Emotion

Emotional Stereotypes on Trial: Implicit Emotion Associations for Young and Old Adults

Maxi Freudenberg, Daniel N. Albohn, Robert E. Kleck, Reginald B. Adams, Jr., and Ursula Hess

Emotional Stereotypes on Trial: Implicit Emotion Associations for Young and Old Adults

Maxi Freudenberg
Humboldt University of Berlin

Daniel N. Albohn
The Pennsylvania State University

Robert E. Kleck
Dartmouth College

Reginald B. Adams Jr.
The Pennsylvania State University

Ursula Hess
Humboldt University of Berlin

Individuals use naïve emotion theories, including stereotypical information on the emotional disposition of an interaction partner, to form social impressions. In view of an aging population in Western societies, beliefs on emotion and age become more and more relevant. Across 10 studies, we thus present findings on how individuals associate specific affective states with young and old adults using the emotion implicit association test. The results of the studies are summarized in 2 separate mini meta-analyses. Participants implicitly associated young adult individuals with positive emotions, that is, happiness and serenity, respectively, and old adult individuals with negative emotions, that is, sadness and anger, respectively (Mini Meta-Analysis 1). Within negative emotions, participants preferentially associated young adult individuals with sadness and old adult individuals with anger (Mini Meta-Analysis 2). Even though young and old adults are stereotypically associated with specific emotions, contextual factors influence which age-emotion stereotype is salient in a given context.

Keywords: stereotypes, emotion attribution, old adults, young adults, IAT

Given the aging of our Western societies, interage social interactions occur more frequently, and thus it becomes more important to study and understand potential problems in such interactions. One such problem are misunderstandings, which are not at all uncommon in the many interactions of everyday life. One type of situation in which such misunderstandings may emerge is in first encounters with a stranger. When meeting someone for the first time, initial impressions are highly relevant to the subsequent development of a relationship. In fact, first impressions determine how likely we are to approach or avoid someone (Szczurek, Monin, & Gross, 2012). Furthermore, it is hard to revise a first impression, especially when it is negative (Harris & Garris, 2008).

When individuals form first impressions, they use the information that is most easily available. Given no prior experience with an interaction partner and in the absence of any contextual information, stereotype knowledge about a person can be a source of relevant information (Hess, 2016). Importantly, visual characteristics of the individual, such as sex, skin color, or age, can serve as cues that activate stereotype knowledge. Despite the criticism that stereotypes involve overgeneralizations and generally disregard individual characteristics, they do serve a purpose. Specifically, stereotypes provide swift, easily accessible information that is most likely relevant in social situations in which little factual information is available (for a review, see Fiske, 1998).

At issue here are the stereotypes associated with age. In fact, very diverse stereotypical beliefs are associated with old adults, ranging from the healthy and capable grandparent to inactive and isolated elderly persons in residential institutions (Brewer, Dull, & Lui, 1981; Hummert, 1990; Schmidt & Boland, 1986). As such, mixed stereotypes about the elderly exist, making the concept of old age ambiguous. Compounding this issue is the fact that age is measured along a continuum and does not naturally exist in distinct categories. Instead, age reflects a state of transition that entails progressive transformation in the same temporal direction for each of us. However, when one tries to understand what is perceived as "young" and "old," individuals define these stages differently, and these definitions also vary as a function of beholder age. Young adults set the threshold of "old age" earlier in life than old adults, and old adults set the threshold for "young" later (Chopik, Bremner, Johnson, & Giasson, 2018; Pew Research

Center, 2009). Moreover, most young adults actually feel as old as their age, whereas the majority of old adults feel younger than their chronological age (Chopik et al., 2018; Pew Research Center, 2009). From this perspective, young and old individuals form asymmetrical groups, both trending toward youthfulness.

Oftentimes individuals, irrespective of age, show a preference for young rather than old adults. Specifically, attitudes toward old adults are often more negative, old adults are treated more negatively, and they are seen as less attractive and less competent than young adults (for a meta-analysis, see Kite, Stockdale, Whitley, & Johnson, 2005). However, this generally negative view of old adults depends on the characteristic at issue. It is particularly relevant for the concept of vitality, that is, aspects of mental and physical health (Boduroglu, Yoon, Luo, & Park, 2006). Importantly, this is the domain in which age-related losses are sooner or later inevitable. By contrast, for stereotypes unrelated to health, Boduroglu et al. (2006) found no differences in the description of typical young and old adults with respect to personality traits and interactions. Yet these authors targeted differences only in the valence of descriptions and not their specific content. Moreover, responses were analyzed only on a global level, which they labeled as the "social/emotional" domain.

Research on stereotypical beliefs about age group differences in emotionality is comparatively sparse, and it therefore remains an open question whether age stereotypes exist for specific social/emotional content and, specifically, regarding age-related changes in emotion experience and expression. This dearth of literature on this topic is surprising, particularly given that stereotypical beliefs regarding emotion expressions play an important role in many everyday situations. In particular, when individuals attempt to decode emotion expressions, they use naïve emotion theories to predict the most likely emotion to be experienced by the other individual (Hess & Hareli, 2016). Most importantly, these naïve emotion theories include stereotype knowledge, for example, information on emotional dispositions of an expresser based on their age and the emotional expectations that are associated with this age group.

When investigating stereotypical beliefs, there are two approaches to consider. One option is to use explicit measures, that is, questionnaires. Montepare and Dobish (2014), for example, investigated explicit beliefs about the experience and expression of emotions beyond late childhood. They found that participants associated increasing age with *decreases* in positive high-arousal emotions as well as *increases* in positive low-arousal emotions, negative high-arousal emotions, and negative low-arousal emotions.

Yet to investigate stereotypical beliefs exclusively with explicit measures is problematic. For example, self-reports are valid only if participants are willing and/or able to describe their beliefs accurately (Krosnick, Judd, & Wittenbrink, 2005). An alternative is to use a performance-based measurement that overcomes this limitation, for example, a response latency measure. The implicit association test (IAT; Greenwald, McGhee, & Schwartz, 1998) is a well-established experimental procedure designed to assess automatic associations between two target concepts and two attributes. Based on a binary categorization task, a scoring algorithm determines the target–attribute combination, for which participants respond faster and more accurately. This is interpreted as a preferred combination of associations. Considering its value in stereotype research on socially sensitive topics, the IAT is known to be less susceptible to strategic control than are self-reports (Stef-

fens, 2004) and, in many domains, to show a greater predictive validity than explicit measures (Greenwald, Poehlman, Uhlmann, & Banaji, 2009).

In the research reported here, we investigated stereotypical associations between young and old adults and specific emotions. Extensive research has used the IAT to assess attitudes toward old adults, with most showing an implicit preference for young over old regardless of the age of the person taking the IAT (Nosek et al., 2007). However, here, we are interested in seeing whether age associations also exist for specific emotions. Therefore, we combine results from a series of conceptually comparable IAT studies that focus on emotions and meta-analyze them, as described in Goh, Hall, and Rosenthal (2016). Overall, the results are presented in two separate mini meta-analyses. For each mini meta-analysis, we first describe the methodology used in the individual studies, followed by the results.

Overview of the Present Research

To our knowledge the present article provides an initial investigation into stereotypical associations between young adult and old adult age groups and emotions using the IAT. In all of the studies reported here, we used a modified version of the standard IAT procedure. Instead of presenting two opposing attribute concepts, we contrast two emotions, as has already been done for examining implicit emotion associations, as a function of gender (Becker, Kenrick, Neuberg, Blackwell, & Smith, 2007) and ethnicity (Bijlstra, Holland, Dotsch, Hugenberg, & Wigboldus, 2014).

