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Emotional Expressions Affect Perceptions of Younger and Older Adults' Everyday Competence

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Abstract

Facial expressions of emotion allow us to predict other people's intentions and behaviors. However, we often overextend these predictions to also make inferences about other people's underlying tendencies and dispositions. People with happy expressions are perceived to have stable positive traits whereas people with sad expressions are perceived to have stable negative traits. In these studies, we tested whether this extends to inferences about younger and older adults' abilities to complete fundamental activities of independent living, such as independently getting dressed, preparing food, and remembering directions. Our results showed that both younger and older adult targets were perceived to have greater everyday competence in completing activities of daily living (ADLs), instrumental activities of daily living (IADLs), and memory tasks when they displayed happy or neutral expressions rather than sad expressions. This pattern did not vary based upon either the target's gender or the participant's age. However, for the ADL and IADL ratings, the overgeneralization of emotions to ratings of everyday competence was greater for the older adult targets than for the younger adult targets. Drawing from the ecological approach to social perception, these results suggest that spontaneous trait inferences are most likely to occur when the age-trait association is strong. Given that perceptions of competence are also associated with behavioral ramifications, such as being subjected to patronizing behavior, having lower employment opportunities, and being seen as low in social status, our results also suggest that older adults whose facial expressions appear sad may be especially prone to these adverse outcomes.

Keywords: person perception, emotion, facial expression, everyday competence

Emotional Expressions Affect Perceptions of Younger and Older Adults' Everyday Competence

The English idiom "don't judge a book by its cover" cautions us not to assume another person's worth or abilities based only upon their outward appearance. However, research on the psychology of face perception reveals that we rarely heed this warning (see Zebrowitz, 2017). According to the ecological approach to social perception this is because physical appearance is often (but not always) a source of useful information (see Zebrowitz, 2011). When we first see another person we quickly appraise their age, race, gender, emotional expression, and health. Under certain conditions, these judgements tend to be remarkably accurate (see Todorov, Olivola, Dotsch, & Mende-Siedlecki, 2015), and this can help us solve evolutionary adaptive problems. For example, survival is more likely if you avoid people who appear angry.

However, according to the ecological approach, problems arise when we overgeneralize these feature-trait associations. For instance, even though it is adaptive to avoid someone who is angry, people often assume that momentary emotional expressions reflect dispositional traits. People who display transient happy expressions are perceived to have stable positive traits -- they are rated as friendly (Jones, DeBruine, Little, Conway, Feinberg, 2006), sociable and cheerful (Knutson, 1996; Reis, et al., 1990), and honest (Thornton, 1943). In contrast, people who display transient sad expressions are perceived to have stable negative traits -- they are rated as less sociable (Knutson, 1996; Montepare & Dobish, 2003) and more submissive (Hareli, Shomrat, & Hess, 2009). This has been described as a temporal extension of emotion such that "the perceiver regards a momentary characteristic of the person as if it were an enduring attribute" (Secord, 1958, p. 313).

Even though the vast majority of studies examining the overgeneralization of emotion to trait inferences have used younger adult (YA) target faces, people also make trait inferences

based upon the emotional expressions displayed by older adult (OA) target faces (Hess, Adams, Simard, Stevenson, & Kleck, 2012; Jones, Batres, Porcheron, Sweda, Morizot, & Russell, 2018; Otta, Abrosio, & Hoshino, 1996). However, it is unclear whether this extends to inferences about peoples' abilities to complete the basic activities of independent living, such as being able to independently bathe and go to the toilet, manage finances and medications, or remember to turn off the stove after cooking. In the current research, we examined whether facial expressions of emotion are overgeneralized as reflecting OAs' everyday competence in completing these types of tasks (Study 1) and whether the overgeneralization of emotion to ratings of everyday competence varies as a function of whether the target is a YA or OA (Study 2). In examining these questions, we also considered whether the overgeneralization of emotion to ratings of everyday competence depends upon the target's gender (male or female) or participant's age (YA or OA).

Study 1

Stereotypes about Competence

The term "everyday competence" refers to peoples' capacity to adequately perform the broad array of tasks necessary for caring themselves, managing their affairs, and living independently (see Willis, 1996; Diehl, 1998). Within the field of gerontology, this is often operationalized as abilities to complete basic activities of daily living (ADLs) such as bathing, dressing, and feeding (Katz, Ford, Moskowitz, Jackson, & Jaffee, 1963) and instrumental activities of daily living (IADLs), such as shopping, managing finances, and housekeeping (Lawton & Brody, 1969), both of which are reliant upon cognitive capabilities (see Diehl, 1998; Diehl, Willis, & Schaie, 1995; Schaie & Willis, 1999; Tomaszewski Farias, et al., 2009).

Although it is true that the prevalence of ADL and IADL difficulties increases with age, it is also true that the vast majority of people aged 60 to 80 have no functional impairments (Santoni, Angleman, Welmer, Mangialasche, Marengoni, & Fratiglioni, 2015). Despite this, OAs (as a whole) are often stereotyped as being low in competence. Compared to YAs, OAs are assumed to have difficulty completing everyday tasks (Löckenhoff, et al., 2009), to have poorer health and lower activity levels (e.g., Harwood, et al., 1996; Harwood, et al., 2001), to have more difficulties dealing with financial situations (Kornadt & Rothermund, 2011), and to be lower in competence-related traits, such as independence and intelligence (Cuddy & Fiske, 2002; Cuddy, Norton, & Fiske, 2005). There is also a tendency for people to assume that OAs' health problems (e.g., Stewart, Chipperfield, Perry, & Weiner, 2012) and memory failures (e.g., Erber, 1989; Erber, Szuchman, & Rothberg, 1990) are due to the to the aging process rather than environmental factors.

Although these ageist stereotypes are common, they are not equally applied in all situations or to all OAs (e.g., Casper, Rothermund, & Wentura, 2010; 2011; Diekman & Hirnisey, 2007; Kite & Johnson, 1988). For instance, within the superordinate category of 'OA', people have multiple sub-stereotypes about specific types of OAs who vary in competency levels (e.g., Brewer, Dull, & Lui, 1981; Hummert, 1990; Schmidt & Boland, 1986) -- whereas *Severely Impaired* OAs are perceived as incompetent, senile, and slow-thinking, *Perfect Grandparent* OAs are perceived as interesting, knowledgeable, intelligent, and wise (Hummert, Garstka, Shaner, & Strahm, 1994).

Perceptions of Competence as a Function of Emotional Expression

How do people decide whether a particular OA is associated with a positive or negative aging sub-stereotype? One factor that plays a role is the OA's facial expression of emotion. In a

study by Hummert, Garstka, and Shaner (1997), OA targets with happy expressions were more likely than OA targets with neutral expressions to be perceived in line with positive aging sub-stereotypes (e.g., as a perfect grandparent). Although Hummert et al. (1997) did not assess whether OAs' emotional expressions also affected perceptions of their competence, other studies with YA targets have established this link. YA targets with happy expressions (or whose neutral expressions objectively resemble happy expressions) are perceived as higher in competence than those with neutral expressions (Reis, et al., 1990; Zebrowitz, Kikuchi, & Fellous, 2010).

