Caring More and Knowing More Reduces Age-Related Differences in Emotion Perception

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Abstract

Traditional emotion perception tasks show that older adults are less accurate than young adults at recognizing facial expressions of emotion. Recently, we proposed that socioemotional factors might explain why older adults seem impaired in lab tasks but less so in everyday life (Isaacowitz & Stanley, 2011). Thus, in the present research we empirically tested whether socioemotional factors such as motivation and familiarity can alter this pattern of age effects. In one task, accountability instructions eliminated age differences in the traditional emotion perception task. Using a novel emotion perception paradigm featuring spontaneous dynamic facial expressions of a familiar romantic partner versus a same-age stranger, we found that age differences in emotion perception accuracy were attenuated in the familiar partner condition, relative to the stranger condition. Taken together, the results suggest that both overall accuracy as well as specific patterns of age effects differ appreciably between traditional emotion perception tasks and emotion perception within a socioemotional context.

Keywords: *emotion perception, aging, ecological validity, motivation, familiarity*

Word Count: 8,295

Caring More and Knowing More Reduces Age-Related Differences in Emotion Perception

Accurate emotion perception is important for social adjustment and maintaining relationships (Carton, Kessler, & Pape, 1999; Engelberg & Sjöberg, 2004). Yet, older adults are less accurate than young adults at recognizing facial expressions of emotion (Ruffman, Henry, Livingstone, & Phillips, 2008) in traditional lab tasks. This finding is somewhat surprising given older adults' greater life experience and research that suggests age-related maintenance or gains in the emotional domain (Gross et al., 1997; Kunzmann, Little, & Smith, 2000; Orgeta, 2009). What factors might be responsible for age-related differences in emotion perception in the traditional emotion perception tasks and do these same differences remain when the emotion perception task is more similar to emotion perception in daily life (i.e., when older adults care more and know more)?

A number of studies have failed to account for age-related differences with tests of perceptual abilities, fluid intelligence, working memory, inhibition, education, or even gaze patterns (Keightley, Winocur, Burianova, Hongwanishkul, & Grady, 2006; Murphy & Isaacowitz, 2010; Phillips, MacLean, & Allen, 2002; Sullivan & Ruffman, 2004), suggesting that age differences in emotion perception abilities remain even when controlling for the "usual suspects" of mediators in aging research (i.e., age-related cognitive and perceptual decline) as well as attentional strategy differences. In the present research, we took a different approach: rather than investigating correlates of age and emotion perception accuracy, we manipulated the emotion perception task to test the boundary conditions of age effects. In one task, we manipulated the motivation of participants with accountability instructions (the "caring more" manipulation). In a second task we adapted a paradigm from the empathic accuracy literature to examine the influence of familiarity on age differences in emotion perception accuracy (the

"knowing more" manipulation). We used a modified standard interview paradigm with a yoked-subject design in which pairs of perceivers viewed videos of emotional expressions of either their romantic partner or a same-age stranger (Ickes & Hodges, 2013). If older adults' accuracy on the emotion perception task varied with these manipulations, it would suggest that age differences in emotion perception may be more tied to mutable socioemotional factors than permanent differences in ability.

Next, we describe age differences in traditional emotion perception tasks and the ways in which traditional emotion perception tasks fail to include the rich context of emotion perception in everyday life. Then, against this backdrop, we present evidence that manipulations to increase the ecological validity in other social judgment tasks, namely, by increasing motivation (*caring more*) and knowledge (*knowing more*), may improve accuracy and attenuate age differences.

Traditional Emotion Perception Tasks Lack Ecological Validity

The most common way of assessing emotion perception ability is with a single-forced-choice-response to a series of photographs of standardized facial expressions of emotion posed at maximum intensity (Isaacowitz & Stanley, 2011). This is referred to as a *traditional emotion perception task* (Isaacowitz & Stanley, 2011; Rauers, Blanke, & Riediger, 2013). Although the largest age effects show young adults outperforming older adults at correctly labeling angry, sad, and fearful facial expressions in a traditional emotion perception task (Ruffman et al., 2008), overall accuracy is quite high in this task and some emotions even exhibit ceiling effects (Charles & Campos, 2011; Isaacowitz et al., 2007). For example, in one study with typical results, the poorest accuracy was for older adults' fear recognition at 72% and the highest accuracy was 97%, for young adults' happiness recognition (Isaacowitz et al., 2007). Thus, even the lowest accuracy scores are typically better than chance (e.g., about 14% in a task with seven

emotion choices). As discussed by Charles and Campos (2011), the extent to which *significant age differences* in emotion perception are also *meaningful differences* is an open question. In other words, traditional emotion perception tasks have high reliability, but their ecological validity has not been rigorously tested (Barrett, Mesquita, & Gendron, 2011; Isaacowitz & Stanley, 2011).

Why might older adults be differentially facilitated in content-rich tasks versus tightly controlled but content-poor tasks? One possibility is that when the ecological validity of tasks is increased, older adults are able to rely on their greater social expertise, relative to young adults' (T. M. Hess, Osowski, & Leclerc, 2005). Extant research on the effect of rich content on age differences in emotion perception is consistent with these ideas: When presented with video without audio of a woman talking about an emotional event, young adults were better than older adults at identifying what the woman was feeling; but when both audio and video were included, these age differences were eliminated (Richter, Dietzel, & Kunzmann, 2010). Similarly, when emotionally-congruent vocal and facial expressions are provided, age differences in emotion perception are eliminated (Hunter, Phillips, & MacPherson, 2010). Taken together, it is clear that additional (congruent) visual or audio information can attenuate or even eliminate age-related deficits on emotional tasks. Yet, the vast majority of research on age differences in emotion perception has relied on traditional emotion perception tasks with static stimuli only. Therefore, the present study attempted to add to the literature on the ways in a more ecologically valid emotion perception task can reduce age-related differences in emotion perception accuracy.

Caring More: The Role of Motivation

In addition to social expertise, age differences in emotion perception may be affected by how motivated individuals feel to expend cognitive resources, which become more scarce with

age (Park, 2000; Salthouse, 1996). Motivation can be a powerful influence on behavior, including accuracy in emotion-related tasks. For example, a financial incentive paid to young adult participants for good performance eliminated gender differences in empathic accuracy (Klein & Hodges, 2001). Because increasing age is associated with fewer cognitive resources (Park, 2000; Salthouse, 1996), older individuals are more selective in how they expend these limited resources than younger individuals (Baltes & Baltes, 1990). Thus, age differences in traditional emotion perception tasks may be due to a lack of sufficient motivation for older adults to invest scarce cognitive resources in the task. Consistent with this possibility, age-related differences in emotion perception were eliminated when participants were told that the target shared many common interests with them, relative to controls (Zhang, Fung, Stanley, & Isaacowitz, 2013). The perceived closeness manipulation was interpreted as producing greater motivation and thus better performance for older adults. Furthermore, research on emotion identification for in-group versus out-group members, shows that identification with the social group expressing emotions can lead to better emotion perception, because individuals are more motivated to interpret the emotional expressions of members of their in-group than members of their out-group (Thibault, Bourgeois, & Hess, 2006).

Knowing More: The Role of Familiarity

Another factor that might contribute to greater accuracy in an emotion perception task is simply being familiar with the person expressing the emotion. Participants are better at recognizing the emotional expressions of a familiar partner than a stranger (Ma-Kellams & Blascovich, 2012; Sabatelli, Buck, & Dreyer, 1982; Sternglanz & DePaulo, 2004; Stinson & Ickes, 1992). Additionally, the literature on the broader concept of *empathic accuracy*, or the ability to correctly infer another person's thoughts or feelings (Ickes & Simpson, 1997), suggests

that people are more accurate at knowing what a close other is feeling than a stranger (Ickes & Hodges, 2013; Sternglanz & DePaulo, 2004). This effect of familiarity may be attributable to the perceiver both *knowing more* and *caring more* about a close other's feelings than a stranger's (Ickes & Hodges, 2013). This may be especially salient for older adults, who prioritize close partners over acquaintances more than young adults (Fredrickson & Carstensen, 1990). Older adults might not only prioritize their close relationships more than young adults, they might also know their social partners better than young adults. In a novel demonstration of the power of familiarity on empathic accuracy, both young and older adults were better than chance at inferring the feelings of their partner when they were not physically together (Rauers et al., 2013). This was true for members of a couple but not strangers. The authors suggest that better-than-chance empathic accuracy when the partner is not present is due to acquired knowledge about the partner and how he or she typically feels during different parts of the day.