All of the studies reported here contrasted young adult and old adult age groups based on a script available online.[1] For each study, items that represented either the two age groups or one of the two emotions tested within each study appeared in the center of a computer screen. Participants then sorted the items into the corresponding categories via key responses. In relevant blocks, an age group as well as an emotion share the same response key. Thus, one response key matches one age group and one of the two emotions, whereas the other response key matches the other age group and the remaining emotion. As the experiment progresses, participants also pass through critical blocks with a reversed key mapping, in that key assignments switch only for the emotion category. If participants associate either young or old individuals with a certain emotion, they should respond faster and more accurately when the associated concepts match the same behavioral responses.

The exact items and, more importantly, the item modalities used to represent the two age groups varied between studies (see Appendix). Additionally, each study is unique in at least one of three aspects of data collection, and the findings presented are based on different sampling procedures. The studies were conducted both in a laboratory environment and online. For all laboratory studies, participants worked in groups of up to five in individual cubicles. Informed consent was obtained from all participants. Online participants indicated their willingness to participate explicitly within the survey tool. Finally, data collection was carried out in both Germany and the United States, and each study was carried out in accordance with procedures approved by the local ethics committees. All IATs were scored in accordance with the improved

---

[1] We retrieved the script from http://www.millisecond.com/download/library/iat/ageiat/.

scoring algorithm (Greenwald, Nosek, & Banaji, 2003). With the exception of Study 5, the order of the critical blocks was counterbalanced between participants.[2] In what follows, we report all measures and manipulations used.

Overall, 10 studies were conducted. As we focus on stereotypical associations for multiple emotions in this article, we analyze our results in two separate mini meta-analyses. Mini Meta-Analysis 1 combines four studies that investigate the effect of pairing young adult and old adult age items with discrete positive and negative emotions. Mini Meta-Analysis 2 summarizes findings from six studies contrasting emotions within the same emotional valence, specifically, anger and sadness.

Mini Meta-Analysis 1: Positive Versus Negative Emotions

Using the IAT, we assessed stereotypical beliefs regarding discrete emotions in young and old adults. Mini Meta-Analysis 1 summarizes results from four studies on whether participants preferentially associate young and old people with primarily positive versus negative emotions. We expected that participants would be faster to pair a positively associated age group with positive emotions and a negatively associated age group with negative emotions. As old age appears to carry more negative associations, we expected that participants would respond faster and more accurately when old age stimuli were paired with negative emotions, that is, sadness (Study 1 and 3) and anger (Study 2 and 4), and young age stimuli with positive emotions, that is, happiness (Study 1 and 2) and serenity (Study 3 and 4).

Method

Power considerations. Based on Bijlstra et al. (2014), who pioneered the emotion IAT, we expected a medium-sized effect ($d = .50$). An a priori power analysis indicated a required sample size of about 35 participants in order for an effect of this size to be detected at the 5% level with power of .80. We therefore aimed to collect data from approximately 40 participants to account for attrition because of lack of diligence. Given diligence problems of Amazon Mechanical Turk (MTurk) participants (see Kennedy, Clifford, Burleigh, Jewell, & Waggoner, 2018), we oversampled for Study 3 but found that participants in that study showed comparable diligence relative to the lab study participants.

Study 1.
Materials. Based on Nosek et al. (2007), we used cropped faces of young and old individuals with neutral facial expressions to represent young and old items for the IAT.[3] On the attribute level, positive items were represented by synonyms for *happiness*, whereas negative items were represented by synonyms for *sadness*.

Participants. Potential participants were invited for an online study via mailing lists at the Humboldt University of Berlin and related Facebook student groups. Participation was limited to native German speakers. Participants currently enrolled in psychology courses received course credit for their participation. A total of 41 participants (four men) with a mean age of 23.2 years

($SD = 4.8$), ranging from 18 to 36 years, volunteered and completed the study.

Study 2.
Materials. The same stimulus material was used as in Study 1, with one exception. For this second study, negative items were represented by synonyms for *anger*.

Participants. Participant recruitment was conducted as in Study 1. A total of 41 individuals participated in the online study. One individual made overly fast responses (<300 ms) on more than 10% of their IAT trials and was thus excluded in accordance with criteria outlined by Greenwald et al. (2003). The remaining 40 participants (seven men) had a mean age of 24.5 years ($SD = 5.3$), ranging from 18 to 39 years.

Study 3.
Materials. On the category level, we used pictures with scenes involving either young adult or old adult individuals to represent young and old items in the IAT. All pictures came from the Emotional Picture Set (Wessa et al., 2010). We selected 12 images[4] that depicted comparable activities for young and old individuals (e.g., two young or old adults, respectively, sitting on a bench) and that had received equal ratings in valence ($M_{young} = 5.55$, $M_{old} = 5.77$) and arousal ($M_{young} = 3.31$, $M_{old} = 3.19$). As in Study 1, negative items were represented by synonyms for *sadness* but were now pitted against synonyms for *serenity*.

Participants. Participants were recruited via MTurk and paid $1.00 for their participation. Participation was limited to residents of the United States with at least 100 approved hits and a hit approval rate greater than 95%. A total of 101 individuals participated in the online study. Of these, three individuals made overly fast responses (<300 ms) on more than 10% of their IAT trials and were thus excluded in accordance with criteria outlined by Greenwald et al. (2003). The remaining 98 participants (53 men) had a mean age of 36.3 years ($SD = 12.8$), ranging from 20 to 69 years.

Study 4.
Materials. Young adult and old adult stimuli were the same pictures with scenes as in Study 3. Furthermore, on the attribute level, synonyms for *serenity* were pitted against synonyms for *anger*.

Participants. Potential participants were invited through PESA, a general participant pool for psychological studies from the Humboldt University of Berlin. Participation was limited to native German speakers as well as psychology students, who then received course credit for their participation. Thus, a total of 35 student participants (11 men) with a mean age of 25.5 years ($SD = 3.4$), ranging from 17 to 33 years, volunteered on site.

Statistical analysis. Within studies, inferential statistics were performed in the usual manner. Across studies, the mini meta-analysis is based on effect sizes as described in Goh et al. (2016). We computed the IAT D-score as the difference between mean response times for the two relevant blocks, divided by their pooled standard deviation (Greenwald et al., 2003). For Studies 1 to 4, a positive D-score reflects faster and/or more accurate responses when

---

[2] For transparency, access to the raw data can be found here: https://osf.io/b29hc/?view_only=c495ec32f66c40cb8c0e6c56bb6edba7.
[3] The stimulus material for the target age groups is available here: http://www.projectimplicit.net/stimuli.html.
[4] We used pictures 044.jpg, 105.jpg, 141.jpg, 150.jpg, 174.jpg, and 200.jpg for the "Young" age group, and 033.jpg, 108.jpg, 117.jpg, 145.jpg, 181.jpg, 198.jpg for the "Old" age group.

negative emotions were paired with old adult items and positive emotions with young adult items relative to blocks with the opposite key pairing. Further, as recommended for greater generalizability (Goh et al., 2016), we used a fully random effects approach.

