' emotions
77. Hurley, Anker, Frank, Matsumoto, and Hwang (2014)	*Study 2*: 127 transportation security officers ($M = 42.4$, $SD = 12.03$)	1	TB	Micro expression emotion perception task (METTv2)	–	Age was negatively related to perception of micro emotional expressions
78. Kessels, Montagne, Hendriks, Perrett, and de Haan (2014)	210 adults (18–75)	2	TB	Emotion perception task with morphed video clips of facial expressions (Montagne et al., 2007)	–	Age was negatively related to emotion perception of anger, fear, sadness, and happiness. Age was unrelated to disgust and surprise perception
79. Krendl, Rule, and Ambady (2014)	32 young ($M = 23.1$, $SD = 3.0$) and 30 older adults ($M = 70.7$, $SD = 6.8$)	2	TB	Facial emotion perception (DANVA2 task) with pictures	–	Older adults were less accurate than young adults in perceiving anger and fear but did not differ in accuracy for sadness and joy. Older adults' deficit in anger perception was related to their executive functioning
80. Lima, Alves, Scott, and Castro (2014)	43 young (19–27, $M = 22.0$, $SD = 2.2$), and 43 older adults (47–83, $M = 61.4$, $SD = 7.9$)	2	TB	Perception of nonverbal emotional vocalization	–	Older adults were less accurate than young adults in perceiving positive and negative emotions, independent of age-related differences in cognitions, affect, or personality

Study	Sample (Age Range, M_{Age}, SD_{Age})	Type of Sample (1 = Worker, 2 = Community/Student)	Type of Measure	Description of Measure	Overall Age Difference[a]	Main Findings
81. Riediger, Studtmann, Westphal, Rauers, and Weber (2014)	*Study 1:* 48 young (20–30, $M = 25.75$, $SD = 2.61$) and 52 older (70–80, $M = 74.53$, $SD = 3.05$) *Study 2:* 48 young (20–31, $M = 25.67$, $SD = 2.72$) and 49 older adults (70–79, $M = 73.55$, $SD = 2.53$)	2	TB	Accuracy in identifying positive-affect, negative-affect, or neutral-affect smiles from videos	–	Older adults were less accurate than young adults in perceiving emotional experiences accompanying smiles. This effect was attenuated by age of the target, such that older adults could better identify emotional experiences accompanying smiles of older targets
82. Schlegel, Grandjean, and Scherer (2014)	454 adults (17–75, $M = 35.8$, $SD = 14.0$)	2	TB	Geneva Emotion Recognition Test (Schlegel et al., 2014)	–	Age was negatively related to perceiving nine out of 14 emotions and the overall score. Age was unrelated to perception of the other five emotions (despair, interest, pleasure, relief, sadness)
83. Ze, Thoma, and Suchan (2014)	*Study 1:* 36 young (20–35, $M = 27.1$, $SD = 4.9$), 36 middle-aged (40–59, $M = 47.0$, $SD = 5.6$), and 36 older adults (60–79, $M = 67.8$, $SD = 5.8$) *Study 2:* 54 young (20–39, $M = 25.3$, $SD = 4.8$) and 54 older adults (55–70, $M = 60.6$, $SD = 4.3$)	2	TB	Cognitive empathy score on the multifacet empathy test (Dziobek et al., 2008), emotion perception from context-rich stimuli	0	There were no age differences in cognitive empathy
84. Beer and colleagues (2015)	*Study 1:* 31 young (18–26, $M = 19.87$, $SD = 1.93$) and 29 older adults (65–85, $M = 73.97$, $SD = 4.28$)	2	TB	Emotion perception task involving human faces, virtual agents and synthetic faces	–	Older adults were overall less accurate than young adults in perceiving anger, sadness, fear, disgust and neutral expressions from human faces, virtual agents and synthetic faces. Using multimodal stimuli did not improve older adults' accuracy

Table A.1. *Continued*

Study	Sample (Age Range, M_{Age}, SD_{Age})	Type of Sample (1 = Worker, 2 = Community/ Student)	Type of Measure	Description of Measure	Overall Age Difference[a]	Main Findings
	Study 2: 42 young (18–28, $M = 19.74$, $SD = 1.43$) and 42 older adults (65–85, $M = 72.48$, $SD = 4.69$)					
85. Blanke, Rauers, and Riediger (2015)	102 young (20–31, $M = 25.95$, $SD = 3.06$) and 106 older women (69–80, $M = 72.94$, $SD = 2.52$)	2	TB	Empathic accuracy in a dyadic interaction paradigm	−/0	Older women were less accurate than young women in perceiving their partner's negative feelings. There were no age differences in empathic accuracy for positive feelings
86. Campbell, Murray, Atkinson, and Ruffman (2015)	32 young (18–29, $M = 20.4$, $SD = 2.2$) and 32 older adults (63–92, $M = 71.0$, $SD = 7.3$)	2	TB	Facial emotion perception task with pictures	−	Older adults were overall less accurate than young adults in perceiving emotions. Young adults were more accurate than older adults in perceiving anger in young faces and fear in older faces. Older adults were more accurate than young adults in perceiving happiness in older faces
87. Di Domenico, Palumbo, Mammarella, and Fairfield (2015)	40 young ($M = 23.63$, $SD = 3.9$) and 40 older adults ($M = 70.25$, $SD = 7.2$)	2	TB	Facial emotion perception task with videos, in which facial expressions change from neutral to happy or angry	0	There were no age differences in emotion perception
88. Grainger, Henry, Phillips, Vanman, and Allen (2015)	*Study 1:* 41 young (19–38, $M = 26.0$, $SD = 5.91$), 42 middle-aged (40–64, $M = 54.4$, $SD = 7.98$), and 39 older adults (66–86, $M = 74.0$, $SD = 4.58$)	2	TB	Emotion perception task with static and dynamic stimuli	−	Older adults were less accurate than middle-aged and young adults in perceiving emotions, regardless of stimulus type However, dynamic stimuli benefitted accuracy of middle-aged and older adults but only for low intensity emotions
89. Hartshorne and Germine (2015)	11,532 participants (10–71)	2	TB	Mind-in-eyes tasks (Baron-Cohen, Wheelwright, and Hill, 2001)	∩	Emotion perception was particularly high among those between 40 and 60 years. After the age of 60 emotion perception decreased

