Published in final edited form as:
Psychol Aging. 2014 September ; 29(3): 542–553. doi:10.1037/a0036730.

Aging and the Impact of Irrelevant Information on Social Judgments

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Abstract

We conducted two experiments to specifically examine whether older adults are more susceptible to the negative impact of irrelevant evaluative information when making social judgments. Young (ages 20 – 44), middle-aged (ages 45 – 63), and older (ages 65 – 85) adults were presented with descriptions of people consisting of positive and negative traits that varied in relevance to specific occupations. They were asked to either form a general impression based on these traits or to evaluate the person's fitness for the specified occupation. In both studies, evaluative content of the descriptions (i.e., the number of positive minus number of negative traits) was a significant predictor of subjective evaluations. Of prime importance, adults of all ages were similarly able to selectively process relevant versus irrelevant information when occupational fitness evaluations required them to focus on a subset of information in the descriptions. Participants also adjusted the specific types of information used in making judgments, with the relative importance of agentic traits and negative information being greater when making occupation evaluations than when forming impressions. The results suggest that age differences in the processing evaluative information are minimal, and that the availability of well-established knowledge structures can help older adults effectively control the impact of irrelevant evaluative information when making social inferences.

Keywords

aging; social cognition; executive functions; impression formation

Interactions with other people are an important aspect of everyday functioning. Such interactions are essential for promoting many aspects of well-being (e.g., happiness, assistance with instrumental activities), and our ability to function effectively in social contexts is in part related to our ability to make inferences about the characteristics of other people and then use this information to facilitate achievement of social goals. Consistent with research and theory about social cognition (for review, see Fiske & Taylor, 2007), the nature of such inferences is likely to be influenced by basic cognitive mechanisms, chronic and situational goals, and knowledge about and experience with the social world. Significantly, these same factors vary with age, highlighting the potential for age-related change in social inferences. An important question concerns how these factors interact in

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determining age differences in social judgments. From a cognitive aging perspective, older adults might be expected to be poorer at making accurate social judgments due to declines in basic cognitive abilities that undergird such processes, and, indeed, some research is consistent with this notion. For example, older adults perform worse than younger adults on theory of mind tasks (e.g., Henry, Phillips, Ruffman, & Bailey, 2013), and are more likely to make stereotypical inferences about members of stigmatized groups (e.g., Krendl, Heatherton, & Kensinger, 2011; Radvansky, Copeland, & von Hippel, 2010; von Hippel & Dunlop, 2005). Further, these age effects are partially mediated by age differences in ability (e.g., speed, executive functions) (e.g., Bailey & Henry, 2008; Charlton, Barrick, Markus, & Morris, 2009; Rakoczy, Harder-Kasten, & Sturm, 2012; von Hippel, 2007; Wang & Su, 2013). In both cases, older adults' difficulties might be viewed in terms of problems with controlling the impact of salient, but inappropriate social information (e.g., one's own perspective, negative stereotypes) on judgments.

Other research suggests that the picture regarding aging and social inferences is not so simple. For example, relative to younger adults, middle-aged and older adults often exhibit superior performance in situations requiring individuals to make inferences about personality traits from behavioral information (for review, see Hess & Queen, in press). This may indicate more effective application of social knowledge relating to the trait diagnosticity of specific types of behavior, perhaps reflecting adaptive processes associated with cumulative social experience over the lifespan (e.g., Hess, Osowski, & Leclerc, 2005). Research has also demonstrated that older adults may base evaluations of others on different types of information than younger adults, with the differences reflecting variation in chronic social goals. For example, older adults are more likely than both young and middle-aged adults to focus on traits in the morality domain (e.g., honesty) when evaluating potential interaction partners (Hess & Kotter-Grühn, 2011). Such traits have primary benefit or harm implications for others, and are often termed *other-profitable* (Peeters & Czapinski, 1990). Thus, a disproportionate focus on such traits in evaluating others in later life might be seen as consistent with chronic goals associated with promoting positive social outcomes (Carstensen, Isaacowitz, & Charles, 1999).