Given the longer duration of close relationships with age, do older couples know more about their partners? Recent work suggests that the knowledge gained in close relationships is at least maintained with age. An experience-sampling study found that young couples are more empathically accurate than older couples when the pairs are physically together, but age differences are eliminated when the pairs are physically separated (Rauers et al., 2013), suggesting that young and older couples are equally able to use what they know about their partner to accurately infer their thoughts and feelings. However, when partners are present, the young couples may have been able to read the emotional expressions of their partner more accurately than older couples, resulting in better accuracy among young couples when partners were physically present. This study used an affect balance score by subtracting negative affect

endorsement from positive affect endorsement. In the present studies, we investigated emotion

perception in strangers and in close relationships from a discrete emotions perspective.

Traditional Emotion Perception Task with Motivation Manipulation

In the first task we tested whether we could improve older adults' performance on a

traditional emotion perception task by making them *care more*, which might compel them to

spend more cognitive resources on the task, thereby increasing accuracy. We manipulated

motivation using accountability instructions. Participants in the motivation condition were

informed prior to completing the traditional emotion perception task that they would later need to

defend their response choices. This accountability manipulation has been shown in the past to be

more involving for participants, which results in greater engagement in effortful processing (e.g.,

Chen, 2004; Tetlock, 1985, 1992). Furthermore, accountability instructions have reduced age

effects in memory and social judgment tasks by differentially improving the performance of

older adults, relative to young (T. M. Hess, Germain, Swaim, & Osowski, 2009; T. M. Hess,

Rosenberg, & Waters, 2001).

Familiar Partner Emotion Perception Task

In the second task, we investigated whether age differences in emotion perception could

be reduced when participants *know more*, by creating stimuli of familiar partners and comparing

emotion perception accuracy of a familiar partner to that of a same-age stranger. In addition to

the primary manipulation of familiarity, this emotion perception task provides more content than

a traditional emotion perception task: the videos are dynamic rather than static and the

expressions are spontaneous rather than posed. Participants are better at recognizing emotions

from dynamic displays than static displays (Ambadar, Schooler, & Cohn, 2005; Bould & Morris,

2008; Lederman et al., 2007). Although no work to date has *directly* compared age differences in

recognizing discrete emotions in dynamic versus static stimuli, two studies have found that young and older adults are equally able to identify the global valence of emotional expressions (i.e., positive or negative) from dynamic displays (Krendl & Ambady, 2010; Sze, Goodkind, Gyurak, & Levenson, 2012). In addition, older adults are more sensitive than young adults at distinguishing genuine "Duchenne" smiles from posed smiles presented in a video display (Murphy, Lehrfeld, & Isaacowitz, 2010), but are less able than young adults to determine the emotional meaning when *three* different types of emotional experiences (positive, negative, or neutral) underlie different kinds of smiles in videos (Riediger, Studtmann, Westphal, Rauers, & Weber, 2014). Thus, the literature to date is mixed on whether age-related differences remain when dynamic emotional stimuli are presented.

Unlike traditional emotion perception tasks that use expressions posed at maximum intensity – and frozen in time at the apex of the emotional expression, this task will present natural, spontaneous facial expressions of emotion in response to emotion-evoking film clips. These more subtle facial expressions may be more difficult for all participants to decode than expressions posed at maximum intensity. Thus, while the motion cues provide important context for identifying the emotion (Bould & Morris, 2008), overall accuracy will likely be much lower than traditional emotion perception tasks because rather than a "caricature" of a facial expression (Barrett, 2006) – these expressions are spontaneous and subtle. This difference will also likely eliminate the problem of ceiling effects that typically restricts traditional emotion perception tasks.

One factor held constant in the present research is the age-matching of the perceiver to the target. Although there is evidence that age-matching is an influential moderator of age effects in social judgment tasks (T. M. Hess et al., 2001), studies specifically focusing on emotion

perception accuracy (both static and dynamic) have not found support for an own-age bias (Ebner & Johnson, 2009; U. Hess, Adams, Simard, Stevenson, & Kleck, 2012; Malatesta, Fiore, & Messina, 1987; Malatesta, Izard, Culver, & Nicolich, 1987; Murphy et al., 2010; Riediger, Voelkle, Ebner, & Lindenberger, 2011; Sze et al., 2012).

Hypotheses

Hypothesis 1: We expected to replicate age differences in the traditional emotion perception task. Specifically, we expected an Age Group x Emotion interaction for emotion perception accuracy, with young adults outperforming older adults at recognizing several of the discrete emotions.

Hypothesis 2: We expected to find an Age Group x Motivation Condition interaction for emotion perception accuracy in the traditional emotion perception task, with age differences attenuated in the explicit motivation condition compared to the no motivation condition.

Hypothesis 3: For the familiar partner emotion perception task, we expected that age differences would be attenuated in the familiar partner condition compared to the stranger condition.

Past research has reported differential age effects in emotion perception accuracy for different discrete emotions, although the specific pattern of these emotion effects differs somewhat across studies (Ruffman et al., 2008). Additionally, there is not a clear theoretical reason to predict specific emotion effects, so while we expected there might be some differences across emotions in the patterns of age effects, we did not explicitly predict specific discrete emotion effects.

Method

The data for this study were collected across two lab sessions. In Session 1, participants completed the perceptual, cognitive, and affective tests as well as the traditional emotion perception task. Participants also had their facial expressions video-recorded in Session 1, from which we developed the stimuli for the Dynamic Emotion Perception Task for Session 2.

Participants

Previous research has reported a medium to large effect size for age differences in emotion perception accuracy (Halberstadt, Ruffman, Murray, Taumoepeau, & Ryan, 2011; Murphy & Isaacowitz, 2010). Using G*Power 3.1.9.2 (a publicly-available software package for power calculations; Faul, Erdfelder, Buchner, & Lang, 2009; Faul, Erdfelder, Lang, & Buchner, 2007), we determined that a total sample size of 40 (for a large effect, $f = .40$) or 98 (for a medium effect $f = .25$) is the minimum total sample size necessary to provide adequate power (.80) to detect the main effects and the within-between interaction with two groups and two measurements.

We recruited young and older adult couples who were in an exclusive romantic relationship for at least three months. Fifty-two young adults (aged 18-30 years; $M = 21.35$, $SD = 3.16$; 28 females and 24 males[1]) and 57 community-dwelling older adults (aged 60-91 years; $M = 74.88$, $SD = 6.60$; 29[2] females and 28 males) living in the northeastern region of the United States participated in Session 1. Two older adults were excluded from analyses because they did not speak English fluently and did not understand the instructions. All remaining participants spoke English fluently. This left 55 older adults for analyses (aged 60-91 years; $M = 74.96$, $SD = 6.63$; 28 females and 27 males). Younger couples had an average relationship duration of 32.33 months ($SD = 31.44$) with a range of 4-121 months, while older couples had an average

relationship duration of 562.40 months (SD = 185.61) with a range of 120-885 months. Young

adults were recruited from an introductory psychology course and with flyers posted on campus.

Older adults were recruited from a lifelong learning class and with advertisements. Participants

received either course credit or a monetary stipend.