Study	Sample (Age Range, M_{Age}, SD_{Age})	Type of Sample (1 = Worker, 2 = Community/ Student)	Type of Measure	Description of Measure	Overall Age Difference[a]	Main Findings
90. Momm and colleagues (2015)	142 employees (M = 38.21, SD = 12.64)	1	TB	Facial emotion perception task (DANVA2) with pictures	−	Age was negatively related to emotion perception
91. Ngo and Isaacowitz (2015)	*Study 1*: 33 young (18–26) and 30 older adults (60–80) *Study2:* 48 young (18–26) and 44 older adults (60–89)	2	TB	Stimuli from FACES database combined with physical context images	−	Older adults were less accurate than young adults in perceiving angry and disgusted targets, but not neutral targets, even when target and context were congruent
92. Phillips and colleagues (2015)	40 young (18–39, M = 25.24, SD = 5.74), 40 middle-aged (40–64, M = 53.4, SD = 8.25), and 36 older adults (65–86, M = 73.86, SD = 5.4)	2	TB	Emotion perception task with videos	−	Older adults were less accurate than young and middle-aged adults in perceiving emotions
93. Stanley and Isaacowitz (2015)	52 young (18–30, M = 21.35, SD = 3.16) and 55 older adults (60–91, M = 74.96, SD = 6.63)	2	TB	*Task 1:* Facial emotion perception task with pictures including an accountability instruction, *Task 2:* Emotion perception task with either a familiar romantic partner or a same-age stranger as target	−	Age differences in emotion perception accuracy were eliminated when people were more accountable for their performance. While young adults were better in perceiving emotions of their partner as well as a same-age stranger, age differences were attenuated in the familiar partner condition
94. Vicaria, Bernieri, and Isaacowitz (2015)	47 young (18–24, M = 19.63, SD = 1.5) and 46 older women (61–85, M = 70.98, SD = 6.47)	2	TB	Correlation between perceivers judgment and criterion values of interaction videos	0	There were no age differences in perception of rapport. However, young adults relied more on behavioral cues in their judgment than older adults
95. Wechtler, Koveshnikov, and Dejoux (2015)	254 expatriate managers (M = 40.79, SD = 11.11)	1	SR	Emotion appraisal subscale of the SSEIT	0	Age was unrelated to emotion perception

Table A.1. *Continued*

Study	Sample (Age Range, M_{Age}, SD_{Age})	Type of Sample (1 = Worker, 2 = Community/ Student)	Type of Measure	Description of Measure	Overall Age Difference[a]	Main Findings
96. Wieck and Kunzman (2015)	101 young (19–30, M = 23.99, SD = 3.42) and 101 older women (59–82, M = 68.45, SD = 5.72)	2	TB	Agreement between film protagonist self-reported feelings and participants ratings of protagonists' feelings	−/0	Older women were less accurate than young women in perceiving the protagonist's emotions. There were no age differences in empathic accuracy if the content of the film clip was highly relevant to older adults
97. Lavrencic, Kurylowicz, Valenzuela, Churches, and Keage (2016)	115 adults (60–85, M = 68.5, SD = 5.92)	2	TB	Emotion Evaluation Test with vignettes from the TASIT-R (Flanagan, McDonald, & Rollins, 2002)	−	Age was negatively related to emotion perception overall and to perception of negative emotions, but unrelated to perception of positive emotions

Note. SR = self-report measure of emotion perception; TB = test-based measure of emotion perception; AFFECT = Animated Full Facial Expression Comprehension Test (Gagliardi et al., 2003); CATS = Comprehensive Affect Testing System (Froming, Levy, Schaffer, & Ekman, 2006); DANVA-2-AF = Diagnostic Analysis of Nonverbal Behavior Adult Facial Expression (Nowicki & Carton, 1993); DERS = Difficulties in Emotion Regulation Scale (Gratz & Roemer, 2004); FEEST = Facial Expression of Emotion: Stimuli and Tests (Young, Perrett, Calder, Sprengelmeyer, & Ekman, 2002); METTv2 = Micro Facial Expressions Training Tool version2 (Ekman, 2004); MEIS = Multibranch Emotional Intelligence Scale (Mayer et al., 1999); MSCEIT = Mayer-Salovey-Caruso Emotion Intelligence Test (Mayer et al., 2002); PEC = The Profile of Emotional Competence (Brasseur et al., 2013); PONS = Profile of Nonverbal Sensitivity (Rosenthal, Hall, DiMatteo, Rogers, & Archer, 1979); SSEIS = Schutte Self Report Emotional Intelligence Scale (Schutte et al., 1998); TASIT-R = The Awareness of Social Inference Test-Revised (Flanagan et al., 2002); WLEIS = Wong and Law emotional intelligence scale (Wong & Law, 2002); N/A = not applicable. + denotes a positive age trend, − denotes a negative age trend, 0 denotes no age differences, and ∩ denotes a curvilinear age trend.
[a]Categorization of overall age differences were, whenever reported, based on main effects.

Table A.2. Studies on Age Differences in Emotion Understanding

Study	Sample (Age Range, M_{Age}, SD_{Age})	Type of Sample (1 = Worker, 2 = Community/ Student)	Type of Measure	Description of Measure	Overall Age Difference	Main Findings
Understanding of own emotions						
1. Labouvie-Vief, DeVoe, and Bulka (1989)	72 participants (10–77)	2	TB	Coding of answers given in an emotion interview in which participants talked about causes, context, and course of feelings during a situation in which they felt angry, sad, fearful, or happy	∩	There was a curvilinear age trend for understanding anger, fear, and happiness
2. S. Kim, Healey, Goldstein, Hasher, and Wiprzycka (2008)	98 young (18–28, M = 20.91) and 103 older adults (60–76, M = 68.45)	2	TB	Accuracy in forecasting satisfaction with product decision	0	There were no age differences in forecasting accuracy of satisfaction with a chosen product
3. Nielsen, Knutson, and Carstensen (2008)	20 young (20–35, M = 25.5, SD = 4.8) and 20 older adults (65–85, M = 74.3, SD = 7.3)	2	TB	Accuracy in forecasting valence and arousal after gains and losses in the monetary incentive delay task (Knutson, Adams, Fong, & Hommer, 2001)	+/0	Older adults were more accurate than young adults in predicting their response to gains or losses than young adults
4. Pearman and colleagues (2010)	46 young (M = 22.04, SD = 5.41) and 48 older adults (M = 74.23, SD = 7.82)	2	TB	Accuracy in forecasting sadness in response to sad photos	0	There were no age differences in forecasting accuracy, when predicting level of sadness in response to sad pictures
5. Löckenhoff and colleagues (2011)	98 adults (19–91, M = 52.0, SD = 20.5)	2	TB	Anticipated affective response to losing or gaining money in a choice task	+	Older adults were aware that immediate and delayed gains result in similar emotional gratification. Young adults erroneously thought that immediate gains result in higher levels of emotional gratification than delayed gains.
6. Scheibe and colleagues (2011)	995 adults, 40% between 20 and 40, 35% between 40 and 60, and 25% between 60 and 80 (final sample size: 346)	2	TB	Accuracy in forecasting affect after victory/loss of supported US presidential candidate	+	Older adults were more accurate than young adults in predicting their emotional reactions to a victory of their supported candidate but were not better in predicting their negative affective reactions to a loss of their supported candidate
7. Brasseur and colleagues (2013)	4,307 participants (15–84)	2	SR	Intrapersonal comprehension subscale of the PEC	+	Age was positively related to self-reported understanding of own emotions