To our knowledge, no prior study has examined the overgeneralization of overt displays of emotion to perceptions of competence using OA targets. Furthermore, no prior study has examined whether emotional expressions affect ratings of *everyday* competence. Even though prior research suggests that we perceive people with sad expressions to be less intelligent and less skillful (i.e., be rated lower on the trait 'competence'), emotional expressions may not affect our perceptions that they can eat independently, prepare meals, or remember directions (i.e., be rated lower in everyday competence) as these are tasks that the vast majority of people under the age of 90 are capable of completing independently (Santoni, et al., 2015). To address this, in Study 1 we tested whether perceptions of OAs' everyday competence (in completing ADLs, IADLs, and memory tasks) is affected by emotional facial expressions (happy, neutral, or sad). We hypothesized that everyday competence would be perceived as highest for OA targets displaying happy expressions and lowest for OA targets displaying sad expressions.

We also evaluated whether the effects of happy and sad expressions on ratings of everyday competence are equivalent. On the one hand, negatively-valenced stimuli tend to elicit stronger reactions than positivity-valenced stimuli (e.g., Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001; Peeters & Czapinski, 1990), and some research using YA targets has shown that this

negativity bias extends to person perception. For example, although high-attractive targets are perceived to possess positive qualities and low-unattractive targets are perceived to possess negative qualities, these effects are not symmetrical. Medium-attractiveness faces are evaluated more similarly to high-attractiveness faces than they are low-attractiveness faces (Griffin & Langlois, 2006). Furthermore, other research has shown that this asymmetry favoring negative information is particularly pronounced when judging competence based upon negative and positive behaviors (Skowronski & Carlston, 1989), particularly amongst OA participants (Hess, Osowski, & Leclerc, 2005; Leclerc & Hess, 2007). Thus, it is possible that OA targets with neutral expressions will be evaluated more similarly to OAs with happy expressions than to OAs with sad expressions.

On the other hand, research has also shown that with the exception of happiness (Ebner, He, & Johnson, 2011; Ebner & Johnson, 2009), OAs' emotional expressions are difficult to decode (see Fölster, Hess, & Werheid, 2014) and OAs' neutral expressions are sometimes interpreted as conveying sadness (Malatesta & Izard, 1984). Because of this, OAs with neutral expressions may be evaluated more similarly to OAs with sad expressions than to OAs with happy expressions.

The Effects of Target Gender

The primary aim of Study 1 was to evaluate how emotional expressions affect ratings of OAs' everyday competence. However, as a secondary aim we tested whether this depends upon whether the target is a man or woman. There is a double-standard of aging such that physical age-related changes, such as gray hair and wrinkles, make men look distinguished and wise but make women look "old" (Deutsch, Zalenski, & Clark, 1986; Sontag, 1979). Perhaps because of this, women are perceived to be "old" at earlier ages than men (Kogan, 1979; see also Seccombe

& Ishii-Kuntz, 1991), and perceived attractiveness decreases with age at a steeper rate for women than for men (Deutsch, et al., 1986).

In Western cultures there are also gender display rules dictating that women should smile more than men, especially when they are being noticed or evaluated (see LaFrance & Hecht, 2000). In prior studies, when OA women complied with gender display rules by smiling, they were more likely to be associated with positive aging stereotypes relative to OA men (Hummert, 1994a), at least when they were young-old (Hummert et al., 1997). Furthermore, some studies have found that emotional expressions by adult women (of various ages) influence their trait ratings, but the emotional expressions by men do not always have similar effects (Hack, 2014). Based upon this, we hypothesized that the effects of emotional expression on perceived everyday competence would be particularly pronounced when the target was an OA woman rather than an OA man.

The Effects of Participant Age

Finally, we also considered whether the effects of emotional expressions on perceived everyday competence would vary based upon whether the participant was a YA or OA. OAs are often more favorable in their trait impressions of others (e.g., Ruffman, Sullivan, & Edge, 2006; Shuster, Mikels, & Camras, 2017; Zebrowitz, Franklin, Hillman, & Boc, 2013). This finding is consistent with other studies documenting "positivity effects" such that OAs attend less to negative information and/or attend more to positive information (see Reed & Carstensen, 2012). Based on this, we expected to observe a main effect of participant age, such that OA participants would provide more positive ratings of the targets' everyday competence.

In addition to predicting a main effect of participant age, we also tested for a possible interaction between participant age and target facial expression. Previous research has suggested

that OAs are more sensitive to trait-diagnostic behavioral cues when making social inferences (e.g., Hess & Auman, 2001; Leclerc & Hess, 2007), and weigh positive behaviors more heavily than negative behaviors when judging competence (Hess, Osowski, & Leclerc., 2005). If a target's facial expression of emotion is also considered a diagnostic cue of competence, it is possible that this will exert a larger impact on the ratings given by the OA, as compared to the YA, participants.

Study 1 Overview

In summary, Study 1 examined whether emotional expressions (happy, neutral, or sad) by OA men and OA women affect how YA and OA participants rated their everyday competence in completing ADLs, IADLs, and memory tasks. We hypothesized that OA targets would be perceived as highest in everyday competence when displaying a happy expression and lowest in everyday competence when displaying a sad expression. We also evaluated whether happy and sad expressions have asymmetrical effects on perceived everyday competence and whether the overgeneralization of emotion to ratings of everyday competence varies based upon target gender or participant age.

Method

Participants. Participants were residents of the United States and were recruited online from Amazon Mechanical Turk via the Turk Prime platform (www.TurkPrime.com; Litman, Robinson, & Abberbock, 2017). A total of 371 individuals participated in the study. Of these, we removed 8 respondents who did not fully complete the questionnaires related to our dependent variables, 2 respondents who reported an incompatible birth year and age, and 22 respondents from duplicated IP address. This left a final sample of 339 participants (45.1% men, 52.8% women, 1.8% genderqueer/ non-binary, 0.3% transgender, 0.3% declined to state). Of this

sample, there were 179 YAs (*M* age = 22.44, *SD* = 1.91, range: 18-29) and 160 OAs (n = 160, *M* age = 62.86, *SD* = 2.80, range: 59-70). Participants received $2 for completing the study.

Participants varied in educational attainment: 0.6% had not graduated high school, 10.6% had a high school diploma or GED, 35.7% had completed some college, 8.8% had a 2-year college degree, 31.9% had a 4-year college degree, 9.1% had a Master's degree, and 3.3% had a doctoral or professional degree. Participants self-reported their racial and ethnic identities as follows: 72.6% White, 9.7% Black, 7.1% Hispanic/ Latino, 8.6% Asian, 1.5% Native American/ Alaska native, 0.3% 'Other', and 0.3% declined to state.

Stimuli. Pictures of OA faces were taken from the Lifespan Database of Adult Emotional Facial Stimuli (Ebner, Riediger, & Lindenberger, 2010). We selected color photographs of three Caucasian OA men (Person ID numbers 065, 151, and 172; age range: 73-77 years, *M* age = 74.67) and three Caucasian OA women (Person ID numbers 005, 112, and 120; age range: 73-48, *M* age = 75.33). For each target, we selected a photograph with a happy expression, neutral expression, and sad expression. A total of 18 photographs (6 individuals X 3 expressions) were used (Figure 1).

Design. A 2 (Participant Age: YA vs. OA) X 2 (Target Gender: Male vs. Female) X 3 (Target Expression: Happy vs. Neutral vs. Sad) design was used. As recommended by Kogan (1979), we used a between-subject design in which each participant made ratings about only a single OA target. This eliminated the possibility that differences would emerge based upon relative comparisons amongst the target stimuli, due to comparisons being brought to mind that may not otherwise have been salient.

Procedure and measures. All procedures were approved by the Institutional Review Board (IRB) at San Francisco State University and analyses of this data were also approved by the IRB at Georgia State University.