Results

Initial analyses. Table 1 shows descriptive and inferential statistics of the age IAT in the four studies, with happiness and serenity contrasted with sadness and anger, respectively. If participants performed equally with both key pairings, the mean D-score would be zero. In consideration of the subset of emotions tested here, the average participant showed a preference for negative–old and positive–young pairings, as indicated by positive D-scores. As can be seen by the range of scores, a small number of participants also showed the reversed preference of positive–old and negative–young, which is a common characteristic for individual difference measures such as the IAT.[5] Taken by itself, each study analyzed separately yielded a significant effect, all showing the same pattern of results. Next, we present the integrated findings as Mini Meta-Analysis 1.

Meta-analytic results. We meta-analyzed the four studies using fully random effects in which the mean effect size represents the arithmetic average of all effect sizes (Goh et al., 2016). Overall, the effect was significant, as indicated by a one-sample t test of the mean effect size against zero (M $D_{IAT} = .57$), $t(3) = 8.438$, $p < .05$ (see Figure 1). Thus, the association of the old adult age group with negative emotions, that is, sadness and anger, and the young adult age group with positive emotions, that is, happiness and serenity, is stronger than the opposite association. As indicated by a mean D-score of .57, this effect approaches a medium effect size (Cohen, 1988).

Discussion

Based on four studies, our Mini Meta-Analysis 1 indicated that individuals tended to implicitly associate young adults with positive emotions, that is, happiness and serenity, and old adults with negative emotions, that is, sadness and anger. This finding is in line with the general preference for young individuals, that is, to have positive associations with youth. Moreover, looking at the individual studies, this effect increases the more the emotions being tested vary in valence. Specifically, the effects when contrasting happiness and sadness (Study 1) or happiness and anger (Study 2) are stronger relative to contrasting serenity and sadness (Study 3) or serenity and

Table 1
Descriptive and Inferential Statistics for IAT D-Scores

		IAT D-score			
Study	N	M (SD)	Range	t	df
Study 1 "Happy – Sad"	41	.56 (.39)	−.41 to 1.23	9.224***	40
Study 2 "Happy – Angry"	40	.67 (.32)	−.05 to 1.60	13.178***	39
Study 3 "Serene – Sad"	98	.38 (.35)	−.61 to 1.17	10.712***	97
Study 4 "Serene – Angry"	35	.66 (.47)	−.13 to 1.55	8.342***	34

Note. IAT = implicit association test. Positive D-scores indicate a stronger preference to associate young adult indidividuals with the specific positive emotion and old adult individuals with the specific negative emotion than for the opposite combination of associations. N = sample size; t = t value; df = degree of freedom.
*** $p \leq .001$.

anger (Study 4). It is important to note that contrasts with anger and one of the two positive emotions also lead to stronger effects than contrasts with sadness and one of the two positive emotions tested. We will return to this issue later.

Mini Meta-Analysis 2 focused on our second research question, namely, to examine the stereotypical beliefs associated with the discrete emotions of anger and sadness as a function of age of stimulus person. In the four studies presented so far, participants categorized items into two emotion categories that varied clearly in emotion valence. Yet such a design enables participants to respond strategically in the IAT, namely, to attend only to the stimulus valence while ignoring the attributes or, more precisely, their specific emotional meaning. On the level of each individual study, this limits potential conclusions, if specific age groups are indeed associated with discrete emotions, for example, old adult age with anger and young adult age with happiness, or whether this is simply an artifact of emotional valence in the IAT, that is, old adult age with a negative emotion like anger and young adult age with a positive emotion like happiness. We therefore conducted a further series of IAT studies, in which the emotional concepts as attributes are similar in emotional valence. More precisely, in Mini Meta-Analysis 2, we investigated whether stereotypical beliefs exist that associate old and young adult individuals differentially with anger relative to sadness.

Mini Meta-Analysis 2: Anger Versus Sadness

In Mini Meta-Analysis 2, involving six separate IAT studies, we posed the question of whether participants preferentially associate young adult and old adult individuals with anger or with sadness. Different hypotheses have been advanced in regard to this issue. First, one well-known theory in the stereotype research is the stereotype content model (SCM; Fiske, Cuddy, Glick, & Xu, 2002). According to this model, social groups, especially outgroups, can be classified along two core dimensions, that is, warmth and competence. Previous research within this framework suggests that the elderly are regarded as high on warmth but low on competence, and thus tend to elicit feelings of pity. The low-competence attribution implies that old individuals stereotypically lack the capability to pursue their interests effectively. Thus, a perceiver might assume that old people frequently deal with emotions that occur whenever personal interests are unachievable by one's own means, namely, feelings of sadness.

Prior research on explicit stereotypical ratings on emotion expressions and experience across the life span supports this assumption. More precisely, age trends indicated that sadness is more stereotypically associated with old adults and anger is more stereotypically associated with young individuals (Montepare & Dobish, 2014). Expecting more anger for young adult individuals also matches with stereotypical beliefs on personality traits, such as higher levels of impulsiveness and rebelliousness in adolescents (Chan et al., 2012; E. F. Gross & Hardin, 2007) and contrariwise higher levels of agreeableness in old individuals (Haslam, Bastian, Fox, & Whelan, 2007; Wood & Roberts, 2006). Taken together, we could therefore expect that participants would preferentially associate young adult individuals with anger and old adult individuals with sadness in the IAT.

---

[5] For a general discussion on interindividual variability in the IAT D-score as well as potential sources, see Nosek et al. (2007).

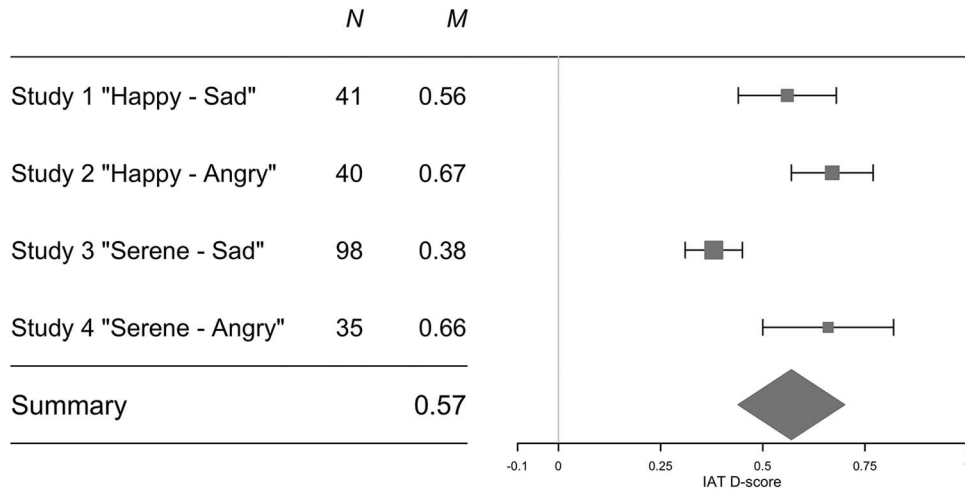|	N	M	
Study 1 "Happy - Sad"	41	0.56	
Study 2 "Happy - Angry"	40	0.67	
Study 3 "Serene - Sad"	98	0.38	
Study 4 "Serene - Angry"	35	0.66	
Summary		0.57	

Figure 1. Forest plot of mean implicit association test (IAT) D-scores for all studies presented on implicit associations between age groups and positive versus negative emotions. The square and horizontal lines represent the study-specific D-scores and 95% confidence intervals. The diamond shows the summarized D-score and a 95% confidence interval.