Table A.2. *Continued*

Study	Sample (Age Range, M_{Age}, SD_{Age})	Type of Sample (1 = Worker, 2 = Community/ Student)	Type of Measure	Description of Measure	Overall Age Difference	Main Findings
8. Fantini-Hauwel and Mikolajczak (2014)	6,688 older adults (50–80, $M = 62.62$, $SD = 7.01$)	2	SR	Intrapersonal comprehension subscale of the PEC	∩	The ability to understand own emotions did not differ between those aged 50–59 and those aged 60–70, but was lower in those aged 71–80
Understanding of others' emotions						
1. Phillips, MacLean, and Allen (2002)	30 young (20–40, $M = 29.9$, $SD = 7.1$) and 30 older adults (60–80, $M = 69.2$, $SD = 6.1$)	2	TB	Understanding emotions branch of the MEIS	0	There were no age differences in understanding emotions from verbal descriptions
2. Kafetsios (2004)	239 adults (19–66, $M = 38.7$, $SD = 13.5$)	2	TB	Understanding emotions branch of the MSCEIT	+	Age was positively related to performance on tasks of the understanding emotions branch
3. Extremera and colleagues (2006)	946 adults (16–58, $M = 19.78$, $SD = 5.6$)	2	TB	Understanding emotions branch of the MSCEIT	+	Age was positively related to performance on tasks of the understanding emotions branch
4. Sullivan, Mikels, and Carstensen (2010)	20 young (18–29, $M = 22.72$, $SD = 3.27$) and 20 older adults (64–88, $M = 75.44$, $SD = 6.88$)	2	TB	Affective perspective taking task (listening and then retelling the story from the perspective of the main character)	+	Older adults, but not young adults, were aware of age-related changes in affective dynamics
5. Gardner and Qualter (2011)	258 young (18–31, $M = 25.09$, $SD = 4.02$) and 262 older adults (32–79, $M = 43.12$, $SD = 8.46$)	2	TB	Understanding emotions branch of the MSCEIT	+	Older adults scored higher on tasks of the understanding emotions branch than young adults
6. Farh and colleagues (2012)	212 employees ($M = 28.18$, $SD = 4.54$)	1	TB	Understanding emotions branch of the MSCEIT	0	Age was unrelated to performance on tasks of the understanding emotions branch
7. Brasseur and colleagues (2013)	4,307 participants (15–84)	2	SR	Interpersonal emotion understanding subscale of the PEC	+	Age was positively related to self-reported ability to understand others' emotions
8. Cabello and colleagues (2014)	310 adults (18–76, $M = 42.3$, $SD = 17.2$)	2	TB	Understanding emotions branch of the MSCEIT	−	Age was negatively related to performance on tasks of the understanding emotions branch
9. Fantini-Hauwel and Mikolajczak (2014)	6,688 older adults (50–80, $M = 62.62$, $SD = 7.01$)	2	SR	Interpersonal emotion understanding subscale of the PEC	−	The ability to understand others' emotions was lower among those aged 60–70 than those 50–60. Deficits were even more pronounced at old age (71–80)

Note. SR = self-report measure of emotion understanding; TB = test-based measure of emotion understanding; MSCEIT = Mayer-Salovey-Caruso Emotion Intelligence Test (Mayer et al., 2002); MEIS = Multibranch Emotional Intelligence Scale (Mayer et al., 1999); PEC = The Profile of Emotional Competence (Brasseur et al., 2013). + denotes a positive age trend, − denotes a negative age trend, 0 denotes no age differences, and ∩ denotes a curvilinear age trend.

Table A.3. Studies on Age Differences in Emotion Regulation

Study	Sample (Age Range, M_{Age}, SD_{Age})	Type of Sample (1 = Worker, 2 = Community/Student)	Type of Measure	Description of Measure	Overall Age Difference[a]	Main Findings
Emotion regulation knowledge						
1. Kafetsios (2004)	239 adults (19–66, M = 38.7, SD = 13.5)	2	TB	Managing emotions branch of the MSCEIT	+	Age was positively related to performance on tasks of the emotion management branch
2. Palmer and colleagues (2005)	50 participants (18–79, M = 37.39, SD = 14.13)	2	TB	Managing emotions branch of the MSCEIT	+	Age was positively related to performance on one subtask of the emotion management branch
3. Extremera and colleagues (2006)	946 adults (16–58, M = 19.78, SD = 5.6)	2	TB	Managing emotions branch of the MSCEIT	+	Age was positively related to performance on tasks of the emotion management branch
4. Gardner and Qualter (2011)	258 young adults (18–31, M = 25.09, SD = 4.02) and 262 older adults (32–79, M = 43.12, SD = 8.46)	2	TB	Managing emotions branch of the MSCEIT	+	Age was positively related to performance on tasks of the emotion management branch
5. Farh and colleagues (2012)	212 employees (M = 28.18, SD = 4.54)	1	TB	Managing emotions branch of the MSCEIT	0	Age was unrelated to performance on tasks of the emotion management branch
6. Cabello and colleagues (2014)	310 adults (18–76, M = 42.3, SD = 17.2)	2	TB	Managing emotions branch of the MSCEIT	0	Age was unrelated to performance on tasks of the emotion management branch
Regulation of own emotions: emotional control						
1. Lawton, Kleban, Rajagopal, and Dean (1992)	207 young adults (18–29, M = 21.0), 231 middle-aged (30–59, M = 41.7), and 828 older adults (≥60, M = 69.3)	2	SR	Self-developed scales assessing emotional control, mood stability, and emotional maturity	+	Older adults reported higher emotional control, mood stability, and emotional maturity than young adults
2. Gross and colleagues (1997)	Four samples: (1) 127 adults (19–96), (2) 82 adults (20–85), (3) 49 adults (20–35 and 70+), (4) 1,080 American nuns (24–101)	2	SR	Single item of emotional control	+	Older adults reported higher emotional control than young adults
3. Kessler and Staudinger (2009)	277 adults (20–80, M = 47.5, SD = 16.8)	2	SR	ACS	+	Age was positively related to self-reported efficiency in up-regulating positive affect and down-regulating negative affect
4. Orgeta (2009)	40 young (17–37, M = 20.08, SD = 3.17) and 40 older adults (61–81, M = 69.83, SD = 4.89)	2	SR	Limited access to emotion regulations strategies subscale of the DERS	+	Older adults reported less difficulty than young adults with regulating their emotions. They reported greater access to emotion regulation strategies