Two conclusions regarding aging effects can be drawn from these findings. First, the types of social information that individuals use to make inferences may vary with age. Age and individual differences in chronic goals, life circumstances, and social experience may result in qualitative differences with respect to the types of information used in constructing social inferences (e.g., Blanchard-Fields, Chen, Schocke, & Hertzog, 1998; Hess & Kotter-Grühn, 2011; Hess et al., 2005; Stanley & Blanchard- Fields, 2011). Second, although knowledge might counteract the impact of declining cognitive resources in later adulthood (Hess & Queen, in press), older adults may experience problems in making social inferences when salient social knowledge—such as one's own perspective in theory of mind tasks—needs to be controlled. Thus, the match between social cues in the environment and salient social knowledge structures may be an important determinant of age differences in performance. When such cues activate inappropriate information (e.g., stereotypes), age will negatively impact social information processing, with ability then being an important determinant of performance. In contrast, age differences in performance will be attenuated or reversed when appropriate knowledge is activated and can be used to interpret social cues.

EXPERIMENT 1

Our first study provided data relevant to these ideas by examining the degree to which different-aged adults are able to ignore salient but irrelevant evaluative (i.e., valenced) information when making social judgments. Evaluative information comprises a central component of representations of others (e.g., Wyer & Srull, 1989), and the processing of such information is fairly ubiquitous and occurs relatively automatically at early stages of processing (for reviews, see Bargh, 1997; Fazio, 2001; Herring et al., 2013). The processing of evaluative information is further enhanced in the presence of evaluative goals (e.g., Spruyt, De Houwer, & Hermans, 2009). The efficiency of processing evaluative information from social cues is also maintained in later life in spite of deficiencies in the encoding of more specific content from the same cues (e.g., Hess & Follett, 1994; Hess, Pullen, & McGee, 1996). Given the fluency of processing associated with such information, an important skill relates to the ability to control the impact of such information when it is irrelevant to the task at hand. Younger adults are able to effectively engage in such control when aware of the source of the irrelevant information (e.g., Murphy & Zajonc, 1993), whereas older adults appear less able to do so (e.g., Hess, Germain, Rosenberg, Leclerc, & Hodges, 2005; Hess, Waters, & Bolstad, 2000; Queen & Hess, 2010). For example, using a method similar to Murphy and Zajonc (1993), Hess et al. (2000) found that evaluations of neutral stimuli by both young and older adults were affected by subliminally presented irrelevant evaluative primes (i.e., positive or negative nouns). When the primes were presented supraliminally, younger adults were able to control their impact on evaluations, whereas older adults continued to demonstrate assimilation to the valence of the prime. Such findings suggest that both young and older adults process evaluative information with little conscious involvement, but that irrelevant evaluative information has a disproportionate impact on older adults' judgments. This may reflect age-related declines in executive skills underlying the ability to monitor and control irrelevant information (for review, see Braver & West, 2008). Our interest is the extent to which relevant social knowledge may allow older adults to effectively process social information in spite of declines in cognitive control mechanisms.

In our first experiment, different-aged adults were presented with descriptions of people consisting of lists of positive and negative personality characteristics. Some descriptions contained traits judged to be of high relevance to a specific job, whereas others contained these same traits plus additional traits judged to be of low relevance for the same job. For each description, participants either formed a general impression about the person or evaluated the person's fitness for a particular job. In general, no age differences were expected in the ability to both process evaluative information (e.g., the number of positive versus negative traits) and use this information in forming impressions. Of primary interest was the extent to which older adults could disregard automatically processed evaluative content of irrelevant traits in forming job evaluations based on the same information. Using a similar task in a consumer decision-making context, Queen and Hess (2010) found that older adults were more likely than younger adults to base decisions on evaluative content of all attributes associated with choice alternatives as opposed to that associated with the relevant subset of attributes. This task, however, was a relatively novel one in which older adults could not apply previous experience. In contrast, participants in the present study could use relatively well-established knowledge to guide processing, permitting examination of the generalizability of these results to a more familiar context.