However, it also seems plausible to expect the reverse combination of associations. Specifically, both sadness and anger share the same evaluative component, but they convey different social signals. According to Paulus and Wentura (2016), it is the social message that determines participants' responses, when an experimental task involves two emotions with the same valence. Specifically, emotion expressions serve a communicative function (Fridlund, 1994) and trigger behavioral responses (Marsh, Ambady, & Kleck, 2005). When an individual expresses anger, it seems reasonable to avoid that person until the anger has passed. In contrast, the expression of sadness signals the need to receive comfort, and thus a perceiver might wish to give consolation and therefore approach the grieving person. Interestingly, when these two emotions were paired in yet another implicit measure, the approach and avoidance joystick task, sadness triggered automatic approach behavior and anger triggered avoidance behavior (Seidel, Habel, Kirschner, Gur, & Derntl, 2010). Thus, if (a) anger and sadness elicit different behavioral tendencies, and (b) contrasting these two emotions in an experimental task accentuates this particular difference, then the behavioral tendencies should determine which emotions are associated with the two age groups in the IAT. As people tend to see old individuals in terms of diminished vitality and even inevitable mortality (Greenberg, Schimel, & Martens, 2002), the associative strength between old age should be stronger for an emotion related to avoidance behavior. Likewise, given an increased preference for youth (Kite et al., 2005), associations for the young target group should be strongest for an emotion that elicits approach motivation. Thus, we could also expect that individuals tend to associate old adults with an emotion that elicits avoidance (anger) and young adults with an emotion that elicits approach (sadness) in the IAT.

To test these two contrasting hypotheses, we conducted a series of six age IAT studies, all contrasting anger and sadness on the attribute level. Next is a description of each study's method, followed by the results of the mini meta-analysis.

Method

Power considerations. We initially assumed the same effect sizes as for Mini Meta-Analysis 1. We also were not able to recruit the desired 35 participants for Studies 5 and 9. It turned out that effect sizes for an emotion IAT contrasting two negative emotions were smaller. We therefore increased sample sizes for the remaining studies. Assuming an effect size of $d = .30$, an N of 90 would have been required for a power of .80 at the 5% significance level. Thus, not all studies reported in Mini Meta-Analysis 2 had adequate power. However, the forest plot shows that all studies yielded comparable effect sizes (see Figure 2). That is, the lower powered studies did not yield anomalous mean IAT D-scores with exaggerated effect sizes.

Study 5.

Materials. We used the same facial images of young adult and old adult individuals as in Study 1 but contrasted synonyms for *anger* and *sadness*.

Participants. As in Study 4, participants were invited through PESA at the Humboldt University of Berlin. Inclusion criteria were the same as in Study 4. A total of 24 student participants (six men) with a mean age of 24.5 years ($SD = 3.3$), ranging from 18 to 29 years, volunteered and completed the study on site.

Study 6.

Materials. We used the same stimulus material for young and old items as in Study 3 and 4. We again contrasted sadness with anger.

Participants. Participant recruitment and inclusion criteria were the same as in Studies 4 and 5. A total of 43 participants (four men), primarily students, with a mean age of 27.0 years ($SD = 8.2$), ranging from 19 to 68 years, volunteered and completed the study on site.

Study 7.

Materials. We used the same stimulus material for young and old items as in Studies 3, 4, and 6. We again contrasted sadness with anger.

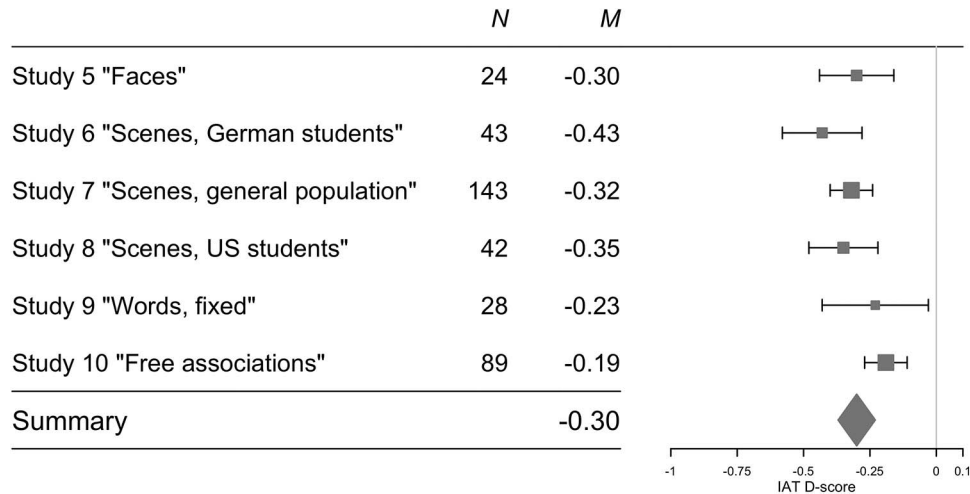|	N	M	
Study 5 "Faces"	24	-0.30	
Study 6 "Scenes, German students"	43	-0.43	
Study 7 "Scenes, general population"	143	-0.32	
Study 8 "Scenes, US students"	42	-0.35	
Study 9 "Words, fixed"	28	-0.23	
Study 10 "Free associations"	89	-0.19	
Summary		-0.30	

Figure 2. Forest plot of mean implicit association test (IAT) D-scores for all studies presented on implicit associations between age groups and anger versus sadness. The square and horizontal lines represent the study-specific D-scores and 95% confidence intervals. The diamond shows the summarized D-score and a 95% confidence interval.

Participants. Participants were visitors of the Long Night of the Sciences at the Psychological Department of the Humboldt University of Berlin who signed up to participate in an experiment as well as a short presentation on the object of the investigation and the current state of research on these issues. One hundred sixty-two individuals were tested on site in groups of up to six. Three participants refused permission to have their data included and their data were deleted. Further, we discarded data from another 16 participants because they were under the age of 16 years ($n = 11$), were a non-native speaker ($n = 1$), or because of computer errors ($n = 4$). The final sample consisted of 143 participants (36 men). One individual did not provide age information. The remaining sample had a mean age of 30.2 years ($SD = 14.0$), ranging from 17 to 70 years.

Study 8.

Materials. We used the same stimulus material for young and old items as in Studies 3, 4, 6 and 7. We again contrasted sadness with anger.

Participants. Participants were recruited at The Pennsylvania State University through the local participant pool. Participation was limited to students in introductory psychology courses who received partial course credit for their participation. Participants were tested in separate rooms in individual computer cubicles. A total of 42 student participants (23 men) with a mean age of 18.3 years ($SD = 4.3$), ranging from 18 to 22 years, volunteered and completed the study on site. One individual did not provide age information.

Study 9.

Materials. In Study 9, words were used to represent young adult and old adult items in the IAT. To select words that are strongly associated with the two age categories, we pretested a list of 44 words. For this, 10 participants (four female; $M_{age} = 25.1$, $SD_{age} = 3.4$, age range $= 19–30$) indicated for each term the degree to which it represents the two age groups along a 5-point scale ranging from *young* (1) to *old* (5), with a mean anchor of "do not know." Prior to this, participants also provided valence and arousal ratings along a 9-point scale for each individually pre-

sented term (Self-Assessment Manikin; Bradley & Lang, 1994). The final stimulus material consisted of 12 items equally distributed among the two age groups. The item pool for the "young" category included six items with the lowest age affiliation ratings ($M = 1.08$, $SD = 0.07$, range $= 1.00–1.20$) and highest consensus among raters (range$_{SD[Item]} = 0.00–0.60$). Accordingly, the item pool for the "old" category included six items with the highest age affiliation ratings ($M = 4.82$, $SD = 0.12$, range $= 4.70–5.00$) and highest consensus among raters (range$_{SD[Item]} = 0.00–0.64$). The resulting young items were more positive (young: $M = 5.80$, $SD = 1.50$, range $= 3.20–7.40$; old: $M = 3.77$, $SD = 0.93$, range $= 2.90–5.50$) and more arousing (young: $M = 4.83$, $SD = 1.08$, range $= 3.40–6.30$; old: $M = 4.02$, $SD = 0.64$, range $= 3.40–5.10$) than the old items. The Appendix provides the specific words used.