Table A.3. *Continued*

Study	Sample (Age Range, M_{Age}, SD_{Age})	Type of Sample (1 = Worker, 2 = Community/Student)	Type of Measure	Description of Measure	Overall Age Difference[a]	Main Findings
5. Gould and Edelstein (2010)	51 young (18–30, M = 21.43, SD = 2.88) and 52 older adults (≥65, M = 77.59, SD = 14.26)	2	SR	Carstensen Emotion Questionnaire (Carstensen, 2000)	0	There were no age differences in reported internal and external control of emotions
6. Weng and colleagues (2011)	110 internists (M = 40.78, SD = 6.91)	1	SR	Emotion regulation subscale of the WLEIS	0	Age was unrelated to self-reported ability to regulate emotions
7. Consedine and colleagues (2012)	1,204 women (50–70, M = 59.5, SD = 6.5)	2	SR	Present personality Questionnaire	0	Age was unrelated to self-reported ability to regulate the expression of emotions
8. Brasseur and colleagues (2013)	4,307 participants (15–84)	2	SR	Intrapersonal emotion regulation subscale of the PEC	+	Age was positively related to self-reported ability to regulate one's own emotions
9. Zacher and colleagues (2013)	*Sample 2*: 400 employees (16–74, M = 31.6, SD = 12.51)	1	SR	Emotion regulation subscale of the WLEIS	0	Age was unrelated to self-reported ability to regulate emotions
10. Fantini-Hauwel and Mikolajczak (2014)	6,688 older adults (50–80, M = 62.62, SD = 7.01)	2	SR	Intrapersonal emotion regulation subscale of the PEC	+	Age was positively related to self-reported ability to regulate one's own emotions between age 50 and 80
11. Hur and colleagues (2014)	256 flight attendants (21–45, M = 29.7, SD = 5.17)	1	SR	Emotion regulation subscale of the WLEIS	0	Age was unrelated to self-reported ability to regulate emotions
12. Popham and Hess (2015)	64 young adults (18–23) and 63 older adults (65–83)	2	SR	Composite score of ACS, CERS, ERQ	+	Older adults reported higher emotional control when facing negative events than young adults
Regulation of own emotions: adaptive strategy use[a]						
1. Blanchard-Fields, Jahnke, and Camp (1995)	70 adolescents (14–17, M = 15.9, SD = 1.1), 69 young (25–35, M = 28.5, SD = 3.4), 74 middle-aged (45–55, M = 48.7, SD = 3.3), and 74 older adults (65–75 years, M = 68.7, SD = 3.4)	2	SR	Response to everyday problem-solving vignettes	–	Older adults used avoidance more and problem solving less than young adults; middle-aged adults were in between
2. Diehl, Coyle, and Labouvie-Vief (1996)	381 participants (10–87, M = 44.1, SD = 20.2)	2	SR	DMI, coping and defense indexes of the CPI	+/–	Age was positively related to use of coping and defensive strategies involving reappraisal and suppression
3. Blanchard-Fields, Stein, and Watson (1997)	349 participants (15–79)	2	SR	Strategies used to handle hypothetical problems taken from the EPSI	+/–	Older adults used more problem solving than young adults in instrumental domains, and more avoidance than young adults in interpersonal domains

Table A.3. *Continued*

Study	Sample (Age Range, M_{Age}, SD_{Age})	Type of Sample (1 = Worker, 2 = Community/ Student)	Type of Measure	Description of Measure	Overall Age Difference[a]	Main Findings
4. Wrosch, Heckhausen, and Lachman (2000)	3,490 adults (25–76, M = 48.77, SD = 13.16)	2	SR	Reappraisal subscale of the CSI	+	Older and middle-aged adults used more positive reappraisal than young adults
5. Siu, Spector, Cooper, and Donald (2001)	634 managers (20–72, M = 35.36, SD = 9.92)	1	SR	Control coping subscales of the Occupational Stress Indicator-2 (S. Williams & Cooper, 1996)	+	Age was positively related to use of problem solving
6. Holman, Chissick, and Totterdell (2002)	347 customer service agents (19–57, M = 32.3)	1	SR	Emotional labor scale (Brotheridge & Lee, 1998)	+/0	Age was negatively related to use of surface acting and unrelated to use of deep acting
7. Whitty (2003)	40 young (17–23, M = 19), 40 middle-aged (40–47, M = 42) and 40 older adults (63–70, M = 66)	2	SR	DSQ, WCQ	+	Older and middle-aged adults used more adaptive coping strategies than young adults
8. Blanchard-Fields, Mienaltowski, and Seay (2004)	35 young (18–39, M = 27.4, SD = 6.45), 31 middle-aged (40–64, M = 50.16, SD = 8.08), and 38 older adults (>65, M = 70.73, SD = 4.24)	2	SR	Coding of reported strategies used in response to interpersonal conflicts	∩	Older and young adults used more avoidance, whereas middle-aged adults used more problem solving
9. John and Gross (2004)	735 young adults (M = 20.0) and 106 middle-aged women (M = 61.0)	2	SR	ERQ	+	Compared with retrospective 20s' ratings of their emotion regulation, middle-aged women used more reappraisal and less suppression. The same pattern emerged when comparing current strategy use of young vs. middle-aged women
10. Birditt and Fingerman (2005)	184 participants (13–99 M = 45.43, SD = 25.68)	2	SR	Coding of reported strategies used in response to interpersonal conflicts	+	Older adults reported using more passive constructive strategies and less active destructive strategies than young adults
11. Birditt and colleagues (2005)	666 participants including young (25–74), middle-aged (40–59), and older adults (60–74)	2	SR	Coding of reported strategies used in response to interpersonal conflicts	+	Older adults reported using more passive constructive strategies and less active destructive strategies than young adults
12. De Minzi and Sacchi (2005)	83 young (20–24) and 70 middle-aged adults (40–45)	2	SR	WCQ	+	Middle-aged adults used more problem solving than young adults
13. Näring, Briët, and Brouwers (2006)	365 teachers (21–64, M = 48.8, SD = 8.35)	1	SR	D-QUEL	+/0	Age was positively related to use of deep acting and unrelated to use of surface acting