At the outset of the study, the computer program randomly assigned participants to see one of the 18 photographs. To acclimate them to the rating process, they first guessed the age of the OA in the photograph. They then rated the OA target's competence in three domains. The target's photograph was always visible while answering these questions. Memory competence was assessed using the Other Memory Efficacy Scale (OMES; Berry Williams, Thomas, & Blair, 2015). Using a 1 (*extremely unlikely*) to 5 (*extremely likely*) scale, participants rated the likelihood that the target OA was able to perform 10 different memory tasks, some of which were relevant to independent functioning, such as remembering to turn off the stove and remembering the shortcut home from the grocery store (Cronbach's alpha = .90). Participants next rated the target OA's ability to complete Instrumental Activities of Daily Living (IADLs; Galasko et al., 1997) and basic Activities of Daily Living (ADLs; Katz, 1983). There were 8 IADLs assessed (the ability to use the telephone, shop, prepare food, do housework, do laundry, use transportation, be responsible for their own medication, and handle their finances) and 6 ADLs assessed (the ability to bathe, get dressed, use the toilet, transfer themselves, control urination and bowel movements, and feed themselves). For each, participants were given a short explanation of the ability and indicated on a 1 (*extremely unlikely*) to 6 (*extremely likely*) scale the likelihood that the OA target could accomplish the task independently. The observed Cronbach's alpha was .96 for the IADL scale and .94 for the ADL scale. This was followed by other ratings about the target (e.g., the extent to which they were 'flourishing'; see Keyes, 2007). These were included so that each target was rated on a variety of traits that varied in valence, but

these additional variables will not be discussed. After this, we also assessed participant's views and knowledge about aging and their experiences with OAs[1], and collected participant's demographic information.

Results and Discussion

All analyses were conducted using SPSS (version 25) and the alpha level for all statistical tests was set to .05.

Exploratory data analysis. We examined boxplots for the between-groups predictors of target expression and target gender on each dependent variable. Based upon this, 15 extreme outliers were identified (i.e., participants with a response more than three times greater than the interquartile range) and these cases were excluded from subsequent analyses. We then used exploratory data analysis (Tukey, 1977) to examine the correlations amongst our dependent variables (IADL, ADL, and memory competence) to ensure the appropriateness of a Multivariate Analysis of Variance (MANOVA) to analyze these outcomes (cf. Tabachnick & Fiddell, 2013). There were moderate-to-large significant correlations amongst these measures within each of the three emotional expression conditions (all *r*s ranging from .373 to .806; see Table 1), and a Box's *M* test showed that the covariance matrices were approximately equal ($p = .190$). Table 2 shows the means and standard deviations on each measure as a function of target expression and target gender.

Effects of emotional expression on perceived competence. We next conducted a 2 (Participant Age) X 2 (Target Gender) X 3 (Target Expression) MANOVA with scores on our three measures of competence as the dependent variables and Roy-Bargmann stepdown *F* tests as post-hoc tests. Dependent variables were ordered as follows: IADL competence, ADL competence, memory competence. Within this analysis, there was a multivariate main effect of

target expression, $F(6, 620) = 2.89$, $p = .009$, Wilk's $\Lambda = .946$. Step-down tests showed that this was significant for perceived IADL capabilities, $F(2, 321) = 3.93$, $p = .021$, and for perceived memory abilities, $F(2, 319) = 3.44$, $p = .033$, but was not statistically significant for perceived ADL capabilities, $F(2, 320) = 0.86$, $p = .425$.

To better understand whether these differences reflected increases in perceived competence when the OA targets had happy expressions or decreases in perceived competence when the OA targets had sad expressions, we next conducted Dunn-Bonferroni post-hoc analyses. Within the domain of memory abilities, OA targets with happy and neutral expressions were rated similarly ($p = .705$). However, OA targets with sad expressions were rated as having significantly less memory competence than targets with happy ($p = .001$) or neutral ($p = .025$) expressions. In contrast, within the domain of IADL competence, the only significant difference was between OA targets with happy and sad expressions ($p = .013$). OA targets with neutral expressions did not significantly differ in perceived IADL competence from those with happy or sad expressions. Although emotional expression did not significantly affect perceived ADL competence, the numerical pattern was similar. OA targets with sad expressions received numerically lower ratings of ADL competence than OA targets with happy or neutral ratings, who were numerically rated more similarly.

The effects of target gender. We next examined whether this pattern varied as a function of target gender. Contrary to our expectations, there was neither a statistically significant multivariate main effect of target gender, $F(3, 310) = 1.76$, $p = .155$, Wilk's $\Lambda = .983$, nor a significant multivariate interaction between target gender and emotional expression, $F(6, 620) = 1.22$, $p = .293$, Wilk's $\Lambda = .977$. Although this is inconsistent with prior studies suggesting that the overgeneralization of emotion to trait ratings is significantly greater for

women than for men (e.g., Hack, 2014; Hummert et al., 1997), it is worth noting that the numerical pattern was consistent with these prior reports. In this study the effects of emotional expression on ratings of everyday competence were always numerically larger when the target was an OA woman rather than an OA man (see Table 2).

The effects of participant age. Finally, we also examined the effects of participant age. Within our primary analysis, there as a significant multivariate effect of participant age, $F(3, 310) = 15.56$, $p < .001$, Wilk's $\Lambda = .869$. Consistent with our expectations, step-down tests showed that OA participants rated the targets higher on each measure than did YA participants [IADLs: $F(1, 312) = 18.06$, $p < .001$; ADLs: $F(1, 311) = 15.84$, $p < .001$; Memory: $F(1, 310) = 10.82$, $p = .001$]. However, there was no significant difference between the YA and OA participants in how their ratings were affected by the targets' emotional expressions. That is, there was no multivariate interaction between participant age and target emotion, $F(6, 650) = 1.17$, $p = .320$, Wilk's $\Lambda = .979$.

Study 1 summary and discussion. In Study 1, OA targets with happy expressions were generally perceived to have greater everyday competence than OA targets with sad expressions. However, these facial expression effects were asymmetrical (see also Griffin & Langlois, 2006). The perceived competence of OA targets with neutral expressions was always numerically more similar to that of OA targets with happy expressions than to that of OA targets with sad expressions.

These findings extend prior reports showing that facial expressions of emotion affect perceptions of OAs' traits (e.g., Hess, et al., 2012; Jones, et al., 2018; Otta, et al., 1996) by showing that they also affect perceptions of OAs' everyday competence. This is important, as perceptions of competence can have behavioral ramifications. Research has shown that

stereotypes about age-declines in competence are associated with patronizing behavior towards OAs (Ryan, Hummert, & Boich, 1995), with reduced employment participation amongst OAs (Bowen & Skirbekk, 2013), with perceived lower social status (e.g., Fiske, Cuddy, Glick, & Xu, 2002; Robertson & Weiss, 2017), and can compromise the believability of OAs' memory reports (Kwong See, Hoffman, & Wood, 2001). The results of Study 1 suggest that these adverse outcomes may be especially likely for OAs whose facial expressions are perceived to be sad. However, a key limitation of Study 1 is that we included only OA targets. It is therefore unclear whether or not similar effects would also occur for YA targets. The primary goal of Study 2 was to address this question.