Participants. As in Studies 4, 5 and 6, participants were recruited through PESA at the Humboldt University of Berlin. Inclusion criteria were also the same. A total of 28 student participants (six men) with a mean age of 22.3 years ($SD = 5.2$), ranging from 17 to 34 years, volunteered and completed the study on site.

Study 10.

Materials. Stimulus items representing the two age categories "young" and "old" varied on the individual level. For this, participants first listed their own associations regarding the young and old categories, five for each age group, before they completed the IAT procedure with these individually customized items.

Participants. Participants were recruited via MTurk following the same criteria as described in Study 3. A total of 100 individuals participated in the online study and were each paid $1.00 for their participation. Of these, 10 individuals made overly fast responses (<300 ms) on more than 10% of their IAT trials and were thus excluded in accordance with criteria outlined by Greenwald et al. (2003). Data from another participant was discarded from the analysis for evidence of random responding during item construction. The remaining 89 participants (48 men) had a mean age of 34.0 years ($SD = 10.3$), ranging from 19 to 60 years.

Statistical analysis. Mini Meta-Analysis 2 followed the same guiding principles as Mini Meta-Analysis 1. However, for Studies 5 to 10, a negative D-score reflected faster and/or more accurate responses pairing *anger* words with old items and *sadness* words with young items relative to blocks with the opposite key pairing.

Results

Initial analyses. Table 2 shows descriptive and inferential statistics for the age IAT in the six studies with anger and sadness. On average, participants showed a preference for angry–old and sad–young, as indicated by negative D-scores for each study. However, a small number of participants also showed the reversed preference of sad–old and angry–young, as can be seen by the range of scores.

Task pairing order is known to significantly influence the IAT D-score (Nosek, Greenwald, & Banaji, 2005). When comparing task orders, we found notable differences with respect to the magnitude as well as significance of the IAT effects. Table 3 shows inferential statistics for each D-score, separated for the initial task pairing. The results imply that the initial task-pairing affects the strength of associations between the social age groups and anger versus sadness. We will return to this issue later.

Meta-analytic results. We again meta-analyzed these six studies using fully random effects in which the mean effect size represents the arithmetic average of all effect sizes (Goh et al., 2016). Overall, the effect was significant, as indicated by a one-sample t test of the mean effect size against zero (M $D_{IAT} = -.30$), $t(5) = -8.669$, $p < .001$ (see Figure 2). Thus, the association of old adult individuals with anger and young adult individuals with sadness is stronger than the reverse association. As indicated by a mean D-score of $-.30$, this effect approaches a small size (Cohen, 1988).

Discussion

Across six studies, Mini Meta-Analysis 2 revealed a stereotypical belief that individuals implicitly associate old people with anger and young people with sadness. Most remarkably, this finding was unaffected by participant demographic, which ranged from a student sample (Studies 5, 6, 8, and 9) and middle-aged to old-aged participants from the general population (Study 7) to MTurk workers (Study 10). That the IAT D-scores remained

unaffected by different test sites, with two studies conducted in the United States (Studies 8 and 10) and the remaining data collected in Germany, also supports the generalizability of this finding.

However, the effect of task-pairing order and its influence on the IAT D-score requires further consideration. Specifically, when participants initially completed the task mapping young adult items with anger words and old adult items with sadness words, the magnitude of the effect is notably decreased. In some cases, the effect did not reach significance in this subgroup of people; however, this may partially be explained by sample size limitations. Yet null effects in this condition signify that performance with the anger–old as well as sad–young pairing is comparable with responses with the reversed combination despite their initial priming. Thus, the overall finding of the angry–old and sad–young association persists, in that task order pairing did not result in a reversed preference in any study, nor did it affect all studies. Nonetheless, this finding is moderated to some degree by order effects.

The fact that the initial combination of attribute and target group biases performance in the IAT is a well-known flaw (Nosek et al., 2005). Previously, Nosek et al. (2005) speculated that pairing order effects are especially strong for IATs that use lexical stimuli. Yet contrary to this notion, one of the few studies reported here unaffected by pairing order effects was Study 10, which used lexical items to represent the two age groups.

It is important to note that Study 10 used a very atypical design, as participants provided their own free associations for the two age groups. Consequently, participants categorized items in this IAT that they personally associated with the young adult and old adult categories. Yet this procedure does not guarantee that participants' responses indeed reflected a respective category of reference exclusively as such, for example, *tired* for the old adult category. As specific associations between the self-chosen age items and age categories might be weaker, the categorization task also yielded a weaker general IAT effect.

Generally, larger effects for word-based relative to picture-based IATs are expected, and this is attributed to different levels of representation (Foroni & Bel-Bahar, 2010). Specifically, abstract verbal terms represent abstract evaluative concepts better, leading to larger IAT effects in attitude research. Opposed to this, our findings for the emotion IATs do not reflect this pattern with larger IAT effects when visual items were used (Studies 5, 6, 7, and 8) relative to lexical stimuli. Based on the notion that IAT effects are

Table 2

Descriptive and Inferential Statistics for IAT D-Scores With Anger and Sadness

		IAT D-score			
Study	N	M (SD)	Range	t	df
Study 5 "Faces"	24	−.30 (.36)	−1.16 to .28	−4.100***	23
Study 6 "Scenes, German students"	43	−.43 (.49)	−1.41 to .80	−5.675***	42
Study 7 "Scenes, general population"	143	−.32 (.50)	−1.25 to 1.35	−7.708***	142
Study 8 "Scenes, U.S. students"	42	−.35 (.42)	−.99 to .57	−5.337***	41
Study 9 "Words, fixed"	28	−.23 (.55)	−1.05 to 1.71	−2.172*	27
Study 10 "Free associations"	89	−.19 (.40)	−1.09 to .77	−4.369***	88

Note. IAT = implicit association test. Negative D-scores indicate a stronger preference to associate young adult individuals with sadness and old adult individuals with anger than for the opposite combination of associations. N = sample size; t = t value; df = degree of freedom.
* $p \leq .05$. *** $p \leq .001$.

Table 3

Inferential Statistics for IAT D-Scores With Anger and Sadness Separated by Initial Task Pairing

Study	Starting Old Angry + Young Sad				Starting Young Angry + Old Sad			
	IAT D-score M	df	t	p	IAT D-score M	df	t	p
Study 5[a]		–			−.30	23	−4.100	<.001
Study 6	−.67	21	−7.519	<.001	−.17	20	−1.781	.090
Study 7	−.38	68	−6.097	<.001	−.26	73	−4.808	<.001
Study 8	−.60	19	−10.218	<.001	−.12	21	−1.351	.191
Study 9	−.49	13	−5.862	<.001	.04	13	.220	.829
Study 10	−.24	40	−3.921	<.001	−.14	47	−2.366	<.05

Note. IAT = implicit association test. Negative D-scores indicate a stronger preference to associate young adult individuals with sadness and old adult individuals with anger than for the opposite combination of associations. df = degree of freedom; t = t value; p = p value.
[a] In Study 5, the task pairing order was held constant between participants.

magnified as the stimuli come to represent the category as a whole, one feasible explanation might be that congruency for the level of representation should not only exist for target concepts but also take account of the attribute concepts. We investigated implicit associations between social age groups and discrete emotions, in other words, emotional responses elicited by specific situational circumstances. In light of this, abstract verbal items referring to young and old individuals' lifestyle might actually lack contextual information and thus be less suitable to activate mental representations of emotions. Conversely, it seems easier to attribute emotional responses to specific individuals portrayed by pictures, despite the lower level of representation.