Study	Sample (Age Range, M_{Age}, SD_{Age})	Type of Sample (1 = Worker, 2 = Community/Student)	Type of Measure	Description of Measure	Overall Age Difference[a]	Main Findings
14. Phillips, Henry, Hosie, and Milne (2006)	286 adults (18–88, M = 43.5, SD = 23.07)	2	SR	STAXI-2	+	Age was positively related to use of inward calming strategies and negatively related to suppression of outward expression of anger
15. Blanchard-Fields, Mienaltowski, and Seay (2007)	53 young (18–27, M = 20.6, SD = 1.6) and 53 older adults (60–80, M = 68.9, SD = = 4.9)	2	SR	Strategies used to handle hypothetical problems taken from the EPSI	+	Older adults used more problem solving than young adults for two out of three problem domains. Age differences for avoidance were inconsistent. Older adults' strategy endorsement was rated as overall more effective by external judges
16. Kafetsios and Loumakou (2007)	263 young teachers (25–40) and 212 older teachers (41–60)	1	SR	ERQ	0	There were no age differences in use of reappraisal or suppression
17. Segal, Coolidge, and Mizuno (2007)	259 young (17–29, M = 19.7) and 69 older adults (60–85, M = 70.8)	2	SR	DSQ	0/+	There were no age differences in use of adaptive defense mechanisms but a decrease in use of maladaptive defense mechanisms
18. Blanchard-Fields and Coats (2008)	337 participants (15–84, M = 40.43, SD = 21.45)	2	SR	Coding of reported strategies used in response to interpersonal conflicts	0/−	Age was unrelated to problem solving and positively related to avoidance
19. Bozionelos and Kiamou (2008)	110 bank employees (M = 36.78, SD = 8.07)	1	SR	Emotional labor scale (Brotheridge & Lee, 2003)	+/0	Age was negatively related to use of surface acting and unrelated to use of deep acting
20. Coats and Blanchard-Fields (2008)	188 adults (18–80, M = 45.5, SD = 20.52)	2	SR	Self-developed problem solving scale in response to vignettes describing sadness or anger situations	+/−	Age was positively related to problem solving and avoidance
21. Bye and Pushkar (2009)	385 recently retired adults (44–79, M = 60.0, SD = 5.49)	2	SR	Four adaptive coping strategies of the COPE	0	Age was unrelated to a set of adaptive coping strategies
22. Cheung and Tang (2009)	442 employees (M = 33.0, SD = 9.84)	1	SR	Emotional labor scale (Diefendorff et al., 2005)	+/0	Age was positively related to use of deep acting but unrelated to use of surface acting
23. Davis and colleagues (2009)	2,513 employees (22–86, M = 42.7)	1	OR	Conflict dynamics profile (Davis, Capobianco, & Kraus, 2004) rated by observers (e.g., co-workers)	−	Older adults used more avoidance than young adults

Table A.3. *Continued*

Study	Sample (Age Range, M_{Age}, SD_{Age})	Type of Sample (1 = Worker, 2 = Community/Student)	Type of Measure	Description of Measure	Overall Age Difference[a]	Main Findings
24. Prati and colleagues (2009)	220 employees (18–72, $M = 31.0$)	1	SR	Surface acting scale (Grandey, 2003)	+	Age was negatively related to use of surface acting
25. Seery and Corrigall (2009)	363 nurses' aides and childcare workers ($M = 38.22$, $SD = 12.92$)	1	SR	Surface acting scales (Kruml & Geddes, 2000)	0	Age was unrelated to use of surface acting
26. Trouillet, Gana, Lourel, and Fort (2009)	153 adults (22–88, $M = 56.2$, $SD = 18.93$)	2	SR	WCC	0	Age was unrelated to problem solving and emotion-focused coping
27. Cheung and Tang (2010)	386 employees (19–62, $M = 33.19$, $SD = 9.47$)	1	SR	Emotional labor scale (Diefendorff et al., 2005)	+	Age was positively related to use of deep acting but unrelated to use of surface acting. Deep acting mediated the positive relationship between age and job satisfaction
28. Dahling and Perez (2010)	186 employees (18–69, $M = 31.2$, $SD = 14.6$)	1	SR	Emotional labor scale (Diefendorff et al., 2005)	+	Age was positively related to use of deep acting and negatively associated with surface acting
29. Hess, Beale, and Miles (2010)	97 (24–79, $M = 51.8$, $SD = 15.8$)	2	SR	ERQ	0	Age was unrelated to use of reappraisal and suppression
30. Li, Fung, and Isaacowitz (2010)	105 adults ($M = 46.58$, $SD = 20.81$)	2	SR	Cognitive reappraisal subscale of the ERQ	0	Age was unrelated to use of reappraisal
31. Song and Liu (2010)	310 call center employees (19–53, $M = 28.43$, $SD = 5.89$)	1	SR	Deep and surface acting scale (Brotheridge & Lee, 1998; Grandey, 2003)	0	Age was unrelated to use of deep acting and surface acting
32. H. J. Kim and Agrusa (2011)	385 hospitality employees (16–72, $M = 27$)	1	SR	MCI	+	Age was positively related to task coping, but negatively related to emotion and avoidance coping
33. Lee and Brotheridge (2011)	198 child care center employees ($M = 33.0$, $SD = 10.68$)	1	SR	Emotional labor scale (Brotheridge & Lee, 2003)	-/0	Age was negatively related to use of deep acting but unrelated to use of surface acting
34. Nolen-Hoeksema and Aldao (2011)	491 young (25–35), 524 middle-aged (45–55), and 297 older adults (65–75)	2	SR	COPE inventory short version	−	Overall, older adults reported less use of reappraisal, acceptance, and problem solving, and more use of suppression
35. Orgeta (2011)	*Study 2*: 40 young (17–48, $M = 22.35$, $SD = 6.06$) and 40 older adults (60–82, $M = 69.73$, $SD = 4.58$)	2	SR	ERQ	−	Older adults used less reappraisal but more emotion suppression than young adults