In doing so, we again considered the role of participant age. In Study 1 we found a significant effect of participant age on competence ratings. As in prior studies (e.g., Ruffman et al., 2006; Shuster et al., 2017; Zebrowitz et al., 2013), OA participants were more favorable in their ratings than were YA participants. However, in contrast to research suggesting that OAs are more sensitive to trait-diagnostic behavioral cues when judging competence (Hess et al., 2005), in Study 1 the overgeneralization of emotion to competence ratings did not vary by participant age. It is possible that this was because our "diagnostic" cue was a facial expression rather than an observable behavior. Alternately, it is also possible that this null effect was because the facial expressions were highly salient features of our stimuli. Research has shown that the age-difference in sensitivity to trait-relevant features is reduced as the salience of those features increases (Betz, Gannon, & Skowronski, 1992; Leclerc & Hess, 2004; Skowronski & Carlston, 1992).

It is also possible that the predicted age differences in the overgeneralization of emotion to competence ratings would have emerged had we used YA targets. In a prior study by

Zebrowitz and Franklin (2014) both YA and OA participants exhibited an attractiveness halo effect by rating attractive targets as higher in competence and health, and lower in untrustworthiness and hostility. For the competence and health ratings, this effect was qualified by participant age and target age such that the attractiveness halo effect was sometimes greater when the participant and target were from the same age group. No similar pattern emerged for the untrustworthiness and hostility ratings. Thus, there was sometimes -- but not always -- an 'own-age' accentuation of stereotypes in person perception. In Study 2 we tested for a similar own-age accentuation effect by including both YA and OA participants, as well as both YA and OA target faces.

Study 2

Perceptions of Competence as a Function of Emotional Expression and Target Age

Although prior research has shown that the overgeneralization of overt emotional expressions to trait ratings occurs for both YA and OA targets, there is a paucity of research examining whether the magnitude of this effect varies as a function of target age. To our knowledge only three studies have examined this question. In the first study, Otta, Abrosio, and Hoshino (1996) recruited YA participants and showed them YA, middle-aged, and OA target faces, which were posed to have neutral or happy expressions. They found that happy expressions were associated with higher ratings of kindness and happiness. However, this did not significantly vary based upon the target's age.

In contrast to this, two subsequent studies suggested the overgeneralization of emotion to trait ratings may vary based upon target age. First, in a study by Hess, Adams, Simard, Stevenson, and Kleck (2012) YA participants were shown YA and OA target faces, which were neutral or digitally-edited to display happiness, anger, or sadness. Participants rated each target's

dominance and sociability. Results showed interactions between target age and target expression for both ratings. For dominance ratings, this reflected differences in how people ordered the relative dominance of YA and OA targets as a function of their emotional expressions [YA targets: happy > angry > neutral > sad; OA targets: happy > angry > neutral = sad]. In contrast, for sociability ratings, participants were consistent in how they ordered the relative sociability of YA and OA targets as a function of their emotional expressions (happy > neutral > sad > angry). However, the YA targets were rated as more sociable than OA targets when they displayed happy, neutral, and sad expressions, but not when they displayed angry expressions. As a result, the sociability ratings were more variable for the YA targets (i.e., a larger difference between the ratings of the happy versus angry faces). This was interpreted as evidence that emotional expressions have a greater effect on the trait ratings of YAs relative to OAs. However, this conclusion is tenuous given that the effect was primarily driven by how participants rated the sociability of angry faces and no similar pattern emerged in the dominance ratings.

Finally, in a recent study by Jones, Batres, Porcheron, Sweda, Morizot, and Russell (2018; Study 2) the opposite pattern emerged such that the overgeneralization of emotion was greater for OA targets than for YA targets. In this study, YA participants were shown YA, middle-aged, and OA target faces, which were posed to have neutral or happy expressions. Participants rated each target's health. Results showed a marginally-significant (p = .05) interaction between target age and target expression. Participants rated targets with happy expressions as having better health, but the magnitude of this effect increased as the age of the target increased.

Thus, results from prior studies have been inconsistent in regards to whether the overgeneralization of emotion to trait ratings varies with target age. The goal of Study 2 was to

further examine this issue. To do so, we examined whether emotional expressions (happy, neutral, sad) affect ratings of YAs' and OAs' everyday competence. Given that competence is stereotyped to decline with age (e.g., Cuddy & Fiske, 2002; Cuddy, et al., 2005) and given that spontaneous trait inferences are more likely to occur when they are consistent with a stereotype (Ramos, Garcia-Marques, Hamilton, Ferreira, Van Acker, 2012), we hypothesized that the overgeneralization of emotion to ratings of everyday competence would be greater for OA than for YA targets.

In testing this, we also considered whether potential target age differences in the overgeneralization of emotion could be explained by differences in perceptions of physical attractiveness. Previous research has shown a *'what-is-beautiful-is-good'* effect, in which attractive targets are rated as having more positive traits than unattractive targets (Dion, Berscheid, & Walster, 1972), and the strength of this association is moderate when considering intellectual competence (see Eagly, Ashmore, Makhijani, & Longo, 1991). Previous research has also shown that YAs are perceived as more attractive than OAs (e.g., Ebner, 2008), and that faces displaying happy expressions are rated as more attractive than faces that are not (e.g., Golle, Mast, & Lobmaier, 2014). Based upon these studies it is reasonable to expect main effects of both target age and target expression on perceived attractiveness. We tested whether this in turn moderated the effects of emotional expression on perceived competence, for either the YA or OA targets.

Study 2 Overview

In summary, Study 2 examined whether the effects of emotional expressions (happy, neutral, or sad) on ratings of everyday competence varies based upon target age, target gender, and participant age. We expected to replicate the Study 1 findings that targets would be

perceived as highest in everyday competence when displaying a happy expression and lowest in everyday competence when displaying a sad expression, and that these effects would be asymmetrical such that targets with neutral expressions would be rated more similarly to targets with happy expressions than to targets with sad expressions. Although we expected this pattern to emerge regardless of target age, novel to Study 2, we also hypothesized that these effects would be greater for OA targets than for YA targets, and tested the role of perceived attractiveness in contributing to this.

As in Study 1, we also evaluated whether the overgeneralization of emotion to perceptions of competence varies based upon target gender (male or female). Based upon both prior findings (e.g., Hack, 2014; Hummet, 1994a; Hummert, et al., 1997) and also the numeric patterns in Study 1, we hypothesized that the overgeneralization of emotion to perceptions of competence may be greater for female than male targets.

Finally, we also evaluated whether participant age affected perceptions of competence. As in Study 1, we expected OA participants to rate the targets as higher in everyday competence. Based upon the findings reported by Zebrowitz and Franklin (2014), we also evaluated for an 'own-age' accentuation effect. We hypothesized that OA participants' ratings would be more affected by the emotional expressions of OA targets than YA targets. Conversely, we expected YA participants' ratings will be more affected by the emotional expressions of YA targets than OA targets. Inclusion of both YA and OA participants in this study is particularly noteworthy; all three prior studies examining whether the overgeneralization of emotion to trait ratings varies as a function of target age have included only YA participants (Hess et al., 2012; Jones, et al., 2018; Otto, et al., 1996).

In testing these hypotheses, we also planned to address two additional limitations of Study 1. First, within Study 1 we did not include attentional checks to ensure that participants were not selecting responses at random. To address this, in Study 2 we also added attentional awareness questions (see Procedure), and excluded responses from participants who incorrectly answered these questions. Additionally, in Study 1 all the face stimuli were of European-American /White OAs but participants came from a variety of racial and ethnic backgrounds. Given that people judge traits of people from other racial groups differently than they do traits of people from their own racial group (e.g., Zebrowitz, Bronstad, & Lee, 2007), in Study 2 we also planned to exclude responses from participants who did not self-identify as European-American /White.