Eighty-eight percent of the sample self-identified as Caucasian, 8% Asian American, 3%

other, <1% African American, and <1% American Indian. Table 1 displays descriptive statistics

and t-test results for age differences in demographic, perceptual, cognitive, and

affective/personality variables. On average, participants reported being in fairly good health (M =

3.75, SD = .95) on a 5-point Likert-type scale (*1 = poor, 2 =fair, 3 = good, 4 = very good, 5 =*

excellent). Young adults reported being in significantly better health than older adults, $p < .05$.

However, the average rating for both age groups was between *good* and *very good*, suggesting an

overall healthy sample. Participants in this sample were highly educated: Most participants had

attended some college or were college graduates. Not surprisingly, because young adult

participants were primarily college students in the process of completing their education, older

adults reported more years of formal education than young adults, $p < .001$. Participants in this

sample exhibited typical age patterns of perceptual and cognitive functioning, with young adults

exhibiting better near and far visual acuity and contrast sensitivity than older adults, ps $< .001$,

and older adults outperforming young adults on a vocabulary test, $p < .001$. We screened for

dementia with the Mini-Mental State Exam (MMSE; Folstein, Folstein, & McHugh, 1975). All

older adult participants scored 26 or above on the MMSE, which is greater than the diagnostic

cut-off score for normal cognitive functioning.

Materials and Measures

Perceptual functioning. In order to ensure that all participants could adequately perceive the visual stimuli of facial expressions, we tested participants' visual functioning on four measures: the standard Snellen Eye Chart for visual acuity (Hetherington, 1954), the Rosenbaum Screener for near vision (Rosenbaum, 1984), the Pelli-Robson Contrast Sensitivity Chart (Pelli, Robson, & Wilkins, 1988), and the Benton Facial Discrimination Test-Short Form (Levin, Hamsher, & Benton, 1975). Although the Benton Facial Discrimination Test is a neuropsychological measure of prosopagnosia, a disorder in the ability to recognize faces, in accordance with past research (Borod et al., 2000; Stanley & Blanchard-Fields, 2008) we used the test as a way to determine whether participants could discriminate between different human faces. In this 27-item test, participants must choose pictures of the same person as the target face out of an array of six faces. The internal consistency of the test is excellent (Cronbach's $\alpha = .90$). Scores were the number of target faces matched correctly.

Cognitive functioning. Crystallized intelligence was measured with the 20-item Shipley Vocabulary Test (Zachary, 1986). Scores were the number of multiple-choice words defined correctly.

Affective and personality measures. Depressive symptomology was measured with the Center for Epidemiological Studies Depression Scale (Radloff, 1977). We also assessed whether participants view their future as open-ended or limited with the Future Time Perspective Scale (Carstensen & Lang, 1996). Participants indicated the extent of their agreement with 10 items using a 7-point Likert-type scale (*1 = very untrue, 7 = very true*). A sample item is: *Many opportunities await me in the future*. Higher scores on this scale indicate a more expansive future time perspective.

Traditional emotion perception task. Participants were asked to identify the emotion expressed by 42 faces from the *Pictures of Facial Affect* set (Ekman & Friesen, 1976). Six different faces for each of the six basic emotions plus neutral (anger, disgust, fear, happy, sad, surprise, and neutral) were presented one at a time in a randomized order on a 17-in. display (resolution 1280 x 1024, refresh rate 60 Hz) using GazeTracker software (Eyetellect, LLC, Charlottesville, VA). Participants were seated approximately 80 cm from the monitor and the faces were centered on the screen, subtended at 5.11° visual angle wide x 6.92° visual angle high. The seven emotion labels corresponded to numbers and participants responded with a key press to indicate their choice for each face. Trials were self-paced and labels for the emotions and corresponding numbers were available throughout the task.

Participants were pseudo-randomly (balanced across age and gender) assigned to one of two motivation conditions: explicit motivation or no motivation. The only difference between the two conditions was that after receiving instructions on how to complete the emotion perception task, participants in the explicit motivation condition were also told, "*Once you have completed the emotion perception task, we will go back through the test together, face by face, and you will explain to me why you chose the emotion you chose for each face.*" In actuality, we did not follow through on this procedure. The additional accountability for the explicit motivation condition was intended to increase motivation for emotion perception accuracy in the task (Chen, 2004; Tetlock, 1985, 1992). Participants in the explicit motivation condition were debriefed about the purpose of this deception at the end of the study session.

Dynamic familiar partner emotion perception task stimuli development. During Session 1, participants were video-recorded while watching film clips intended to evoke seven

different emotions: anger, disgust, fear, happy, sad, surprise, and neutral. Participants reported

the emotion they felt and intensity ratings for each of the seven film clips.

Film task materials and procedure. Participants watched seven film clips validated to

evoke the six basic emotions plus neutral in young and older adults (Rottenberg, Ray, & Gross,

2007), in one of four different counterbalanced orders. Each member of a couple was tested

individually, but in order to reduce the possibility that partners would give away how they felt by

discussing the clips they saw after participating, each member of a couple saw a completely

different set of seven emotion-eliciting film clips. The clips ranged in duration from 14 seconds

to 4 minutes.

Participants were informed that they would be video-recorded while they watched the

film clips and were asked to, "*Express whatever you are feeling on your face so that someone*

who was watching you would know exactly what you are feeling." Prior to each film clip,

participants completed a pre-film questionnaire in which they indicated, 1) the emotion they felt

the most "*right now*" (*angry, disgusted, afraid, happy/amused, sad, surprised, neutral/no*

emotion), 2) rated how intensely they were feeling that emotion (*0 = not feeling even the*

slightest bit of the emotion to *8 = the most you could imagine feeling the emotion in a lab*

setting), and 3) indicated any other emotions they felt and the intensity of those emotions.

Immediately following each film clip, participants completed a post-film affect

questionnaire, which was identical to the pre-film questionnaire except participants were asked

how they felt "*during the film clip*". Before going on to the next pre-film questionnaire,

participants were instructed to clear their minds and completed a 40-second distractor task where

they copied an abstract geometric drawing. This distractor task, adapted from Gross and

colleagues (Gross, Sutton, & Ketelaar, 1998), was used in order to reduce emotional carryover

effects. Participants were instructed to copy, sketch, or draw an abstract geometric figure that was presented for 40 seconds on the computer screen. Participants were assured that *the quality of the drawings is not important; we just want to give you a break between the films*.

   Editing and coding of dynamic facial expressions. Each participant yielded seven different clips of facial expressions, one for each of the seven emotions. The clips were edited down to approximately 30 seconds each, with the stipulation that each clip begin with a neutral expression and then unfold into the most intense emotion shown for each of the seven emotions. The average duration of edited face videos was $M = 23.70$ seconds, $SD = 2.81$. The young adult clips ($M = 22.08$ sec., $SD = 2.35$) were significantly shorter than the older adult clips ($M = 25.43$ sec., $SD = 2.16$), $t(89) = 7.08$, $p < .001$, $d = 1.48$, perhaps because the emotional expression unfolded more slowly or later in the older adult videos than the young adult videos. Next, all of the emotion clips were independently coded by two researchers familiar with the Facial Action Coding System (FACS; Ekman, Friesen, & Hager, 2002) according to the quality of the emotion expressed (*0 = target emotion not present, 1 = target emotion minimally present, 2 = target emotion present, 3 = target emotion clearly present*). To assess inter-rater reliability a two-way mixed, consistency, single-measures Intraclass Correlation Coefficient (ICC) was computed for each of the six emotions across participants and separately by age group for these quality codes (see Table 2). ICCs ranged from moderate to substantial (Landis & Koch, 1977), depending on the emotion. By comparing the 95% CIs for young and older adults for each emotion, it can be seen that the reliability for quality codes for most of the emotions were similar for the two age groups (i.e., the confidence intervals overlap). One exception was the reliability for coding the quality of happy facial expressions: the ICC was higher for older adults than young adults and

the CIs around the ICCs did not overlap, suggesting that the two coders were more likely to

agree on the quality score for happy videos of older adults than young adults.