Table A.3. *Continued*

Study	Sample (Age Range, M_{Age}, SD_{Age})	Type of Sample (1 = Worker, 2 = Community/Student)	Type of Measure	Description of Measure	Overall Age Difference[a]	Main Findings
36. Trouillet, Doan-Van-Hay, Launay, and Martin (2011)	137 adults (20–90, M = 46.16, SD = 20.55)	2	SR	WCC	+/0	Age was positively related to problem solving
37. Yeung, Wong, and Lok (2011)	654 adults (18–64, M = 31.04, SD = 11.46)	2	SR	ERQ	+/0	Age was positively related to use of reappraisal, but unrelated to suppression. Reappraisal mediated the positive relationship between age and positive emotions
38. Bal and Smit (2012)	163 employees (17–62, M = 36.0, SD = 12.86)	1	SR	ERQ	0	Age was unrelated to use of reappraisal and suppression
39. Biron and Van Veldhoven (2012)	170 service workers (M = 40.81, SD = 12.45)	1	SR	Deep and surface acting scale (Brotheridge & Lee, 1998; Grandey, 2003)	0	Age was unrelated to use of deep and surface acting
40. Gerolimatos and Edelstein (2012)	117 young (18–30, M = 20.42, SD = 2.13) and 86 older adults (60–90, M = 69.94, SD = 8.11)	2	SR	ERQ	+/0	Older adults used reappraisal more often than young adults. There were no age differences in use of suppression
41. Sütterlin, Paap, Babic, Kubler, and Vogele (2012)	300 participants (15–87, M = 41.9, SD = 18.57)	2	SR	RSQ	+	Older adults above age 63 reported less rumination than young and middle-aged adults
42. Yeung and Fung (2012)	87 insurance workers (18–61, M = 38.55, SD = 11.18)	1	SR	Suppression subscale of the ERQ	0	Age was unrelated to use of suppression. For older, but not young adults, suppression was associated with lower negative affect and higher sales productivity
43. Yeung, Fung, and Kam (2012)	*Sample 1*: 98 young adults (17–22, M = 20.44, SD = 1.02) and 98 older adults (61–93, M = 75.09, SD = 6.48) *Sample 2*: 68 young adults (20–24, M = 21.40, SD = 0.88) and 65 older adults (61–94, M = 75.78, SD = 8.07)	2	SR	Coding of reported strategies used in response to interpersonal conflicts (Blanchard-Fields et al., 2004)	−	Older adults used problem solving less and avoidance more than young adults. Future time perspective mediated the age differences in problem solving
44. Bjälkebring, Västfjäll, and Johansson (2013)	108 adults (19–89, M = 47)	2	SR	Use of seven regret regulatory strategies (Zeelenberg & Pieters, 2007)	+	Age was positively related to use of reappraisal. Reappraisal of the decision explained low levels of regret in older adults

Table A.3. *Continued*

Study	Sample (Age Range, M_{Age}, SD_{Age})	Type of Sample (1 = Worker, 2 = Community/ Student)	Type of Measure	Description of Measure	Overall Age Difference[a]	Main Findings
45. Cheung and Wu (2013)	242 employees older than 45 years ($M = 51.1$, $SD = 4.45$)	1	SR	Emotional labor scale (Diefendorff et al., 2005)	0	Age was unrelated to use of deep acting and surface acting
46. English and John (2013)	157 young women ($M = 20$) and 106 older women aged 60	2	SR	ERQ	+	Older women used less suppression, but marginally more reappraisal than young women
47. Johnson, Holdsworth, Hoel, and Zapf (2013)	273 retail sector employees ($M = 30.2$, $SD = 10.5$)	1	SR	Stress Coping Questionnaire (Janke, Erdmann, & Kallus, 2002), active coping, humor as a strategy	0	Age was unrelated to use of reappraisal and problem solving
48. E. Kim, Bhave, and Glomb (2013)	2,072 employees ($M = 44.71$, $SD = 10.88$)	1	SR	Suppression scale (Grandey, Fisk, & Steiner, 2005)	0	Age was unrelated to suppression
49. Niven and colleagues (2013)	*Study 1*: 300 employees ($M = 45.71$, $SD = 9.8$) *Study 2*: 70 employees ($M = 37.09$, $SD = 8.61$)	1	SR	Emotion regulation scale (Grandey, Dickter, & Sin, 2004)	+/0	Age was unrelated to use of reappraisal. Age was negatively related to use of suppression when interacting with internal relations, but unrelated to use of suppression when interacting with external relations
50. Popham and Hess (2015)	64 young adults (18–23) and 63 older adults (65–83)	2	SR	Composite score of ACS, CERS, ERQ	0	There were no age differences in avoidance
51. Shallcross, Ford, Floerke, and Mauss (2013)	340 adults (21–73, $M = 41.32$, $SD = 12.51$)	2	SR	Acceptance subscale of the KIMS	+	Age was positively related to acceptance
52. Sliter, Chen, Withrow, and Sliter (2013)	519 employees (18–68, $M = 32.31$, $SD = 13.72$)	1	SR	Emotional labor scale (Diefendorff et al., 2005)	+	Age was positively related to deep acting and negatively associated with surface acting
53. Walsh and Bartikowski (2013)	237 service employees ($M = 31.7$, $SD = 11.2$)	1	SR	Deep and surface acting scale (Grandey, 2003)	−	Age was unrelated to deep acting, but positively related to surface acting
54. Bruine de Bruin, Strough, and Parker (2014)	335 adults (20–89, $M = 53.97$, $SD = 13.77$)	2	SR	Self-developed scale of rumination avoidance, combining items from the revised ACS (Diefendorff, Hall, Lord, & Strean, 2000) and the CTI	+	Age was positively related to avoiding ruminative thoughts in response to scenarios involving irrecoverable losses