Method

The data collection and analytic plan for this study were preregistered on Open Science Framework (https://osf.io/2ruaw/?view_only=523d8574c71d43029476a3a6849c18ea).

Participants. Participants were recruited online using a Turk Prime panel. Participants were residents of the United States, and were recruited from a variety of online sources (e.g., www.swagbucks.com, www.surveyjunkie.com, www.theoremreach.com). Unlike participants recruited from Amazon Mechanical Turk, these participants had minimal prior exposure to psychological studies and were less familiar with psychological manipulations. Compensation varied based upon the recruitment source. It included donations to a charity of the participants' choosing, gift card reward points, or monetary payments up to $2. This choice of compensation method was managed by Turk Prime and is not known to the researchers.

As outlined in our pre-registration plan, an a priori power analysis conducted in G*Power 3.1 (Faul, Erdfelder, Lang, & Buchner, 2007) suggested that a sample size of 828 individuals

would provide 80% power to see the expected omnibus multivariate effect of emotional expression on perceptions of everyday competence. To account for our planned exclusions, we pre-registered a plan to enroll at least 960 participants. We exceeded this, enrolling 1,005 participants within our specified age ranges (18-35 or 59 or older). However, there was a higher number of participants than expected that met our exclusion criteria: 121 failed the attentional awareness question (see Procedure), 13 did not provide a compatible birth year and age, and 174 did not self-identify as only European-American /White. Of the remaining participants, an additional 54 did not fully complete the questionnaires related to our dependent variables. Although not specified in our pre-registration plan, we also excluded an additional four participants whose study completion times indicated poor response quality and one participant whose end-of-study comments suggested poor response quality. This left a final sample of 638 participants. An additional power analysis conducted in G*Power 3.1 using the observed effect size from Study 1 (f = 0.1788) and specifying a β/α ratio of 4 with 12 groups, showed that this final sample size provided over 96% implied power to detect the expected effects of emotional expression on competence ratings within ANOVA analyses.

Of the 638 European /White participants (27.3% men, 73.2% women, 0.5% genderqueer or non-binary), there were 267 YAs (M age = 28.24, SD = 4.73, range: 18-35) and 371 OAs (M age = 66.24, SD = 5.48, range: 59-86). These participants had a broad range of educational attainment: 1.1% had not graduated high school, 19% had a high school diploma or GED, 19.6% had completed some college, 13.5% had a 2-year college degree, 30.1% had a 4-year college degree, 12.4% had a Master's degree, 4.3% had a doctoral or professional degree, and 0.2% did not state.

Stimuli. To ensure the Study 1 results were not limited to the specific face stimuli used, a new set of faces were used in Study 2. These were again taken from the Lifespan Database of Adult Emotional Facial Stimuli (Ebner, et al., 2010). For this study we selected photographs of three OA Caucasian men (Person ID numbers 046, 141, and 176) three OA Caucasian women (Person ID numbers 012, 044, and 100), three YA Caucasian men (Person ID numbers 037, 057, and 089), and three YA Caucasian women (Person ID numbers 034, 115, and 132). The OA targets ranged in age from 70 to 74 years (M = 72.17). The YA targets ranged in age from 20 to 23 years (M = 22.00). For each target individual, we selected a photograph with a happy expression, a neutral expression, and a sad expression. Although a total of 36 photographs (12 individuals X 3 expressions) were used, each participant saw only one photograph.

Design. A 2 (Participant Age: YA vs. OA) X 2 (Target Age: YA vs. OA) X 2 (Target Gender: Male vs. Female) X 3 (Target Expression: Happy vs. Neutral vs. Sad) design was used. All factors were manipulated between subjects.

Procedure and measures. The procedure and measures were identical to Study 1 with the following exceptions. First, we changed when participants rated the target's age. In Study 1, to introduce participants to the rating task we first asked them to evaluate the target's age. However, making age salient may have brought to mind ageist stereotypes and affected the subsequent ratings. Because of this, in Study 2 we asked participants to rate the target's age after rating the target's competence. Second, we edited one question from the Other Memory Efficacy Scale (OMES; Berry, et al, 2015) from 'Remembers her grandchildren's birthdays' to 'Remembers important birthday' in order to make it applicable to both YA and OA targets. Third, after completing the competency ratings, participants also rated the physical attractiveness of the target. Finally, we added an attentional check by embedding the statement "I will show

that I am reading the questions by choosing 'strongly agree' for this question" into the Anxiety about Aging Scale (Lasher & Faulkender, 1993). After completing this study, participants completed two unrelated surveys, which will not be discussed further here.

Results and Discussion

All analyses were pre-registered unless otherwise noted. Analyses were conducted using SPSS (version 25) and the alpha level for all statistical tests was set to .05.

Exploratory data analysis. Within each of the three emotional expression conditions, we used boxplots to test for outliers based upon target age or target gender for each competence measure. Based upon this, 21 extreme outliers were identified (i.e., responses more than three times greater than the interquartile range) and these cases were excluded from subsequent analyses. We next used exploratory data analysis to evaluate the correlations amongst our dependent variables (IADLs, ADLs, and memory competence) to determine the appropriateness of a MANOVA. This was performed separately within each of the target expression and target age conditions. As in Study 1, when the target was an OA there were significant correlations amongst our three competence measures. However, when the target was a YA there were no significant correlations between perceived ADL and memory competence and correlations between the three measures were weaker for YA targets (Table 1). A Box's *M* test also showed significant inequality in the covariance matrices based upon target age ($p < .001$), which was a meaningful violation of assumptions (with Cohen's $w = .349$ as the effect size for the *M* statistic). Because of this, we analyzed perceptions of IADL, ADL, and memory competence using separate univariate ANOVAs rather than a MANOVA, which can be recommended when there are weak correlations between dependent variables (cf. Tabachnick & Fidell, 2013). Table

4 shows the means and standard deviations on each measure as a function of target age, target gender, and target expression.

IADL competence. Within a 2 (Participant Age) X 2 (Target Age) X 2 (Target Gender) X 3 (Target Expression) ANOVA on IADL competence ratings there was a significant main effect of target expression, $F(2, 593) = 73.11$, $p < .001$, and target age, $F(1, 593) = 22.28$, $p < .001$. However, these main effects were qualified by a significant interaction between target expression and target age, $F(2, 593) = 3.07$, $p = .047$.

Although not specified in our preregistration, we next conducted Dunn- Bonferroni post-hoc analyses to determine whether this reflected increases in IADL ratings when the targets had happy expressions or decreases in IADL ratings when the targets had sad expressions. Results showed that for both YA and OA targets, those with happy and neutral expressions were rated similarly ($p = .066$ and $p = .063$ respectively). In contrast, targets with sad expressions were rated as less able to independently complete IADLs as compared to targets with neutral or happy expressions (all ps $< .001$ for both YA and OA targets). However, as can be seen in Panel A of Figure 2, sad expressions had a larger adverse influence on OA targets' than on YA targets' perceived IADL competence.