We were also interested in determining the impact of different categories of traits on judgments. Descriptions were composed of equal numbers of communal and agentic traits, which relate to the two primary dimensions along which social inferences are made (e.g., Abele & Wojciszke, 2007; Fiske, Cuddy, & Glick, 2007). Communal traits are essentially the same as the aforementioned morality traits. In contrast, agentic traits reflect competence (e.g., intelligence) and tend to be more beneficial—or detrimental—to the individual possessing them, and are often characterized as *self-profitable* (Peeters & Czapinski, 1990). Communal traits typically have primacy over agentic traits in forming impressions of others, but situational goals may moderate this relationship (e.g., Wojciszke & Abele, 2008). For example, goals emphasizing interdependencies with others (e.g., evaluating a work partner) result in increased emphasis being placed on agentic traits in making judgments of others. In our study, we hypothesized that the relative emphasis on agentic versus communal trait information will be greater when evaluating fitness for a job than when forming an impression.

We also hypothesized that when compared to young and middle-aged adults, older adults will exhibit a disproportionate focus on communal traits. This would be consistent with hypothesized shifts in chronic social goals to those emphasizing the affective aspects of social relationships (Carstensen et al., 1999). Of further interest was the extent to which different situational goals (i.e., forming an impression vs. evaluating fitness for a job) would attenuate these hypothesized age differences. Using a somewhat different task, Hess and Kotter-Grühn (2011) found evidence for a general developmental shift towards emphasizing communal traits in evaluating others, but also found that older adults were less sensitive to situational goals than young and middle-aged adults in adjusting their relative focus on agentic versus communal traits. The present study allowed us to test for similar trends.

Method

Participants—We tested 146 participants: 61 younger (31 women; 20 – 44 years), 42 middle-aged (23 women; 45 – 63 years), and 43 older (23 women; 65 – 85 years) adults. All were community-dwelling volunteers recruited from the NCSU Adult Development Lab participant pool and received a $30 honorarium. Age group differences in health and ability (Table 1, top) are consistent with typically observed trends.

Materials

Social judgment task: We created 12 different sets of 6 traits for each of four different jobs (judge, physician, police officer, and teacher). The traits were drawn from the endpoints of trait dimensions judged to be relevant to the job (e.g., *biased* vs. *fair* for a judge) by an independent group of 10 young and 10 older adults. The mean relevance rating for these items was 2.07 on a scale from 1 (most relevant) to 7 (least relevant), with the correlation between mean ratings for young and old for all traits used being .93. In addition, three traits in each set were drawn from the communal domain (e.g., *fair, honest, open-minded* for the job of judge) and three from the agentic domain (e.g., *attentive, decisive, logical* for the job of judge).[1] Combinations of positive and negative traits were then used to create descriptions varying in evaluative content, defined as number of positive traits minus number of negative traits. Two sets of traits at each of the following evaluative levels were then created for each job: 6, 4, 2, -2, -4, and -6. These 6-item sets formed the short descriptions containing only job-relevant information. The long descriptions contained an additional three communal (e.g., *generous*, *nurturing*, and *warm* for judge) and three agentic traits (e.g., *active*, *enthusiastic*, and *outgoing* for judge) that had been judged to be relatively low in relevance (M rating = 5.57) for the associated job (e.g., *thrifty* for a doctor). The difference in relevance ratings for the high and low relevance traits was significant, $t(46) = 23.70$, $p < .001$. Thus, these longer descriptions consisted of exactly the same job-relevant information as the short descriptions (i.e., identical job-specific evaluative scores), but with a like amount of less relevant information. The overall evaluative content of the longer descriptions ranged from 10 to -10, with overall and job-specific evaluative scores for these descriptions being only moderately correlated, $r = .48$. (Note that total independence of the two scores was impossible while maintaining relatively similar levels of representation across the range of evaluative scores for both the entire set of traits and just the job-relevant ones.) To control for content, we created four different sets of stimuli, with each set containing an equal number of descriptions relating to each of the four occupations spread across the evaluative content levels.

Ability: We used several measures to assess basic cognitive and executive functions. The digit-symbol-substitution (DSS) and letter-number-sequencing (LNS) subtests from the Wechsler Adult Intelligence Scale-III (WAIS-III; Wechsler, 1997) assessed perceptual speed and working memory, respectively. The Plus-Minus task assessed task switching. Participants were presented with a sheet containing three columns with a two-digit number at the top of each. They were instructed to add 3 to each number in the first column, subtract 3 from each number in the second column, and alternate between adding and subtracting 3 from the numbers in the third column. The dependent measure for this task is the time taken to complete the third column minus the mean time taken to complete the first two. A Stroop task assessed response inhibition, with mean response time for congruent trials being subtracted from that of incongruent trials. Finally, the WAIS-III vocabulary subtest measured verbal ability.