Average quality codes for each emotion separately by age group are displayed in Table 3.

To assess whether there were age or emotion differences in the coder-rated quality of the videos,

we conducted a 2 (Age Group) x 6 (Emotion) mixed-design ANOVA on quality scores. There

was a main effect of Emotion, $F(4.09, 355.53) = 31.02$, $p < .001$, $\eta_p^2 = .26$. Follow-up pairwise

comparisons with Bonferroni adjustments indicated that the quality codes for fear ($M = 1.43$, SE

$= .09$) were significantly lower than the quality codes for all other emotions, $ps < .001$.

Conversely, the quality codes for happy ($M = 2.77$, $SE = .06$) were significantly higher than the

quality codes for all other emotions, $ps \leq .001$. The Age x Emotion interaction was not

significant, $F(4.09, 355.53) = .34$, $p = .86$, $\eta_p^2 = .004$. The main effect of age group was not

significant, $F(1,87) = .25$, $p = .62$, $\eta_p^2 = .003$.

Emotional intensity ratings. Because 42% of participants did not respond to the intensity

rating for the neutral clip, we limited our intensity rating analyses to the six emotional film types.

The majority of participants indicated they felt the target emotion for each of the six emotional

clips. The anger clips were the most likely to evoke a different emotion ($n = 18$) with participants

reporting feeling disgusted or sad rather than angry. The fear and disgust clips were the next

most likely to fail to elicit the intended emotion. Twelve participants reported feeling neutral

rather than afraid for the fear clips. Twelve participants did not report feeling disgusted for the

disgust clip, with the majority of these reporting feeling surprised rather than disgusted. These

emotional videos were considered failed inductions and as such were not included in accuracy

analyses for the dynamic emotion perception task.

To minimize loss of data due to missing values for the intensity ratings, we used the *replace missing values* function in SPSS 22.0 to replace missing values with the mean intensity rating for each age group for each missing emotion intensity rating. Young adults had the following number of missing values for each emotion: 11 for anger, 3 for disgust, 6 for fear, 1 for happy, 1 for sad, and 1 for surprise. Older adults had the following number of missing values for each emotion: 7 for anger, 9 for disgust, 7 for fear, 4 for happy, 0 for sad, and 2 for surprise. Thus, out of 637 emotion inductions (91 participants induced into 7 emotions), 52 were not successful and we replaced the null value with the mean by age group for these 52 values (8% of the intensity data). Descriptive statistics for intensity ratings by age group can be found in Table 4. To determine whether there were age differences in the intensity ratings of the emotional film clips, we conducted a 2 (Age Group) x 6 (Emotion) mixed-design ANOVA on the intensity ratings with missing values replaced. Results revealed a significant main effect of Age Group, $F(1, 89) = 31.00$, $p < .001$, $\eta_p^2 = .26$, with older adults ($M = 6.21$, $SE = .17$) reporting higher intensity ratings than young adults ($M = 4.91$, $SE = .16$). There was also a significant main effect of Emotion, $F(5, 445) = 19.68$, $p < .001$, $\eta_p^2 = .18$. Follow-up pairwise comparisons with Bonferroni adjustments showed that the fear clip ($M = 4.37$, $SE = .19$) was rated as significantly less intense than all of the other clips, ps $< .001$. In addition, disgust ($M = 6.24$, $SE = .18$) was rated as significantly more intense than anger ($M = 5.57$, $SE = .16$) and surprise ($M = 5.50$, $SE = .18$), ps $< .05$. These main effects were qualified by a significant Emotion x Age Group interaction, $F(5, 445) = 2.30$, $p = .044$, $\eta_p^2 = .03$. Follow-up comparisons with Bonferroni adjustments (see Table 4) showed that for all six emotions, older adults rated their emotional experience as significantly more intense than young adults, albeit to a differing extent (hence the interaction).

Examining all of these results on our created stimuli together, it appears that the emotion induction for fear was not successful. Thirteen percent of the sample reported feeling neutral rather than afraid during the fear clip. In addition, those participants who *did* report feeling afraid reported it at a significantly lower intensity than all of the other emotions (with a mean of 4.37 on a scale of 0-8). Finally, the coder-rated quality for fear was significantly lower than all other emotions, suggesting that participants were also not clearly expressing fear in the video clips. For these reasons, we considered the fear induction unsuccessful and so we did not include fear in the dynamic emotion perception task analyses, leaving six emotions (anger, disgust, happiness, sadness, surprise, and neutral) for analysis of emotion perception accuracy.

Dynamic emotion perception task. The duration between session one and session two ranged from 0-9 months. An independent samples t-test indicated that there was more time between the sessions for older adults ($M = 4.37$ months, $SD = 3.19$) than young adults ($M = 3.05$ months, $SD = 1.61$), $t(89) = 2.56$, $p = .012$, $d = .52$. A total of 47 young adults and 44 older adults returned for the second session of the study[3], during which they were asked to identify the emotions expressed in 7 videos of their familiar partner (one for each emotion) and 7 videos of an age-and-sex-matched stranger. That is, the characteristics of the stranger video were matched to the characteristics of the familiar video for each participant so that if an older adult male saw his older adult female partner for the familiar condition, he was assigned an older adult female video set for his stranger video condition. The order of the stranger and familiar partner video sets was counterbalanced between participants and the order of emotion type within each block was also counterbalanced within and across participants. Prior to viewing the stranger block, each participant was presented with a still photo of the stranger and asked to confirm that the person was unknown to them. If the participant knew the stranger, another set of stranger videos

was selected. (This happened once for a young adult). Participants watched each of the 14

dynamic emotional expression videos twice, in succession. Because the videos were relatively

short (about 30 seconds), we wanted to ensure participants had enough time to view the

emotions. For this reason, we showed the emotional videos twice for all emotions, conditions,

and participants. Participants were given the following instructions:

> *Next, you will watch short clips of facial expressions. You will watch each clip twice.*
>
> *After the second viewing, please indicate the emotion that is exhibited the <u>most intensely</u>*
>
> *in the clip by circling one of the following emotion choices on your answer sheet: happy,*
>
> *neutral, sad, fear, surprise, disgust, anger.*

Results

H1 and H2: Age Differences in Emotion Perception Accuracy and Effect of Motivation Condition

Table 1 in the supplementary material displays the confusion matrix and hit-rate

accuracies as percentages of responses for young and older adults for each emotion, separately

by motivation condition. In order to test for, 1) age differences in emotion perception accuracy in

the traditional emotion perception task, and, 2) whether age differences in emotion perception

accuracy were attenuated in the explicit motivation condition compared to the no motivation

condition, we conducted a mixed-design ANOVA with Age Group and Motivation Condition as

between-subjects factors and Emotion as a within-subjects factor. The dependent variable was

proportion responses correct out of number of responses present for each of the seven discrete

emotions, such that scores could range from 0 to 1.0. Of note, and consistent with past findings

(Isaacowitz et al., 2007), the hit-rate accuracies for all cells were well-above chance (14% in a

decision task with seven choices). Happy faces were recognized best, while fearful faces had the

lowest accuracy. All analyses for the traditional emotion perception task were also computed

using the unbiased hit rate to correct for any systematic response biases.[4] Because the patterns of

effects using the unbiased hit rates for accuracy were identical to those using the raw accuracy

scores, we present the raw accuracy scores to increase the interpretability of the scores and allow

for comparisons across studies.

Consistent with past work (Ruffman et al., 2008), the main effect of Age Group was

significant, $F(1, 102)^5 = 10.66$, $p = .001$, $\eta_p^2 = .10$, with young adults ($M = .85$, $SE = .01$)

exhibiting greater emotion perception accuracy overall than older adults ($M = .79$, $SE = .01$).