As in Study 1, the overgeneralization of emotion to ratings of everyday competence did not vary based upon target gender. Within a 2 (Participant Age) X 2 (Target Age) X 2 (Target Gender) X 3 (Target Expression) ANOVA on IADL competence ratings there was no significant interaction between target gender and target expression, $F(2, 593) = 0.99$, $p = .372$, or between target gender, target age, and target expression, $F(2, 593) = 0.93$, $p = .397$.[2]

Although our preregistration plan did not specify interpretation of effects involving participant age, we also found a main effect of participant age, $F(1, 593) = 22.28$, $p < .001$. As in

Study 1 this reflected the fact that OA participants rated the targets as having greater IADL competence than did YA participants. This did not depend upon the targets' age or gender; there was no significant interaction between participant age and target age, $F(1, 593) = 2.07$, $p = .151$, between participant age and target expression, $F(2,593) = 0.43$, $p = .654$, or between participant age, target age, and target expression, $F(2, 593) = 0.54$, $p = .584$. Thus, there was no evidence for an own-age accentuation effect.

ADL competence. The pattern of results for the ADL competence ratings was very similar to that of the IADL competence ratings. Within a 2 (Participant Age) X 2 (Target Age) X 2 (Target Gender) X 3 (Target Expression) ANOVA on ADL competence ratings there was a significant main effect of target expression, $F(2, 593) = 53.19$, $p < .001$, and target age, $F(1, 593) = 84.68$, $p < .001$. However, these main effects were qualified by a significant interaction between target expression and target age, $F(2, 593) = 6.27$, $p = .002$.

We next conducted Dunn- Bonferroni post-hoc analyses, which were not specified in our preregistration plan. These showed asymmetrical effects in how happy and sad expressions affected ratings of everyday competence. As in the IADL analyses, targets with happy and neutral expressions were rated similarly in ADL competence ($p = .99$ for YA targets and $p = .460$ for OA targets). In contrast, targets with sad expressions were rated less able to independently complete ADLs compared to targets with neutral or happy expressions (all ps $< .001$ for both YA and OA targets). This adverse effect was greater for the OA targets than for the YA targets (see Panel B of Figure 2).

We next examined the roles of target gender and participant age. Within the aforementioned 2 (Participant Age) X 2 (Target Age) X 2 (Target Gender) X 3 (Target

Expression) ANOVA on ADL competence ratings there were no significant effects involving target gender (all p's $\geq .056$).

Although our preregistration did not specify interpretation of effects involving participant age, we again observed a main effect of participant age, $F(1, 593) = 7.23$, $p = .007$, such that OA participants rated the targets as having greater ADL competence than did the YA participants. However, there was no evidence of an own-age accentuation effect. There was no significant interaction between participant age and target age, $F(1, 593) = 3.35$, $p = .068$, between participant age and target expression, $F(2,593) = 1.71$, $p = .182$, or between participant age, target age, and target expression, $F(2, 593) = 0.13$, $p = .881$.

Memory competence. The pattern of results was different when examining the memory competence ratings. Within a 2 (Participant Age) X 2 (Target Age) X 2 (Target Gender) X 3 (Target Expression) ANOVA on memory competence ratings there was a significant main effect of target expression, $F(1, 593) = 116.36$, $p < .001$. However, in contrast to analyses of the IADL and ADL ratings, there was no significant interaction between target expression and target age, $F(2, 593) = 0.13$, $p = .875$. As can be seen in Panel C of Figure 2, emotional expression had remarkably similar effects on how people perceived YA targets' and OA targets' memory abilities.

Follow-up Dunn- Bonferroni post-hoc analyses (not specified in our preregistration) showed that targets with happy expressions were rated as having better memory abilities than targets with neutral expressions. This pattern was numerically present for the YA targets ($p = .070$) but statistically significant for OA targets ($p = .010$). Targets with neutral expressions were in turn rated as having better memory abilities than targets with sad expressions, and this effect was significant for both the YA targets ($p < .001$) and for the OA targets ($p < .001$). Thus,

emotional expressions affected perceived memory competence and the detrimental effects of sad expressions were larger than the beneficial effects of happy expressions.

The effect of target expression on perceived memory competence also did not vary based upon target gender. Within the 2 (Participant Age) X 2 (Target Age) X 2 (Target Gender) X 3 (Target Expression) ANOVA on memory competence ratings, there was no significant interaction between target gender and target expression, $F(2, 593) = 0.99$, $p = .372$, or between target gender, target age, and target expression, $F(2, 593) = 0.93$, $p = .397$.

Even though we did not preregister a plan to interpret the effects involving participant age, we again observed a main effect of participant age, $F(1, 593) = 14.01$, $p < .001$. OA participants provided higher ratings of the targets' memory abilities. However, there was again no evidence of an own-age accentuation effect. There was no significant interaction between participant age and target age, $F(1, 593) = 2.04$, $p = .154$, between participant age and target expression, $F(2,593) = 0.19$, $p = .830$, or between participant age, target age, and target expression, $F(2, 593) = 1.00$, $p = .369$

The role of target attractiveness. We next conducted exploratory analyses testing the role of perceived attractiveness, which were not included in our pre-registration plan. Eleven participants did not provide ratings of target attractiveness and are excluded from these analyses. Within a 2 (Participant Age) X 2 (Target Age) X 2 (Target Gender) X 3 (Target Expression) ANOVA on perceived attractiveness, we found main effects for target age, $F(1, 582) = 149.29$, $p < .001$, target expression, $F(2, 582) = 29.28$, $p < .001$, and participant age, $F(1, 582) = 57.67$, $p < .001$. As expected, OA targets were rated as less attractive than YA targets. Targets with sad expressions were rated as less attractive than targets with neutral or happy expressions, who in

turn did not differ from one another. YA participants rated the targets as less attractive than did OA participants.

We next tested whether the overgeneralization of emotion to perceived competence varied as a function of target attractiveness. We also tested whether the potential interaction between target expression and target attractiveness on competence was different for the YA and OA targets. These two- and three-way interactions were assessed using Hayes' (2018, model 3) PROCESS macro for SPSS. We tested this model separately for each of the three outcome measures.[3] Within these analyses, none of the two- or three-way interactions were significant (all $ps \geq .079$). Thus, we did not find any evidence that the effects of emotional expression on perceived competence varied based upon the target's attractiveness.

Study 2 summary and discussion. In Study 2 we found that YA and OA targets were rated as having greater competence when they displayed happy as compared to sad expressions. There was also valence asymmetry in these facial expression effects. The perceived competence of the targets with neutral expressions was always numerically more similar to that of targets with happy expressions than to that of targets with sad expressions.

Even though the overgeneralization of emotion to perceived everyday competence occurred for both YA and OA male and female targets, we also found that in some domains it was greater for OA targets. Emotional expressions affected ratings of both YA and OA targets' IADL and ADL competence, but the magnitude of this effect was greater for OA targets. In contrast, the effects of emotional expressions on ratings of memory competence were statistically equivalent for the OA and YA targets. Although not predicted, drawing from the ecological approach to social perception (see Zebrowitz, 2011), these domain differences likely occurred because the age-trait associations differ in magnitude across these domains. Even though

memory abilities decline with age (e.g., Salthouse, 2009; West & Craik, 1999), there is considerable overlap in the distributions of YAs' and OAs' memory abilities. There are some OAs who perform better on memory tasks than the average YA, and there are some YAs who perform worse on memory tasks than the average OA (e.g., Salthouse & Babcock, 1991). A different pattern emerges for IADL and ADL prevalence rates. Data from the 2008 National Health Interview Survey (Adams, Heyman, & Vickerie, 2009) suggests that almost no YAs need help with either IADLs or ADLs. However, the likelihood of experiencing problems independently completing these activities rises with age. Adults aged 75 or older were about three times more likely than adults ages 65 to 74 to report need assistance completing either an IADL (19.2% vs. 6.9%) or ADL (10% vs 3.4%; Adams, et al., 2009). When considered together, these results suggest that the overgeneralization of emotion on ratings of competence is most likely to vary by age when the age-trait association is strong. To test this, future research should include ratings of traits that are stereotypical of either YAs or OAs.