Table A.3. *Continued*

Study	Sample (Age Range, M_{Age}, SD_{Age})	Type of Sample (1 = Worker, 2 = Community/ Student)	Type of Measure	Description of Measure	Overall Age Difference[a]	Main Findings
55. Brummer, Stopa, and Bucks (2014)	317 young adults (18–29, M = 22.15, SD = 3.35), 175 middle-aged adults (30–64, M = 49.42, SD = 2.15), and 85 older adults (65–91, M = 74.28, SD = 6.33)	2	SR	ERQ	−	Older adults used suppression more often than young and middle-aged adults. There were no age differences in use of reappraisal
56. Diehl and colleagues (2014)	4-wave longitudinal data across 12 years, at baseline: 392 participants (10–87, M = 45.35, SD = 20.01)	2	SR	CPI	∩	Suppression increased at young and middle age and started to decline at age 60–65
57. Hur and colleagues (2014)	256 flight attendants (21–45, M = 29.7, SD = 5.17)	1	SR	Emotional labor scale (Diefendorff et al., 2005)	0	Age was positively related to both deep and surface acting
58. Luong and Charles (2014)	80 young (18–28, M = 20.23, SD = 1.79), 79 older adults (60–88, M = 70.01, SD = 7.75)	2	SR	Brief COPE	0	There were no age differences in use of avoidance
59. Shimanoe and colleagues (2014)	7,873 adults (40–69)	2	SR	Self-developed scale based on the COPE and GPQ	−/+	Age was negatively related to reappraisal, problem solving, and avoidance
60. Fung and Chan (2015)	280 managerial employees (22–66, M = 42.03, SD = 9.92)	1	SR	Rahim Organizational Conflict Inventory-II (Rahim, 1983)	−	Older employees (>40 years) used more avoidance than young adults in response to conflicts with supervisors. For young, but not older employees avoidance had a negative effect on interpersonal relations
61. Graf, Ramsey, Patrick, and Gentzler (2015)	469 adults (18–79, M = 35.89, SD = 13.10)	2	SR	Self-developed measure of domain-specific rumination	+/0	Age was negatively related to rumination in the work, social and time/planning domain but unrelated to rumination in the family, weather/ environment, and health domain
62. Hertel and colleagues (2015)	676 employees (17–73, M = 43.47, SD = 10.29)	1	SR	COPE	+/0	Age was positively related to problem solving, which in turn resulted in lower job strain. Age was negatively related to avoidance and unrelated to reappraisal
63. Hofer, Burkhard, and Allemand (2015)	108 young (18–28, M = 20.9, SD = 1.9) and 99 older adults (62–87, M = 72.5, SD = 7.0)	2	TB	20-item scale combining multiple existing measures assessing strategies used when watching a distressing film scene	0	Older adults used more reappraisal and suppression than young adults. No age differences were observed regarding avoidance and rumination

Table A.3. *Continued*

Study	Sample (Age Range, M_{Age}, SD_{Age})	Type of Sample (1 = Worker, 2 = Community/ Student)	Type of Measure	Description of Measure	Overall Age Difference[a]	Main Findings
64. Scheibe, Sheppes, and Staudinger (2015)	38 young (19–28) and 43 older adults (65–75)	2	TB	Emotion regulation choice task with pictures by Sheppes et al. (2011)	−	Age was positively related to the preference for choosing avoidance over reappraisal. In older adults, the preference for avoidance over reappraisal predicted better affect
65. Kuba and Scheibe (2016)	92 healthcare professionals (17–64, $M = 43.47$, $SD = 11.14$)	1	SR	Acceptance and Action Questionnaire II (Bond et al., 2011)	+	Age was positively related to acceptance
66. Scheibe, Spieler, and Kuba (2016)	92 healthcare professionals (17–64, $M = 43.47$, $SD = 11.14$)	1	SR	Emotion Regulation Profile-Revised (Nelis, Quoidback, Hansenne, & Mikolayczak, 2011)	+	Age was negatively related to maladaptive strategy use but positively related to adaptive strategy use
Regulation of own emotions: strategy effectiveness						
1. Kunzmann and colleagues (2005)	48 young (18–28, $M = 21.0$) and 47 older adults (60–85, $M = 71.0$)	2	TB	Emotion regulation task with film clips	0	There were no age differences in effective suppression and amplification of emotion experience and facial expressions
2. Magai and colleagues (2006)	32 young ($M = 23.1$, $SD = 3.0$), 32 middle-aged ($M = 46.5$, $SD = 5.9$), and 32 older adults ($M = 64.1$, $SD = 5.4$)	2	TB	Relived emotion task with suppression instruction	+/0	Older adults were more effective than young and middle-aged adults in reducing the duration of emotion experience with suppression, but did not differ in effective suppression of facial expressions
3. Phillips, Henry, Hosie, and Milne (2008)	64 young (18–40, $M = 22.7$, $SD = 6.9$) and 62 older adults (60–88, $M = 72.2$, $SD = 6.33$)	2	TB	Emotion regulation task with film clips	+/0	Older adults were more effective than young adults in reducing experienced negative emotions using avoidance. There were no age differences in effective suppression of behavioral expressions
4. Scheibe and Blanchard-Fields (2009)	91 young (20–30) and 116 older adults (60–75)	2	TB	Emotion regulation task with film clips plus working memory assessment	0	There were no age differences in the effectiveness of down-regulating experienced disgust. However, for older adults, down-regulating disgust was less cognitively costly than for young adults

Table A.3. *Continued*

Study	Sample (Age Range, M_{Age}, SD_{Age})	Type of Sample (1 = Worker, 2 = Community/ Student)	Type of Measure	Description of Measure	Overall Age Difference[a]	Main Findings
5. Shiota and Levenson (2009)	48 young (20–29), 48 middle-aged (40–49), and 48 older adults (60–69)	2	TB	Emotion regulation task with film clips	+/−/0	Older adults were more effective than young and middle-aged adults in reducing emotion experience using positive reappraisal, less effective using detached reappraisal, and equally effective using suppression
6. Langeslag and Van Strien (2010)	19 young (18–26, $M = 20.7$) and 20 older adults (60–77, $M = 68.1$)	2	TB	Changes in the late positive potential in the brain in response to an emotion regulation task with pictures	0	There were no age differences in effects of emotion regulation on late positive potential, an objective index of emotional responding
7. Emery and Hess (2011)	48 young (18–37, $M = 19.54$, $SD = 3.85$) and 53 older adults (60–81, $M = 70.89$, $SD = 4.75$)	2	TB	Emotion regulation task with pictures	0	There were no age differences in the effectiveness of suppressing facial emotional expressions. However, for older adults, suppression was less cognitively costly than for young adults
8. Winecoff, LaBar, Madden, Cabeza, and Huettel (2011)	22 young (19–33, $M = 23$) and 20 older adults (59–73, $M = 69$)	2	TB	Emotion regulation task with pictures	−	Older adults were less effective than young adults in reducing experienced negative emotions using detached reappraisal
9. Opitz and colleagues (2012)	16 young (18–22, $M = 19.25$, $SD = 1.43$) and 15 older adults (55–65, $M = 59.87$, $SD = 3.14$)	2	TB	Emotion regulation task with pictures	−/+	Older adults were less effective than young adults in *reducing* experienced negative emotions using reappraisal, but more effective in *increasing* experienced negative emotions
10. Tucker and colleagues (2012)	40 young (19–30, $M = 23.5$, $SD = 0.6$) and 40 older adults (60–78, $M = 67.4$, $SD = 0.6$)	2	TB	Emotion regulation paradigm by McRae and colleagues (2010)	−/0	Older adults were less effective than young adults in reducing experienced negative emotions using reappraisal. There were no age differences in avoidance effectiveness