There was also a significant main effect of Emotion, $F(4.01, 409.15)^6 = 65.92$, $p < .001$, $\eta_p^2 =$

.39, which was qualified by the predicted Age Group x Emotion interaction, $F(4.01, 409.15) =$

4.93, $p = .001$, $\eta_p^2 = .05$. Follow-up comparisons with Bonferroni adjustments revealed

significant age differences, with young outperforming older adults, for accurate recognition of

angry (YA: $M = .85$, $SE = .03$; OA: $M = .72$, $SE = .03$; $p = .008$), sad (YA: $M = .85$, $SE = .03$;

OA: $M = .68$, $SE = .02$; $p < .001$), and neutral faces (YA: $M = .96$, $SE = .02$; OA: $M = .88$, $SE =$

.02; $p = .004$).

The predicted Age Group x Motivation Condition interaction was also significant, $F(1,$

$102) = 9.84$, $p = .002$, $\eta_p^2 = .09$ (Figure 1). Simple effects tests separately by motivation

condition revealed significant age differences in the no motivation condition, $F(1, 51) = 17.16$, p

$< .001$, $\eta_p^2 = .25$, with young adults ($M = .88$, $SE = .02$) outperforming older adults ($M = .77$, SE

$= .02$). As predicted, age differences were not significant in the explicit motivation condition,

$F(1, 51) = .01$, $p = .92$, $\eta_p^2 < .001$. However, this attenuation in age differences is due to both the

lower accuracy of young adults and the *higher* accuracy of older adults in the explicit motivation

condition compared to those in the no motivation condition, respectively. Follow-up tests within

age groups confirmed that young adults' accuracy was significantly worse in the explicit

motivation condition than the no motivation condition, $F(1, 49) = 8.19$, $p = .006$, $\eta_p^2 = .14$,

whereas older adults' accuracy did not significantly differ by motivation condition, $F(1, 53) =$

3.13, $p = .082$, $\eta_p^2 = .06$. However, it appears that the means are in the expected direction-- and

opposite to young adults-- with older adults exhibiting a trend for slightly better performance in

the explicit motivation condition than the no motivation condition. The main effect of Motivation

Condition was not significant, $F(1, 102) = .16$, $p = .69$, $\eta_p^2 = .002$. And neither the Motivation

Condition x Emotion interaction, $F(4.01, 409.15) = 1.75$, $p = .14$, $\eta_p^2 = .02$, nor the Motivation

Condition x Age Group x Emotion interaction, $F(4.01, 409.15) = 1.46$, $p = .21$, $\eta_p^2 = .01$, were

significant.

H3: Age Differences in Dynamic Emotion Perception Accuracy as a Function of Familiarity

Before analyzing the dynamic emotion perception task data, we wanted to determine

whether the scores needed to be corrected for response biases. For example, if the older adults

were more likely than the young adults to respond with "disgust" when they were unsure of the

emotion, then the older adults might have higher disgust accuracy than young adults due to this

disgust bias. To check whether there were systematic biases that differed by age group for

endorsing the various response options, we conducted a 2 (Familiarity) x 6 (Emotion) x 2 (Age

Group) mixed-design ANOVA on the total responses submitted for each emotion type. The main

effect of age group on the number of responses across emotions was not significant, $F(1, 89) =$

3.47, $p = .07$, $\eta_p^2 = .04$. Additionally, the Familiarity x Age Group interaction was not

significant, $F(1, 89) = 2.20$, $p = .14$, $\eta_p^2 = .02$, and neither was the Emotion x Age Group

interaction, $F(3.96, 352.46) = 2.34$, $p = .056$, $\eta_p^2 = .03$, nor the Familiarity x Emotion x Age

Group interaction, $F(3.68, 327.40) = .22$, $p = .91$, $\eta_p^2 = .003$. Because we did not find evidence

for systematic age differences in response biases, we moved forward with data analysis with the

raw accuracy scores.

In order to reduce the amount of data loss due to failed emotion inductions (see above),

the *replace missing values function* in SPSS 22.0 was used to impute the mean accuracy

separately by age group for each of the 14 emotion judgments on the sample of participants who

returned for the second session (i.e., 47 young adults and 44 older adults). This resulted in 80

emotion judgments out of 1,274 (8%) being replaced by the age group mean. The number of

values replaced with the mean for each emotion judgment is presented in Table 5. Hit-rate

accuracy percentages and percentages of each error type are provided in Table 2 of the

supplementary materials separately for strangers and familiar partners. It is clear that this task

was much more difficult than the traditional emotion perception task: hit-rate accuracies were

much lower, with some hovering near chance (e.g., for anger recognition). One-sample t-tests

separately by age group revealed that young adults were not significantly different from chance

(14%) at identifying angry expressions in strangers or familiar partners, ps > .05. Older adults

were significantly worse than chance at identifying anger in their familiar partner, ps < .05. In

addition, older adults were not significantly different from chance at recognizing sadness in their

familiar partner; or anger, disgust, sadness, or surprise in the stranger condition, ps < .05.

To determine whether the familiarity of the target influenced age differences in emotion

perception accuracy, we conducted a 2 (Age Group) x 6 (Emotion) x 2 (Familiarity Condition)

mixed-design ANCOVA on the raw emotion perception accuracy scores. Because there was a

wide range for the duration between sessions one and two (0-9 months) and young and older

adults significantly differed on this variable, we included duration between sessions as a

covariate to control for possible differential history or maturation effects. There was a main

effect of Age Group, $F(1, 87) = 45.47$, $p < .001$, $\eta_p^2 = .34$, with young adults ($M = .62$, $SE = .03$) outperforming older adults ($M = .34$, $SE = .03$). There was also a main effect of Emotion, $F(5, 435) = 15.43$, $p < .001$, $\eta_p^2 = .15$. These main effects were qualified by an Emotion x Age Group interaction, $F(5, 435) = 3.53$, $p = .004$, $\eta_p^2 = .04$. Pairwise comparisons with Bonferroni adjustments revealed significant age differences for all emotions, with young adults exhibiting higher accuracy than older adults for all six emotions. Both groups were best at recognizing happy facial expressions and worst at identifying angry expressions. However, the range of accuracy differed for the two groups. Young adult accuracy ranged from 17% (anger) to 95% (happy), while older adults' accuracy scores only spanned 5% (anger) to 56% (happy).

There was also a significant Age Group x Familiarity interaction, $F(1, 87) = 4.77$, $p = .032$, $\eta_p^2 = .05$, such that the advantage of familiar partners over strangers was greater for older adults than young adults (see Figure 2). To decompose this interaction and examine the prediction that age differences would be attenuated in the familiarity condition relative to the stranger condition, we performed Emotion x Age Group mixed-design ANCOVAs for each condition separately (controlling for duration between sessions). As expected, in the stranger condition, young adults ($M = .63$, $SE = .03$) were more accurate than older adults ($M = .29$, $SE = .03$), $F(1, 88) = 50.64$, $p < .001$, $\eta_p^2 = .37$. However, also in the familiar condition, young adults ($M = .61$, $SE = .03$) were more accurate than older adults ($M = .38$, $SE = .04$), $F(1, 87) = 20.87$, $p < .001$, $\eta_p^2 = .19$. Thus, age differences were significant for both conditions, but the stranger condition had a larger effect size ($\eta_p^2 = .37$) than the familiar condition ($\eta_p^2 = .19$).

The main effect of Familiarity was not significant, $F(1, 87) = .36$, $p = .55$, $\eta_p^2 = .004$, nor was the Familiarity x Emotion interaction, $F(3.77, 327.85) = .82$, $p = .51$, $\eta_p^2 = .009$. The Familiarity x Emotion x Age Group interaction was also not significant, $F(3.77, 327.85) = 1.48$,

$p = .21$, $\eta_p^2 = .017$. Duration between sessions was not a significant covariate and it did not

interact with any of the other variables, ps $> .05$.[7]

Discussion

We set out to determine whether age differences in emotion perception accuracy could be

attenuated when participants care more about their performance (motivation) or know more

about the targets (familiarity) in order to better understand whether age-related differences in

emotion perception are biologically-bound or mutable. We found evidence that these factors can

influence the pattern of age effects. Experimenter-provided motivation eliminated age

differences and the familiarity of the target attenuated age differences.