Although the overgeneralization of emotion on ratings of competence varied based upon target age, there was no evidence that it varied based upon target gender. When considered in conjunction with other null effects (e.g., Hummert, et al., 1997; Jones, et al., 2018; Kite, Deaux, & Miele, 1991), including the null effects in Study 1, this suggests that gender differences in the overgeneralization of emotion to trait ratings may be a small effect that is dependent upon specific contextual factors or that is limited to specific sets of stimuli.

Finally, we also replicated the Study 1 finding that OA participants gave more favorable ratings than did the YA participants. This is consistent with other studies also documenting that OAs provide more positive trait ratings than do YAs (e.g., Ruffman, et al., 2006; Shuster, et al., 2017; Zebrowitz, et al., 2013). However, as in Study 1, the overgeneralization of emotion to

perceived competence never significantly varied based upon participant age. This is in contrast to the findings reported by Zebrowitz and Franklin (2014) who found an own-age accentuation effect in the overgeneralization of attractiveness to ratings of competence and health. However, it is worth noting that within this same study, Zebrowitz and Franklin found no similar effect for the hostility and untrustworthiness ratings. Future research is needed to determine the factors that predict when own-age accentuation effects emerge.

General Discussion

Facial expressions of emotion are often assumed to reflect dispositional characteristics. For example, people with happy expressions are perceived as being kinder, healthier, more honest, and with a better sense of humor (e.g., Jones, et al., 2018; Jones, et al., 2006; Thorton, 1943; Reis, et al., 1990). Building upon this, we found that emotional expressions also affect perceptions of everyday competence. In two studies, people with happy expressions were perceived to have greater competence in completing both IADLs and memory tasks than people with sad expressions. In Study 2, this even extended to perceptions that people could complete basic ADLs, such as showering and going to the bathroom independently.

Overgeneralizing emotional expressions as being indicative of everyday competence can be problematic. However, it is important to point out that overgeneralization and accuracy are not mutually exclusive. For example, prior research has shown that ratings of targets' likely health correlate with the targets' actual health (Kalick, Zebrowitz, Langlois, & Johnson, 1998) and ratings of targets' likely competence correlate with the targets' actual IQ scores, reasoning abilities, and short term memory abilities (Zebrowitz, et al., 2014). Furthermore, research has shown that smile intensity in childhood, yearbook, or social media photos predict a variety of long-term outcomes. These include marriage stability and satisfaction (Harker & Keltner, 2001;

Hertenstein, Hansel, Butts, & Hile, 2009), life satisfaction (Seder & Oishi, 2012), and even longevity (Abel & Kruger, 2010). Thus, whereas a fleeting smile or frown may lead to incorrect overgeneralizations about a target person's capabilities, there may be accuracy to these conclusions when evaluating a target's recurring facial expressions over time. This may be particularly true when perceptions based upon the facial expression cue are combined with other sources of information, such as the target's behavior and the contextual location (Hummert, 1994b). Future research is needed to determine how these sources of information combine to affect perceptions of YA and OA targets' everyday competence, as well as the relative accuracy of these assessments.

Future research should also assess how emotional expressions affect trait ratings that vary in valence. In these studies, we found asymmetrical effects such that relative to neutral expressions, sad expressions had larger effects on perceived competence than did happy expressions. This is consistent with research suggesting a negativity effect in person perception (e.g., Griffin & Langlois, 2006) and also research showing that priming negative age stereotypes has a larger impact than priming positive age stereotypes (Meisner, 2012). However, it is alternately possible that this asymmetry reflected the fact that the traits being assessed were negative (i.e., losses of abilities). Future research is needed to determine whether happy expressions may conversely have a larger effect on perceptions of positive traits (but see Griffin & Langlois, 2006).

There are also limitations to these studies. One is that we did not ask participants to decode the emotional expression of the target's face. Studies have found that the emotional expressions by OA targets are less accurately identified than those by YA targets (Ebner & Johnson, 2009; Riediger, Voelkle, Ebner, & Lindenberger, 2011). This may be because age-

related wrinkles and creases can themselves resemble emotional expressions, making it more difficult to decipher the expression being displayed (see also Malatesta, Izard, Culver, & Nicolich, 1987; Borod, et al., 2004). If the facial expression of OA is not accurately decoded, then if follows that the effects of these expressions to trait inferences should also be reduced. In contrast to this, we found that emotional expressions sometimes had a greater effect on the perceived competence of OAs. It is possible that this effect is even larger when accounting for participants' ability to identify the targets' emotions.

An additional limitation is that we also asked each participant to rate only one target face. Because of this, our results are based upon the ratings of a relatively small number of target faces, and these faces were not pretested for differences in how they were perceived. To address this, we could have instead used a within-subject design in which each participant rated a large number of YA and OA targets who varied in their emotional expressions. However, a drawback to this approach is that targets are rated relative to one another and this can drastically affect ratings. For example, in a meta-analysis there were large differences in how YA and OA targets were evaluated in within-subject design studies but almost no age differences in how YA and OA targets were evaluated in between-subject design studies (Kite & Johnson, 1988). Although we used a between-subject design, we still observed differences in ratings of everyday competence as a function of target age and target expression. It is possible that these effects would have been even larger in a within-subject design.

In conclusion, we found that facial expressions of emotion affect perceptions of everyday competence. When people appear sad they are perceived as less competent even in the basic activities that support independent living, such as showering, eating, and going to the toilet independently. Although these effects were often greater for the OA targets we also found some

domain specificity to the effects. This is consistent with the ecological approach to person perception, which posits that directly observable characteristics of a target person can often provide useful information about the target's biological and social fitness. However, problems arise when we overgeneralize these feature-trait associations. Our research suggests that when there is a strong age-trait association, people are more likely to use facial expressions of emotion to make trait inferences.

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Footnotes

[1] Aging attitudes were assessed via the 20-item Anxiety about Aging Scale (Lasher & Faulkender, 1993), which consists of four subscales (Cronbach's alpha = .72 to .90). Knowledge of the aging process and experiences with OAs were assessed via 6 questions based upon Berry et al (2015). These questions assessed knowledge of healthy aging, how it differs from Alzheimer's disease, and participants' quality of interactions with OAs (Cronbach's alpha of -.07). We repeating the analyses reported in the Results with scores on the Anxiety about Aging subscales and responses to the six questions assessing knowledge about aging and experiences with OAs as covariates. This did not alter any of the conclusions reported and these scales will not be discussed further.

[2] In the IADL and memory analyses, there were also significant main effects of target gender, which were qualified by significant interactions between target gender and target age. As shown in Table 4, this reflects the fact that the highest IADL competence ratings were given to the female YA targets.

[3] Within these analyses, facial expression of emotion was dummy coded as -1 for sad, 0 for neutral, and 1 for happy. Target gender and participant age were entered as covariates and were allowed to load on both the moderator of attractiveness as well as on the outcome measures of competence. A bootstrapping procedure was used to generate a sample size of 5,000 to assess the regression models and we used 95% bias-corrected and accelerated confidence intervals and mean-centered products.

Table 1

Correlations amongst the three outcome measures as a function of facial expression of emotion and target age in Study 1 and 2.