In sum, the pattern of results obtained in Studies 6 to 10 contradicts some typical findings for the IAT as a function of stimulus type and also shows a stronger than anticipated order effect for nonlexical stimuli. We propose that both these findings illustrate the complex nature of age stereotypes. Attitudes toward old adults depend on which of several possible stereotypes is activated (Schmidt & Boland, 1986). For example, participants may imagine a frail, helpless old person or a crusty curmudgeon. It is plausible that the attribution of emotions to old people in an IAT also depends on which type of old person is salient when the experimental task is completed. Yet facial images portray specific individuals and thus limit both the age range and other qualities (such as health and vigor) of the target group. In contrast, lexical items might activate a broader age range, and thus the particular stereotype activated can differ more between respondents.

In this vein, the first pairing of age and emotion items in the combined categorization task also constrains stereotype activation. Participants who are initially forced to pair old individuals with anger words on the same response key might imagine the shrew/curmudgeon subtype. In contrast, pairing old individuals with sadness words might activate the stereotype of the despondent elder. Interestingly, our findings suggest that both subtypes are accessible in the initial combined task, but they are not of equal strength. Thus, once the association between old age and anger is reinforced, it interferes with the later experimental task to combine old people and sadness. In contrast, when behavioral responses initially match the despondent subtype, the association of old age and anger still remains strong. This indicates a general predisposition to preferentially associate old with anger (and young with sadness) when using implicit measures.

General Discussion

The results of 10 studies confirm implicit associations between different age groups and discrete emotions. Specifically, old age is associated with negative emotions and anger in particular. Importantly, this conclusion is based on the cumulated data of two mini meta-analyses, reflecting a highly congruent pattern of results with each individual study showing a significant effect, while also varying samples and stimulus materials. As such, the present research fulfills the growing call for replicability of research findings (Pashler & Wagenmakers, 2012).

In Mini Meta-Analysis 1, participants preferentially associated young individuals with positive emotions, that is, happiness and serenity, and old individuals with negative emotions, that is, sadness and anger. This is highly congruent with research on implicit and explicit preference of the young over the old age group (Chopik & Giasson, 2017). Beyond this general impact of emotional valence, we also investigated age-related associations within negative emotions. Specifically, we proposed two conflicting hypotheses regarding the association of the two age groups with sadness versus anger. The contrasting hypotheses were derived from different measurement approaches. Based on varying behavioral tendencies in response to these two emotions, that is, avoidance behavior elicited by anger and approach behavior elicited by sadness (Paulus & Wentura, 2016), one hypothesis expected a stronger associative connection between anger and old adult individuals and sadness and young adult individuals. In contrast, findings from explicit stereotype research, most of all, the SCM (Fiske et al., 2002), suggested the reversed preference of combinations.

The present results point to a predisposition to implicitly associate anger with old people and sadness with young people. Though, as can be seen in the effects of task-pairing order, both associative pairings are available in principle. Nevertheless, the angry–old and sad–young association was stronger overall.

One reason for this outcome might be the congruence of measurement type between the IAT and experimental procedures underlying the two hypotheses. The IAT as well as the approach–avoidance joystick task represent implicit measures that relate psychological processes to nonverbal behavior, in this particular case, response latencies. Moreover, the IAT D-score reflects the implicit associations of an individual. By contrast, research on the SCM focused on participants' explicit beliefs on how social groups

are generally viewed by American society. Thus, stereotypical beliefs derived from the SCM might reflect knowledge of social stereotypes as opposed to personal beliefs.

We investigated stereotypical associations between emotions and age groups based on the notion that the attribution of emotional dispositions to others biases perceptual processes. In this regard, Gawronski and De Houwer (2014) argued that it is less the explicit beliefs and more the automatic associations activated in a context that bias the interpretation of ambiguous information. Thus, implicit measures might predict biases in emotion perception better than explicit measures. In fact, prior research indicates a strong relationship between the emotion IAT and emotion classification for male and female faces (Becker et al., 2007) as well as for individuals of different ethnicity (Bijlstra et al., 2014).

The present findings suggest that individuals tend to implicitly associate specific emotions with young adult and old adult age groups. In fact, such preferential beliefs have been proposed to explain reduced emotion decoding accuracy for old adult faces (Fölster, Hess, & Werheid, 2014). Yet present research also points to the possibility that automatic emotion associations for age groups are complex and depend on contextual factors that may influence which representation of age stereotypes becomes salient in a specific situation.

It is also noteworthy that sadness triggers different age associations in the IAT depending on the contrast emotion it is paired with. If the experimental procedure accentuates emotional valence, for example, contrasting sadness with happiness, the negative valence of sadness drives responses. Specifically, the negative valenced emotion is associated with the negatively valenced age group. Conversely, when sadness is contrasted with anger, it is attributed toward young adult people who are typically associated with positive evaluative connotations. In this context, sadness appears to be the more positive, approachable emotion.

Although results within each mini meta-analysis were consistent, all studies are subject to the same limitation, namely, the relative nature of assessment. More precisely, the IAT measures the relative strength between two targets and two attributes. In consequence of its specific task structure, it is thus not suitable to interpret single target–attribute associations. Therefore, it remains an open question whether participants implicitly associate (a) one of the two emotions with young people, (b) the contrast emotion with old people, or (c) a combination of both. Further research should focus on different experimental procedures to disentangle this effect.

Notably, there is a discrepancy between implicit emotion associations toward age groups and patterns of actual changes in emotion experience and expression across the life span. Specifically, old adults report greater emotional well-being relative to young adults (e.g., Carstensen et al., 2011; J. J. Gross et al., 1997; Kessler & Staudinger, 2009; Santorelli, Ready, & Mather, 2018).

Yet, as noted at the outset, stereotype beliefs are practically important. They give significant directions in everyday-life situations in a variety of domains—for example, they influence the willingness to cooperate at work (Chiu, Chan, Snape, & Redman, 2001) or they even lead to negative health outcomes later in life (Levy, Zonderman, Slade, & Ferrucci, 2009). Thus, understanding age-related stereotypical beliefs is of crucial importance. The research reported here contributes to a better grasp of implicit associations between discrete emotions and age. Most importantly, this relationship is not attributable to age expectations alone.

Contextual factors trigger different subtypes of age stereotypes that, in turn, influence the associative strength between age groups and specific emotions.