Caring More: Accountability Instructions Eliminate Age Differences in Emotion Perception

The accountability instructions prior to the traditional emotion perception task did

eliminate age differences in emotion perception accuracy (Figure 1), suggesting that motivation

to care more about the task improved the performance of older adults. This is an important

finding because it speaks to whether age differences in emotion perception reflect motivational

shifts (Carstensen, 2006) or brain-based changes (Cacioppo, Bernston, Bechara, Tranel, &

Hawkley, 2011). Our findings are consistent with recent work by Zhang and colleagues (2013) in

which a closeness manipulation eliminated age differences in an emotion perception task. In the

present study, however, young adults' accuracy was actually hampered by the accountability

instructions; perhaps because the instructions changed the way in which young adults

approached the task. It may be that young adults in the no motivation condition relied on

intuitive, automatic processing of the faces. But when warned they would be made accountable

for explaining such choices in the motivation condition, their strategy changed to a more deliberate, analytical style – which led to worse performance. Emotional facial expressions can be identified automatically (Mather & Knight, 2006; Tracy & Robins, 2008). It may be that the natural strategy employed by young and older adults in the traditional emotion perception task differs such that young adults may use an automatic, "gut" response style while older adults might typically use a deliberate, effortful processing style. The accountability instructions may have compelled young adults to process the faces using more controlled processing, and older adults to effortfully engage even more cognitive resources in the task. This possibility is consistent with research on "thin slice" judgments, where manipulations to provide reasons for what are usually intuitive impressions impairs performance (Ambady, 2010). This suggests that age differences in emotion perception could be due to young and older adults naturally using different processing styles (automatic vs. effortful) when making emotion judgments and perhaps older adults should be encouraged to rely on more automatic processing to improve emotion perception accuracy.

Accountability instructions may also trigger a self-oriented focus, rather than an other-oriented focus (Ma-Kellams & Blascovich, 2013). For example, students promised a financial incentive for greater empathic accuracy performed worse than students who were not given a financial incentive (Ma-Kellams & Blascovich, 2013). At this point, these ideas are speculative and future replications of this manipulation and investigation into the underlying mechanisms are warranted.

Knowing More: Target Familiarity Attenuated Age Differences

In the dynamic emotion perception task the most striking result was the overall extremely low accuracy when videos of actual felt emotions were used as stimuli. Compared to the

traditional emotion perception task where accuracy ranged from 55% to 98%, accuracy in our familiar partner emotion perception task ranged from 5% to 95% with young adults not different from chance at recognizing anger in strangers or familiar partners. Older adults were actually worse than chance at recognizing anger in both types of partners. Clearly, the dynamic emotional stimuli of the familiar partner emotion perception task, which relied on the target expressing their felt emotions, provided a less clear signal than the static posed facial expressions in the traditional emotion perception task. The familiar partner task was therefore a harder task than the traditional task and overcame one of the challenges of traditional emotion perception studies, namely, ceiling effects (Isaacowitz et al., 2007). This seemed especially true for older adults, whose maximum average score was only 56% for happiness identification.

Nevertheless, age differences were attenuated in the familiar partner condition relative to the stranger condition. Although young adults were more accurate than older adults in both conditions, the smaller effect size for the age difference in the familiar condition, relative to the stranger condition, suggests that familiarity with the target brings the accuracy of young and older adults closer together.

Limitations and Future Directions

These findings are tempered by several limitations. The overall low accuracy in our dynamic emotion perception task is problematic because it suggests the task may have been too difficult. While we were successful at avoiding the ceiling effects that typically handicap this literature, we traded that problem for floor effects. Despite low overall accuracy, a similar pattern of accuracy to the traditional emotion perception task emerged, with happiness being the easiest emotion to recognize and anger being among the most difficult. The fact that the pattern of accuracy differences by discrete emotion is mimicked in our dynamic task helps to validate

this new type of task and situate it in the literature. Low accuracy for recognizing naturally

expressed emotions is consistent with the contention that the category boundaries of emotions do

not necessarily map on to the boundaries of functional emotion concepts (Barrett, 2006; Barrett,

Lindquist, & Gendron, 2007).

A second limitation was the age difference in the duration of the edited clips in the

dynamic emotion perception task; older adult target clips were significantly longer than young

adults'. This difference is confounded with age group because older adults only made emotion

judgments about older adult targets and young adults only made judgments about young adult

targets. Although we would have preferred to have equal durations of clips across age, given that

older adults still performed worse than young adults, and we assume longer clip durations are

related to *more* accurate judgments, we believe it is unlikely that this mean difference of 3.5

seconds can account for the observed pattern of results. Of course, this is an empirical question

that deserves further study. A third limitation is that the fear induction was not successful so we

could not include fear in the dynamic emotion perception accuracy task. Future work should use

a better fear induction technique so age differences in fear recognition of familiar partners can be

studied.

Future research should also investigate the effects of motivation and knowledge

longitudinally to determine whether age-related differences are due to developmental shifts or

cohort effects. Furthermore, it would be interesting to examine how motivation and familiarity

influence perception across generations (i.e., young adults interpreting the facial expressions of

older adults and vice versa).

Conclusion

The main contributions of this study were the simultaneous investigation of boundary conditions on age effects in emotion perception research paired with the introduction of a more ecologically valid dynamic emotion perception task. Understanding a social partner's emotion is likely determined based on a constellation of factors – situational context, physiology, history with partner, motivation, biases, goals, body, vocal, lexical cues, etc. Although aging may knock down the accuracy of a single cue (visual perception of facial emotion), older adults may be able to adapt to these changes in everyday life by reserving judgment and/or relying on other cues to determine the emotion of their social partners. However, in traditional emotion perception tasks, participants are forced to make a judgment based on the limited (and perhaps degraded, for older adults) information in the static photograph of a facial expression of a stranger.

Accurate emotion perception is likely related to better interpersonal functioning, and this is probably true at any age. Many of the elements present in everyday emotion-laden interactions are absent in traditional emotion perception tasks, thus potentially leading lab tasks to suggest emotion perception problems that older adults do not actually experience. The current findings hint at important differences in the type of processing that occurs when making emotion judgments in traditional emotion perception tasks versus situations where motivation or knowledge is increased.

More generally, these findings point to basic elements of emotion perception that may be missing in standard tasks with participants of any age. Across age groups, person-level variables such as motivation, as well as dyad-level variables such as familiarity, can be key drivers of emotion perception and performance. A key implication for social perception in general is thus that interpersonal aspects of the emotion perception task may be critical yet understudied.

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Footnotes

[1]The number of male and female participants is unbalanced because two same-sex couples participated in the study.

[2]One older adult female participated whose male partner did not participate.

[3]Three young adults were missing the second session experiment date. For these 3 young adults, we replaced the missing value for duration between sessions with the average duration between sessions for young adults ($M = 3.05$).