	Experiment 1: Older Adult Targets		
	Happy expression n = 108	Neutral expression n = 112	Sad expression n = 104
IADL and OMES	.629**	.509**	.626**
IADL and ADL	.746**	.729**	.806**
OMES and ADL	.540**	.373**	.573**
	Experiment 2: Younger Adult Targets		
	Happy expression n = 115	Neutral expression n = 91	Sad expression n = 100
IADL and OMES	.400**	.289*	.355**
IADL and ADL	.376**	.209*	.524**
OMES and ADL	.107	.133	.155
	Experiment 2: Older Adult Targets		
	Happy expression n = 87	Neutral expression n = 115	Sad expression n = 109
IADL and OMES	.426**	.455**	.497**
IADL and ADL	.637**	.683**	.826**
OMES and ADL	.297*	.315*	.405**

* Correlation is significant at the .05 level (2-tailed)
** Correlation is significant at the .001 level (2-tailed)

Table 2

Average competence ratings of independence in completing IADLs, independence in completing ADLs, and memory abilities (OMES) as a function of target gender and target expression (happy, neutral, or sad) in Study 1. Numbers in parentheses represent standard deviations.

	Male Faces		
	Happy expression (n = 55)	Neutral expression (n = 54)	Sad expression (n = 50)
IADL	39.82 (6.45)	39.24 (6.38)	38.80 (6.05)
ADL	31.64 (4.20)	32.33 (3.99)	31.46 (4.67)
OMES	37.89 (6.92)	37.24 (6.37)	34.60 (7.05)
	Female Faces		
	Happy expression (n = 53)	Neutral expression (n = 58)	Sad expression (n = 54)
IADL	40.11 (5.74)	38.48 (7.50)	35.83 (9.30)
ADL	32.13 (4.20)	31.36 (4.45)	30.52 (4.94)
OMES	36.66 (7.46)	35.29 (6.55)	33.17 (6.86)

Table 3

Average competence ratings of independence in completing IADLs, independence in completing ADLs, and memory abilities (OMES) as a function of target age, target gender, and target expression (happy, neutral, or sad) in Study 2. Numbers in parentheses represent standard deviations.

YOUNGER ADULT TARGETS			
		Male Faces	
	Happy expression (n = 53)	Neutral expression (n = 43)	Sad expression (n = 48)
IADL	5.25 (0.66)	4.76 (1.01)	4.22 (1.34)
ADL	5.86 (0.36)	5.90 (0.23)	5.41 (0.72)
OMES	3.66 (0.78)	3.33 (0.67)	2.31 (1.00)
		Female Faces	
	Happy expression (n = 62)	Neutral expression (n = 48)	Sad expression (n = 52)
IADL	5.60 (0.50)	5.43 (0.86)	4.78 (1.26)
ADL	5.85 (0.32)	5.90 (0.25)	5.53 (0.84)
OMES	3.85 (0.86)	3.64 (0.88)	2.65 (0.91)
OLDER ADULT TARGETS			
		Male Faces	
	Happy expression (n = 52)	Neutral expression (n = 60)	Sad expression (n = 49)
IADL	5.13 (0.72)	5.04 (0.62)	3.72 (1.32)
ADL	5.59 (0.52)	5.59 (0.50)	4.64 (1.22)
OMES	3.66 (0.81)	3.55 (0.62)	2.47 (0.98)
		Female Faces	
	Happy expression (n = 35)	Neutral expression (n = 55)	Sad expression (n = 60)
IADL	5.38 (0.69)	4.77 (0.92)	3.95 (1.21)
ADL	5.60 (0.56)	5.25 (0.73)	4.73 (1.16)
OMES	3.92 (0.77)	3.24 (0.88)	2.54 (0.95)

Table 4

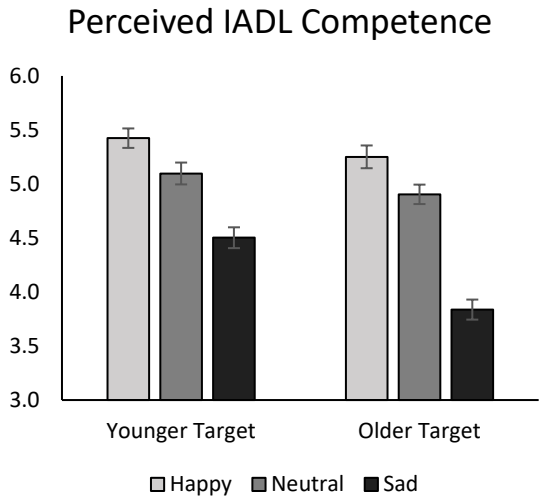
Average attractiveness ratings as a function of target age, target gender, and target expression (happy, neutral, or sad) in Study 2. Numbers in parentheses represent standard deviations.

	Happy expression	Neutral expression	Sad expression
Younger adult targets			
Male	3.58 (0.86)	3.35 (0.95)	2.63 (0.94)
Female	3.48 (0.86)	3.67 (0.86)	2.96 (0.84)
Older adult targets			
Male	2.56 (0.92)	2.55 (0.83)	2.00 (0.84)
Female	2.68 (1.22)	2.58 (1.03)	2.15 (0.93)

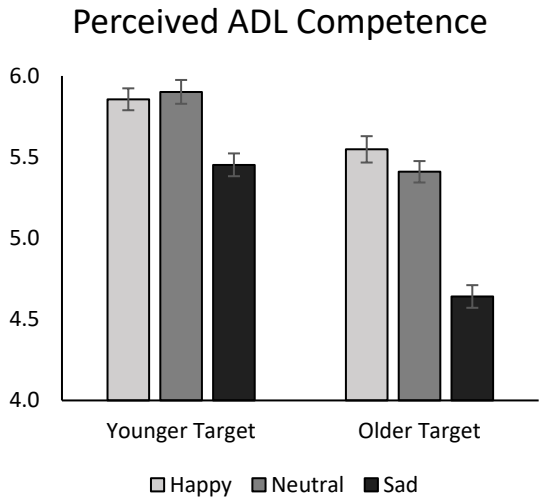
Happy Expression Neutral Expression Sad Expression

Figure 1. Sample photographs from the Lifespan Database of Adult Emotional Facial Stimuli (Ebner, Riediger, & Lindenberger, 2010). Although these specific photographs were not used in the current studies, they are representative of our target stimuli.

Panel A



Panel B



Panel C

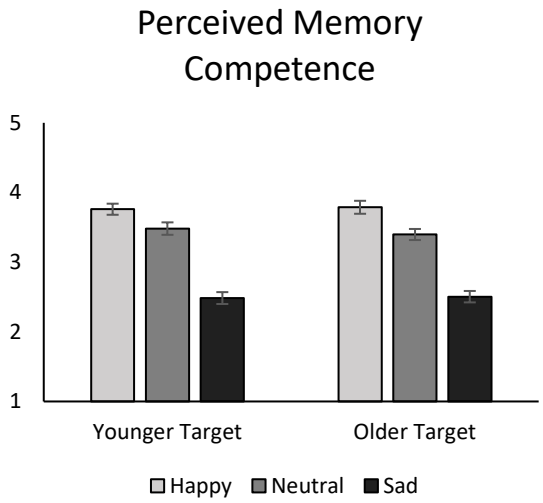


Figure 2. Ratings of the target's perceived IADL competence (Panel A), ADL competence (Panel B), and memory competence (Panel C) as a function of target age and target facial expression of emotion in Study 2. Error bars represent standard errors of the mean.