References

Becker, D. V., Kenrick, D. T., Neuberg, S. L., Blackwell, K. C., & Smith, D. M. (2007). The confounded nature of angry men and happy women. *Journal of Personality and Social Psychology, 92,* 179–190. http://dx.doi.org/10.1037/0022-3514.92.2.179

Bijlstra, G., Holland, R. W., Dotsch, R., Hugenberg, K., & Wigboldus, D. H. (2014). Stereotype associations and emotion recognition. *Personality and Social Psychology Bulletin, 40,* 567–577. http://dx.doi.org/10.1177/0146167213520458

Boduroglu, A., Yoon, C., Luo, T., & Park, D. C. (2006). Age-related stereotypes: A comparison of American and Chinese cultures. *Gerontology, 52,* 324–333. http://dx.doi.org/10.1159/000094614

Bradley, M. M., & Lang, P. J. (1994). Measuring emotion: The self-assessment manikin and the semantic differential. *Journal of Behavior Therapy and Experimental Psychiatry, 25,* 49–59. http://dx.doi.org/10.1016/0005-7916(94)90063-9

Brewer, M. B., Dull, V., & Lui, L. (1981). Perceptions of the elderly: Stereotypes as prototypes. *Journal of Personality and Social Psychology, 41,* 656–670. http://dx.doi.org/10.1037/0022-3514.41.4.656

Carstensen, L. L., Turan, B., Scheibe, S., Ram, N., Ersner-Hershfield, H., Samanez-Larkin, G. R., . . . Nesselroade, J. R. (2011). Emotional experience improves with age: Evidence based on over 10 years of experience sampling. *Psychology and Aging, 26,* 21–33. http://dx.doi.org/10.1037/a0021285

Chan, W., Mccrae, R. R., De Fruyt, F., Jussim, L., Löckenhoff, C. E., De Bolle, M., . . . Terracciano, A. (2012). Stereotypes of age differences in personality traits: Universal and accurate? *Journal of Personality and Social Psychology, 103,* 1050–1066. http://dx.doi.org/10.1037/a0029712

Chiu, W. C. K., Chan, A. W., Snape, E., & Redman, T. (2001). Age stereotypes and discriminatory attitudes towards older workers: An East-West comparison. *Human Relations, 54,* 629–661. http://dx.doi.org/10.1177/0018726701545004

Chopik, W. J., Bremner, R. H., Johnson, D. J., & Giasson, H. L. (2018). Age differences in age perceptions and developmental transitions. *Frontiers in Psychology, 9,* 67. http://dx.doi.org/10.3389/fpsyg.2018.00067

Chopik, W. J., & Giasson, H. L. (2017). Age differences in explicit and implicit age attitudes across the life span. *The Gerontologist, 57*(Suppl. 2), S169–S177. http://dx.doi.org/10.1093/geront/gnx058

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

Fiske, S. T. (1998). Stereotyping, prejudice, and discrimination. In D. T. Gilbert, S. T. Fiske, & G. Lindzey (Eds.), *The handbook of social psychology* (pp. 357–411). New York, NY: McGraw-Hill.

Fiske, S. T., Cuddy, A. J., Glick, P., & Xu, J. (2002). A model of (often mixed) stereotype content: Competence and warmth respectively follow from perceived status and competition. *Journal of Personality and Social Psychology, 82,* 878–902. http://dx.doi.org/10.1037/0022-3514.82.6.878

Fölster, M., Hess, U., & Werheid, K. (2014). Facial age affects emotional expression decoding. *Frontiers in Psychology, 5,* 30. http://dx.doi.org/10.3389/fpsyg.2014.00030

Foroni, F., & Bel-Bahar, T. (2010). Picture-IAT versus word-IAT: Level of stimulus representation influences on the IAT. *European Journal of Social Psychology, 40,* 321–337.

Fridlund, A. J. (1994). *Human facial expression: An evolutionary view*. San Diego, CA: Academic Press.

Gawronski, B., & De Houwer, J. (2014). Implicit measures in social and

personality psychology. In H. T. Reis & C. M. Judd (Eds.), *Handbook of research methods in social and personality psychology* (2nd ed., pp. 283–310). New York, NY: Cambridge University Press.

Goh, J. X., Hall, J. A., & Rosenthal, R. (2016). Mini meta-analysis of your own studies: Some arguments on why and a primer on how. *Social and Personality Psychology Compass, 10,* 535–549. http://dx.doi.org/10.1111/spc3.12267

Greenberg, J., Schimel, J., & Martens, A. (2002). Ageism: Denying the face of the future. In T. D. Nelson (Ed.), *Ageism: Stereotyping and prejudice against older persons* (pp. 27–48). Cambridge, MA: MIT Press.

Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. (1998). Measuring individual differences in implicit cognition: The implicit association test. *Journal of Personality and Social Psychology, 74,* 1464–1480. http://dx.doi.org/10.1037/0022-3514.74.6.1464

Greenwald, A. G., Nosek, B. A., & Banaji, M. R. (2003). Understanding and using the implicit association test: I. An improved scoring algorithm. *Journal of Personality and Social Psychology, 85,* 197–216. http://dx.doi.org/10.1037/0022-3514.85.2.197

Greenwald, A. G., Poehlman, T. A., Uhlmann, E. L., & Banaji, M. R. (2009). Understanding and using the Implicit Association Test: III. Meta-analysis of predictive validity. *Journal of Personality and Social Psychology, 97,* 17–41. http://dx.doi.org/10.1037/a0015575

Gross, E. F., & Hardin, C. D. (2007). Implicit and explicit stereotyping of adolescents. *Social Justice Research, 20,* 140–160. http://dx.doi.org/10.1007/s11211-007-0037-9

Gross, J. J., Carstensen, L. L., Pasupathi, M., Tsai, J., Skorpen, C. G., & Hsu, A. Y. (1997). Emotion and aging: Experience, expression, and control. *Psychology and Aging, 12,* 590–599. http://dx.doi.org/10.1037/0882-7974.12.4.590

Harris, M. J., & Garris, C. P. (2008). You never get a second chance to make a first impression: Behavioral consequences of first impressions. In N. Ambady & J. J. Skowronski (Eds.), *First impressions* (pp. 147–168). New York, NY: Guilford Press.

Haslam, N., Bastian, B., Fox, C., & Whelan, J. (2007). Beliefs about personality change and continuity. *Personality and Individual Differences, 42,* 1621–1631. http://dx.doi.org/10.1016/j.paid.2006.11.001

Hess, U. (2016). Nonverbal communication. In H. S. Friedman (Ed.), *Encyclopedia of mental health* (2nd ed., pp. 208–218). Waltham, MA: Academic Press. http://dx.doi.org/10.1016/B978-0-12-397045-9.00218-4

Hess, U., & Hareli, S. (2016). The impact of context on the perception of emotions. In C. Abell & J. Smith (Eds.), *The expression of emotion: Philosophical, psychological, and legal perspectives* (pp. 199–218). Cambridge, UK: Cambridge University Press. http://dx.doi.org/10.1017/CBO9781316275672.010

Hummert, M. L. (1990). Multiple stereotypes of elderly and young adults: A comparison of structure and evaluations. *Psychology and Aging, 5,* 182–193. http://dx.doi.org/10.1037/0882-7974.5.2.182

Kennedy, R., Clifford, S., Burleigh, T., Jewell, R., & Waggoner, P. (2018). The shape of and solutions to the MTurk quality crisis. *SSRN.* Retrieved from https://ssrn.com/abstract=3272468

Kessler, E. M., & Staudinger, U. M. (2009). Affective experience in adulthood and old age: The role of affective arousal and perceived affect regulation. *Psychology and Aging, 24,* 349–362. http://dx.doi.org/10.1037/a0015352

Kite, M. E., Stockdale, G. D., Whitley, B. E., & Johnson, B. T. (2005). Attitudes toward younger and older adults: An updated meta-analytic review. *Journal of Social Issues, 61,* 241–266. http://dx.doi.org/10.1111/j.1540-4560.2005.00404.x

Krosnick, J. A., Judd, C. M., & Wittenbrink, B. (2005). The measurement

of attitudes. In D. Albarracin, B. T. Johnson, & M. P. Zanna (Eds.), *The handbook of attitudes* (pp. 21–76). Mahwah, NJ: Erlbaum.