[4]We also analyzed these data using the unbiased hit rate (Wagner, 1993) to correct for possible biases in responses, especially given the age comparisons in this study (Isaacowitz et al., 2007). Because the pattern of results was remarkably similar to the analyses using the raw scores, we present the raw scores in the main text to facilitate interpretation and comparisons across studies. We computed the unbiased hit rate (hits squared divided by (the total number of items multiplied by the base rate of total responses submitted for that emotion across all trials)) and then normalized the proportions with an arcsine transformation. The main effect of age group was significant, $F(1, 102) = 9.36$, $p = .003$, $\eta_p^2 = .08$, with young adults ($M = .99$, $SE = .03$) exhibiting greater emotion perception accuracy overall than older adults ($M = .84$, $SE = .03$). There was also a significant main effect of Emotion, $F(4.34, 442.28) = 113.30$, $p < .001$, $\eta_p^2 = .53$, which was qualified by the predicted Age Group x Emotion interaction, $F(4.34, 442.28) = 3.17$, $p = .011$, $\eta_p^2 = .03$. Follow-up comparisons with Bonferroni adjustments revealed significant age differences, with young outperforming older adults, for accurate recognition of angry (YA: $M = .82$, $SE = .05$; OA: $M = .61$, $SE = .05$; $p = .004$), sad (YA: $M = .95$, $SE = .05$; OA: $M = .66$, $SE = .04$; $p < .001$), and neutral faces (YA: $M = 1.33$, $SE = .06$; OA: $M = 1.06$, $SE = .06$; $p = .001$). The predicted Age Group x Motivation Condition interaction was also

significant, $F(1, 102) = 9.36$, $p = .003$, $\eta_p^2 = .08$. Simple effects tests separately by motivation condition revealed significant age differences in the no motivation condition, $F(1, 51) = 19.77$, $p < .001$, $\eta_p^2 = .28$, with young adults ($M = 1.07$, $SE = .05$) outperforming older adults ($M = .79$, $SE = .04$). As predicted, age differences were not significant in the explicit motivation condition, $F(1, 51) = .39$, $p = .54$, $\eta_p^2 = .008$. However, this attenuation in age differences is due to both the *lower* accuracy of young adults and the *higher* accuracy of older adults in the explicit motivation condition compared to those in the no motivation condition, respectively. Follow-up tests within age groups confirmed that young adults' accuracy was significantly worse in the explicit motivation condition than the no motivation condition, $F(1, 49) = 6.86$, $p = .012$, $\eta_p^2 = .12$, whereas older adults' accuracy did not significantly differ by motivation condition, $F(1, 53) = 2.88$, $p = .096$, $\eta_p^2 = .05$. However, the means are in the expected direction-- and opposite to young adults-- with older adults exhibiting a trend for slightly better performance in the explicit motivation condition than the no motivation condition.

[5]One young adult female participant was missing data for the traditional emotion recognition task, reducing the young adults sample to 51 for these analyses.

[6]When assumptions about sphericity were violated, statistics applying the Greenhouse-Geisser correction are reported.

[7]We also checked whether duration of relationship might better account for differences in emotion perception accuracy than age. Relationship duration was significantly negatively correlated with emotion perception accuracy in the familiar, $r(86) = -.31$, $p < .001$, condition. When total emotion perception accuracy across all six emotions in the familiar partner condition was regressed on age group, age group was significant, $b = -.64$, $SE = .15$, $p < .001$. When duration of the relationship was added to the model as a predictor, age group remained a

significant predictor, b = -.77, SE = .33, p = .021, while relationship duration was not significant,

b = .001, SE = .001, p = .492. We also examined the correlations between relationship duration

and emotion perception accuracy separately by age group. None of the correlations were

significant, ps > .30.

Table 1
Descriptive Statistics and T-tests for Age Differences in Demographic, Perceptual, Cognitive, and Affective/Personality Variables

Variable Type		Max. or Best Score	Young Adults (N = 52)		Older Adults (N = 55)		df	t	p	d
			Mean	*SE*	*Mean*	*SE*	*df*	*t*	*p*	*d*
Demographic	Health	5	3.96	.12	3.54	.13	104	**2.36**	.02	.45
	Years Education	21	14.67	.31	16.48	.37	104	**3.74**	< .001	.73
Perceptual	Far Visual Acuity	20	26.42	1.89	43.33	3.64	104	**4.08**	< .001	.80
	Near Visual Acuity	20	21.25	.51	49.27	7.57	105	**3.59**	< .001	.70
	Contrast Sensitivity	2.25	1.63	.01	1.46	.02	105	**7.21**	< .001	1.35
	Facial Discrimination	27	19.20	.75	17.62	.69	102	1.54	.13	.30
Cognitive	Vocabulary	20	13.29	.28	14.80	.29	104	**3.77**	< .001	.73
Affective/	Depressive Symptoms	60	10.48	.85	7.63	.91	104	**2.28**	.03	.44
Social	Future Time Perspective	7	5.46	.11	3.52	.13	104	**11.51**	< .001	2.25

Note. Degrees of freedom differ due to missing data. Higher scores indicate better performance/greater endorsement unless otherwise indicated. Significant age differences are denoted by a bold *t*-statistic, $p < .05$. The visual acuity score is the denominator of the visual acuity ratio (20/20) representing the letter size in *M*-units that the participant can read at a distance of 20 meters. Thus, lower scores indicate *better* visual acuity. The Rosenbaum near vision acuity score also represents the denominator of the ratio for distance equivalents (20/20), with lower scores representing *better* near visual acuity. One older adult female was missing data for the Health, Education, Far Visual Acuity, Vocabulary, and Affective/Social Variables. Two older adult females and one young adult female were missing the Facial Discrimination data.

Table 2

Intraclass Correlation Coefficients (ICCs) for Inter-rater Reliability of Quality Codes for

Dynamic Emotional Videos

	Across Age [95% CI]	YA, 95% CI	OA, 95% CI
Anger	.65 [.51, .75]	.65 [.45, .79]	.64 [.43, .79]
Disgust	.65 [.52, .76]	.61 [.39, .76]	.69 [.49, .82]
Fear	.50 [.32, .64]	.49 [.24, .68]	.51 [.25, .70]
Happy	.75 [.64, .82]	.48 [.22, .67]	.80[.67, .89]
Sad	.58 [.42, .70]	.62 [.41, .77]	.52 [.27, .71]
Surprise	.62 [.47, .73]	.73 [.56, .84]	.51 [.25, .70]

Table 3

Average Quality Codes of Dynamic Facial Expression Videos

	Young Adults (*n* = 47)		Older Adults (*n* = 44)	
Emotion	*Mean*	*SD*	*Mean*	*SD*
Anger	2.04	.91	1.91	.89
Disgust	2.34	.89	2.30	.83
Fear	1.43	.83	1.43	.85
Happy	2.85	.36	2.70	.73
Sad	1.94	.92	2.02	.76
Surprise	2.09	.93	1.98	.93

Table 4

Descriptive Statistics and Pairwise Comparisons for Film Intensity Ratings by Age Group

	Young Adults *n* = 47	Older Adults *n* = 44			
	Mean (SD)	Mean (SD)	*Mean Difference*	*p*	*d*
Anger	4.50 (1.82)	6.65 (1.22)	2.15	< .001	1.39
Disgust	5.57 (2.06)	6.91 (1.25)	1.35	< .001	.79
Fear	3.85 (1.71)	4.89 (1.82)	1.04	.006	.59
Happy	5.54 (1.72)	6.45 (1.67)	.91	.012	.54
Sad	5.09 (1.90)	6.27 (1.47)	1.19	.001	.69
Surprise	4.91 (1.89)	6.10 (1.39)	1.18	.001	.72

Table 5

Number of Missing Values Replaced by the Age Group Mean for Emotion Judgment in the Familiar Partner (FP) and Stranger (ST) Dynamic Emotion Perception Task