Study	Sample (Age Range, M_{Age}, SD_{Age})	Type of Sample (1 = Worker, 2 = Community/ Student)	Type of Measure	Description of Measure	Overall Age Difference[a]	Main Findings
11. Beadel, Green, Hesseinbor, and Teachman (2013)	42 young (16–25, $M = 18.9$, $SD = 1.5$) and 40 older adults (66–92, $M = 76.0$, $SD = 7.9$)	2		Emotion regulation task with thought induction	+	Older adults were more effective than young adults in avoiding intrusive thoughts
12. Harm, Vieillard, and Didierjean (2014)	22 young (19–25, $M = 23.0$, $SD = 4.0$) and 25 older adults (56–82, $M = 67.0$, $SD = 8.0$)	2	TB	Emotion regulation task with humorous stimuli	0	There were no age differences in the effectiveness of reducing experienced negative emotions using humor
13. Lohani and Isaacowitz (2014)	42 young (18–25, $M = 18.5$) and 48 older adults (60–89, $M = 71.42$)	2	TB	Emotion regulation task with sad film clips	+/0	Older adults were more effective than young adults in reducing experienced sadness using reappraisal and attentional deployment, but equally effective using suppression
14. Opitz and colleagues (2014)	30 young (18–22, $M = 19.5$, $SD = 1.18$) and 30 older adults (55–72, $M = 61.9$, $SD = 5.14$)	2	TB	Cognitive reappraisal task by Urry (2010)	0	There were no age differences in reappraisal effectiveness
15. Livingstone and Isaacowitz (2015)	70 young (17–24, $M = 19.26$, $SD = 1.45$) and 76 older adults (60–89, $M = 70.64$, $SD = 8.11$)	2	TB	Self-designed situation selection and situation modification task using videos	0	There were no age differences in the effectiveness of minimizing experienced negative emotions using situation selection or situation modification
16. Vieillard, Harm, and Bigand (2015)	31 young (20–45, $M = 31.0$, $SD = 10.30$) and 30 older adults (50–78, $M = 64$, $SD = 7.45$)	2	TB	Emotion regulation task using positive and negative music excerpts	0	There were no age differences in suppression or amplification of facial expressions. Amplifying positive expression was less cognitively costly and suppressing negative expression more costly for older than young adults
17. Pedder and colleagues (2016)	35 young (18–34, $M = 23.2$, $SD = 3.71$) and 35 older adults (64–85, $M = 71.63$, $SD = 5.68$)	2	TB	Emotion regulation task with pictures	0	There were no age differences in effective reduction of facial expressions using detached reappraisal or expressive suppression

Table A.3. *Continued*

Study	Sample (Age Range, M_{Age}, SD_{Age})	Type of Sample (1 = Worker, 2 = Community/ Student)	Type of Measure	Description of Measure	Overall Age Difference[a]	Main Findings
Regulating other's emotions: emotional control						
1. Brasseur and colleagues (2013)	4,307 participants (15–84)	2	SR	Interpersonal emotion regulation subscale of the PEC	+	Age was positively related to self-reported ability to regulate others' emotions
2. Fantini-Hauwel and Mikolajczak (2014)	6,688 older adults (50–80, M = 62.62, SD = 7.01)	2	SR	Interpersonal emotion regulation subscale of the PEC	0	Age was unrelated to self-reported ability to regulate others' emotions

Note. SR = self-report measure of emotion regulation; OR = other-report of emotion regulation; TB = test-based measure of emotion regulation; ACS = Action Control Scale (Kuhl & Beckmann, 1994); CERS = Cognitive Emotion Regulation Scale (Garnefski & Kraaij, 2006), COPE inventory (Carver et al., 1989); CPI = California psychological inventory (Gough, 1987); CSI = Control Strategy Inventory (Peng & Lachman, 1994); CTI = Control Thinking Inventory (Epstein & Meier, 1989); DERS = Difficulties in Emotion Regulation Scale (Gratz & Roemer, 2004); DMI = Defense Mechanism Inventory (Gleser & Ihilevich, 1969); DSQ = Defense Style Questionnaire (Andrews, Pollack, & Stewart, 1989); D-QUEL = Dutch Questionnaire for Emotional Labor (Näring, Briët, & Brouwers, 2007); EPSI = Everyday Problem Solving Inventory (Cornelius & Caspi, 1987); ERQ = Emotion Regulation Questionnaire (Gross & John, 2003); GPQ = General Coping Questionnaire (Sasaki, Kitaoka-Higashiguchi, Morikawa, & Nakagawa, 2009); KIMS = Kentucky Inventory of Mindfulness Skills (Baer, Smith, & Allen, 2004); MCI = Multidimensional Coping Inventory (Endler & Parker, 1990); MSCEIT = Mayer-Salovey-Caruso Emotion Intelligence Test (Mayer et al., 2002); PEC = The Profile of Emotional Competence (Brasseur et al., 2013); RSS0 Ruminative Response Scale (Treynor, Gonzalez, & Nolen-Hoeksema, 2003); SSEIT = Schutte Self-Report Inventory of Emotional Intelligence (Schutte et al., 1998); STAXI-2 = State-trait Anger Expression Inventory-2 (Spielberger, 1988); WCC = Ways of Coping Checklist (Vitaliano, Russo, Carr, Maurio, & Becker, 1985); WCQ = Ways of Coping Questionnaire (Folkman & Lazarus, 1988); WLEIS = Wong and Law Emotional Intelligence Scale (Wong & Law, 2002). + denotes a positive age trend, – denotes a negative age trend, 0 denotes no age differences, and ∩ denotes a curvilinear age trend.

[a]For studies listed under strategy use + denotes a positive age trend for adaptive strategy use, – denotes a negative age trend for adaptive strategy use, and 0 denotes no age-related differences in adaptive strategy use. Adaptive and maladaptive strategies are those identified as such in meta-analyses by Aldao and colleagues (2010) and Hülsheger and Schewe (2011) or by expert scoring. Note that some researchers have used a different categorization of emotion regulation strategies that broadly map onto problem solving and avoidance. In our review, we categorized problem-focused action, cognitive problem analysis (Blanchard-Fields et al., 1995) and instrumental strategies (Blanchard-Fields et al., 2004) as problem solving; and passive-dependent behavior and avoidant thinking and denial (Blanchard-Fields et al., 1995), passive emotional regulation strategies (Blanchard-Fields et al., 2004) as well as emotion-focused strategies (Blanchard-Fields et al., 2007) as avoidance.