Levy, B. R., Zonderman, A. B., Slade, M. D., & Ferrucci, L. (2009). Age stereotypes held earlier in life predict cardiovascular events in later life. *Psychological Science, 20,* 296–298. http://dx.doi.org/10.1111/j.1467-9280.2009.02298.x

Marsh, A. A., Ambady, N., & Kleck, R. E. (2005). The effects of fear and anger facial expressions on approach- and avoidance-related behaviors. *Emotion, 5,* 119–124. http://dx.doi.org/10.1037/1528-3542.5.1.119

Montepare, J. M., & Dobish, H. (2014). Younger and older adults' beliefs about the experience and expression of emotions across the life span. *The Journals of Gerontology: Series B, Psychological Sciences and Social Sciences, 69,* 892–896. http://dx.doi.org/10.1093/geronb/gbt073

Nosek, B. A., Greenwald, A. G., & Banaji, M. R. (2005). Understanding and using the Implicit Association Test: II. Method variables and construct validity. *Personality and Social Psychology Bulletin, 31,* 166–180. http://dx.doi.org/10.1177/0146167204271418

Nosek, B. A., Smyth, F. L., Hansen, J. J., Devos, T., Lindner, N. M., Ranganath, K. A., . . . Banaji, M. R. (2007). Pervasiveness and correlates of implicit attitudes and stereotypes. *European Review of Social Psychology, 18,* 36–88. http://dx.doi.org/10.1080/10463280701489053

Pashler, H., & Wagenmakers, E. J. (2012). Editors' introduction to the special section on replicability in psychological science: A crisis of confidence? *Perspectives on Psychological Science, 7,* 528–530. http://dx.doi.org/10.1177/1745691612465253

Paulus, A., & Wentura, D. (2016). It depends: Approach and avoidance reactions to emotional expressions are influenced by the contrast emotions presented in the task. *Journal of Experimental Psychology: Human Perception and Performance, 42,* 197–212. http://dx.doi.org/10.1037/xhp0000130

Pew Research Center. (2009). *Growing old in America: Expectations vs. reality.* Retrieved from http://www.pewsocialtrends.org/files/2010/10/Getting-Old-in-America.pdf

Santorelli, G. D., Ready, R. E., & Mather, M. A. (2018). Perceptions of emotion and age among younger, midlife, and older adults. *Aging & Mental Health, 22,* 421–429. http://dx.doi.org/10.1080/13607863.2016.1268092

Schmidt, D. F., & Boland, S. M. (1986). Structure of perceptions of older adults: Evidence for multiple stereotypes. *Psychology and Aging, 1,* 255–260. http://dx.doi.org/10.1037/0882-7974.1.3.255

Seidel, E. M., Habel, U., Kirschner, M., Gur, R. C., & Derntl, B. (2010). The impact of facial emotional expressions on behavioral tendencies in women and men. *Journal of Experimental Psychology: Human Perception and Performance, 36,* 500–507. http://dx.doi.org/10.1037/a0018169

Steffens, M. C. (2004). Is the implicit association test immune to faking? *Experimental Psychology, 51,* 165–179. http://dx.doi.org/10.1027/1618-3169.51.3.165

Szczurek, L., Monin, B., & Gross, J. J. (2012). The stranger effect: The rejection of affective deviants. *Psychological Science, 23,* 1105–1111. http://dx.doi.org/10.1177/0956797612445314

Wessa, M., Kanske, P., Neumeister, P., Bode, K., Heissler, J., & Schönfelder, S. (2010). EmoPics: Subjektive und psychophysiologische Evaluationen neuen Bildmaterials für die klinisch-bio-psychologische Forschung [EmoPics: Subjective and psychophysiologic appraisal of recent stimulus pictures for clinical and biopsychological research purposes]. *Zeitschrift für Klinische Psychologie und Psychotherapie, 1,* 77.

Wood, D., & Roberts, B. W. (2006). The effect of age and role information on expectations for big five personality traits. *Personality and Social Psychology Bulletin, 32,* 1482–1496. http://dx.doi.org/10.1177/0146167206291008

(Appendix follows)

Appendix

Overview of Stimulus Material Used in Each Study

Study	Age stimuli	Emotion stimuli	
1	Faces (Project Implicit)[a]	Happiness Zufrieden, glücklich, begeistert, erfreut, froh, freudig, fröhlich, heiter, vergnügt, entzückt	Sadness Traurig, besorgt, trauernd, unglücklich, betrübt, niedergeschlagen, bedrückt, deprimiert, bekümmert, leidend
2	Faces (Project Implicit)	Happiness See Study 1	Anger Verärgert, gereizt, aufgebracht, verbittert, empört, erbost, wütend, frustriert, mürrisch, zornig

3	Scenes (Emotional Picture Set[b])
	Young:
	    044.jpg, 105.jpg, 141.jpg, 150.jpg, 174.jpg, 200.jpg
	Old:
	    033.jpg, 108.jpg, 117.jpg, 145.jpg, 181.jpg, 198.jpg
		Serenity
		serenity, composure, even-tempered, placidity, relaxation, sangfroid, prudence, calm
			Sadness
			Grief, sorrow, gloom, vapours, wistfulness, woe, depression, melancholia

4	Scenes (Emotional Picture Set) See Study 3	Serenity Gelassen, ausgeglichen, besonnen, gefasst, Gleichmut, Klarheit	Anger Ärgerlich, zornig, tobend, aufgebracht, Groll, Rage
5	Faces (Project Implicit)	Anger Rage, aufgebracht, Zorn, tobend, Groll, Ärger	Sadness Kummer, freudlos, niedergeschlagen, Schwermut, Trübsal, Sorge
6 & 7	Scenes (Emotional Picture Set) See Study 3	Anger See Study 5	Sadness See Study 5
8	Scenes (Emotional Picture Set) See Study 3	Anger Angry, wrath, mad, rage, fury, ire	Sadness Sad, worried, depressed, grief, gloom, woe

9	Words
	Young:
	    Zahnspange (braces), Dreadlocks, YouTube Video, MP3-Player, Elektro-Beat (electro beat), Kopfhörer (headphones)
	Old:
	    Gebiss (dentures), Dauerwelle (perm), Arztroman (hospital romance), Lesebrille (reading glasses), Klassisches Konzert (classical concert), Tabakpfeife (pipe)
		Anger
		See Study 5
			Sadness
			See Study 5

10	Free associations	Anger Rage, temper, fury, choler, dander, ire, chagrin, madness	Sadness Grief, sorrow, gloom, vapours, wistfulness, woe, depression, melancholia

[a] See http://www.projectimplicit.net/stimuli.html.   [b] Wessa, M., Kanske, P., Neumeister, P., Bode, K., Heissler, J., & Schönfelder, S. (2010). EmoPics: Subjektive und psychophysiologische Evaluationen neuen Bildmaterials für die klinisch-bio-psychologische Forschung [EmoPics: Subjective and psychophysiologic appraisal of recent stimulus pictures for clinical and biopsychological research purposes]. *Zeitschrift für Klinische Psychologie und Psychotherapie, 1*, 77.