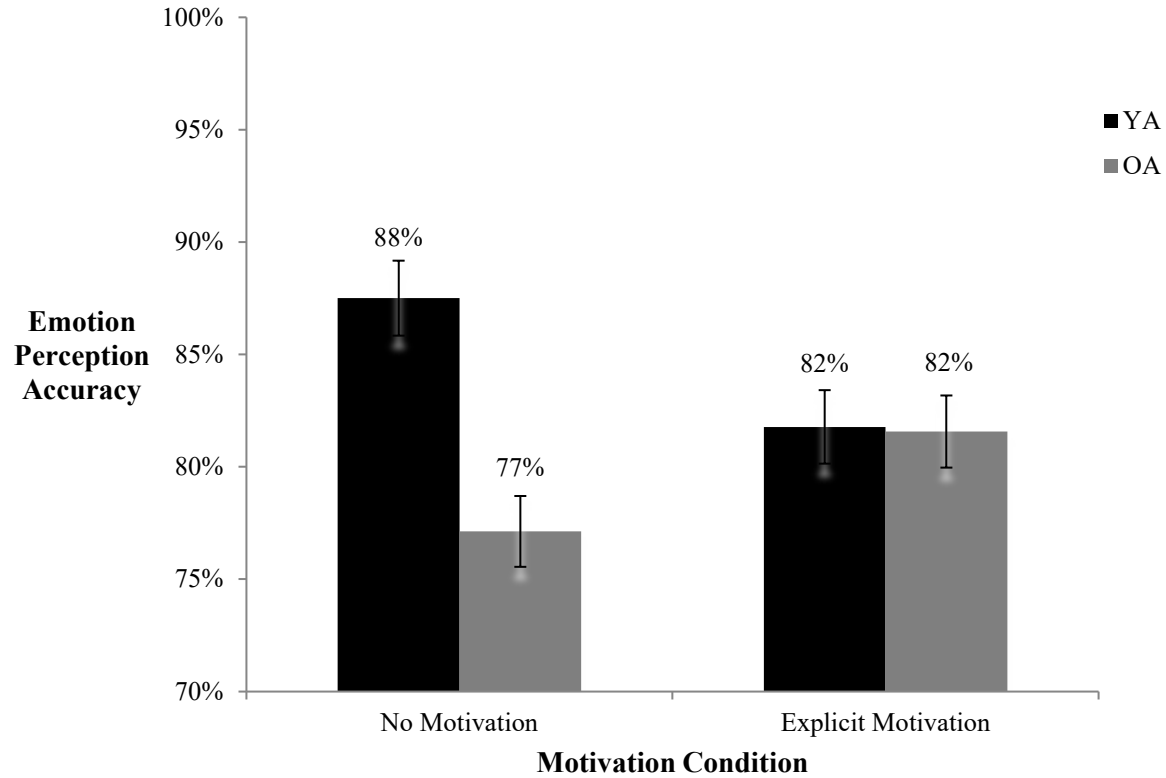|	Young Adults (*n* = 47)	Older Adults (*n* = 44)	Total
FP Anger	12	8	20
FP Disgust	3	10	13
FP Happy	1	5	6
FP Sad	1	1	2
FP Surprise	0	3	3
FP Neutral	0	1	1
ST Anger	11	6	17
ST Disgust	3	8	11
ST Happy	1	2	3
ST Sad	1	0	1
ST Surprise	1	2	3
ST Neutral	0	0	0
Total	34	46	80

Figure 1. Average emotion perception accuracy in the traditional emotion perception task as a function of motivation condition and age group.
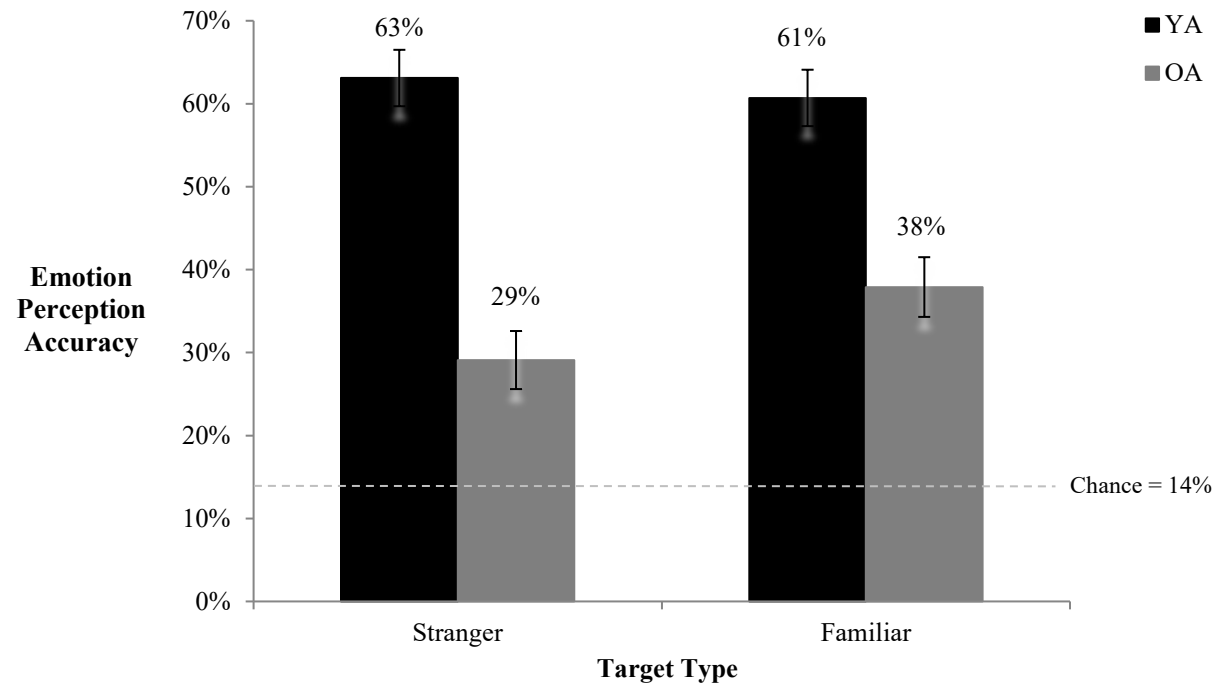
Bars are standard errors of the mean.

Figure 2. Average emotion perception accuracy for the dynamic emotion perception task as a function of familiarity and age group. Bars represent standard errors of the mean.

Supplementary Materials: Confusion Matrices for Emotion Responses

Table 1

Percentage of Response Types for Young Adults and Older Adults in the Traditional Emotion Perception Task by Motivation Condition

	Intended Expression													
	Anger		Disgust		Fear		Happy		Sad		Surprise		Neutral	
Response	YA	OA	YA	OA	YA	OA	YA	OA	YA	OA	YA	OA	YA	OA
No Motivation Condition														
Anger	**90%**	**67%**	21%	19%	1%	6%	--	--	--	3%	--	--	1%	--
Disgust	3%	20%	**79%**	**76%**	5%	11%	--	--	5%	4%	--	--	1%	1%
Fear	1%	2%	--	2%	**69%**	**55%**	1%	1%	8%	10%	3%	8%	1%	--
Happy	--	--	--	--	--	--	**97%**	**98%**	1%	1%	--	--	1%	2%
Sad	5%	4%	--	3%	1%	--	2%	--	**85%**	**67%**	--	--	1%	11%
Surprise	0%	1%	--	--	24%	28%	--	1%	--	4%	**97%**	**90%**	--	1%
Neutral	1%	6%	--	-	1%	--	1%	1%	1%	11%	--	2%	**95%**	**86%**
Explicit Motivation Condition														
Anger	**79%**	**77%**	28%	17%	2%	10%	--	--	1%	4%	--	--	--	1%
Disgust	10%	16%	**69%**	**83%**	8%	6%	--	--	6%	6%	--	--	1%	1%
Fear	2%	1%	1%	--	**48%**	**55%**	--	--	4%	10%	3%	2%	--	1%
Happy	--	--	--	--	--	1%	**97%**	**99%**	--	--	--	--	--	1%
Sad	7%	2%	1%	1%	4%	1%	1%	--	**85%**	**70%**	1%	1%	3%	7%
Surprise	--	1%	--	--	38%	27%	--	--	--	6%	**96%**	**98%**	--	--
Neutral	2%	4%	1%	--	--	--	2%	1%	3%	4%	1%	--	**97%**	**90%**

Note. Hit-rate accuracy percentages are in boldface. Totals may not sum to 100% due to rounding.