Procedure—Prior to testing, participants were sent and completed a background questionnaire assessing basic demographic information and the SF-36 Health Survey (Ware, 1993), which they returned when they came to the laboratory. Following informed consent, the social judgment task was administered. Participants viewed 48 target descriptions on a computer screen. This included two presentations of each of the aforementioned 24 descriptions, once under general impression instructions and once under job-evaluation

[1]Each job had a different set of relevant and irrelevant traits, with minimal overlap (i.e., no more than 1 shared trait dimension) across jobs.

instructions. Approximately equal numbers of participants viewed each of the four different stimulus sets. Traits in each description were presented individually in random order, with participants controlling presentation rate using the spacebar. Prior to each description, participants were informed whether they were to (a) form an impression of the target based on the listed traits or (b) evaluate the target's fitness for a specific job. After viewing all the traits, participants made the appropriate rating on a 1 (negative) – 5 (positive) scale using a response box. Presentation of the 48 descriptions was quasi-random, with one description from each Task × Description Length condition presented in each group of four descriptions. After this task, participants completed the ability tests, were debriefed, and then given their honorarium.

Results

Judgments—Our first set of analyses focused on ratings made by participants using multi-level modeling (MLM) to examine the impact of age group (dummy-coded, with young adults serving as the referent), judgment type (i.e., impression [referent] versus job) and evaluative content. This allowed us to use each participant's individual responses to each description as dependent variables.[2] Each analysis used different subsets of observations to address different questions. Fully unconditional null models conducted on these subsets revealed significant within-person variance in all models (*p*s < .0001), whereas significant between-person variance (*p*< .01) was only observed in the model examining responses to 12-trait descriptions. The percentage of variance representing within-person variability ranged for 98 – 100%. Note that the small percentage of between-person variance does not mean that there are no differences between individuals, but rather that clustering participants by age groups does not help explain variability across observations. In other words, participants can be treated as independent of each other even if they belong to the same age group.

General predictors: Our first model focused on ratings for the short descriptions. Age group was a Level 2 predictor, and judgment task and evaluative score were Level 1 predictors. All within- and cross-level interactions were included in the model. Given that all traits in these descriptions were also relevant to the job being judged, we expected minimal effects due to judgment type. The results of this analysis revealed a significant positive association with evaluative score, $b = .29$, $t(3395) = 34.87$, $p < .0001$. Judgment type also was significant, $b = -.25$, $t(3395) = -5.92$, $p < .0001$, due to job-evaluation ratings being lower than impression ratings. Unexpectedly, judgment type moderated the impact of evaluative score, $b = .02$, $t(3395) = -2.53$, $p = .01$, but this relatively small effect was due to the relation between evaluative score and ratings being a bit stronger for the job task ($b = .32$). The only age effects observed involved the contrasts for the middle-aged, $b = -.12$, $t(145) = -2.18$, $p = .03$, and older groups, $b = -.16$, $t(145) = -3.00$, $p = .003$, due to ratings in these groups being lower on average than those of younger adults. Thus, as expected, participants in the three age groups were equally adept at using the evaluative information to

[2]In both experiments, we had also included stimulus set in all analyses to ensure that variations in descriptive content across the four sets did not influence responses. Inclusion of this variable did not affect the basic pattern of results, and thus it was not considered further.

form impressions and make job evaluations. This conditional model explained 75% of the variance accounted for by the null model for the 6-item descriptions.

Of primary interest was whether age differences existed in the ability to control the impact of irrelevant information in making judgments. We investigated this possibility using two different models. A first model was analogous to the preceding one, but compared impression and job judgments associated with the longer descriptions (Figure 1). Note that both judgments were made based on the same 12 traits, but only 6 were relevant to the job description. If summary evaluative scores based on all traits are used to predict ratings, we should observe that they do better predicting general impressions than job evaluations. That is, judgment type should moderate the impact of evaluative score on ratings. In addition, if older adults are unable to filter out the irrelevant information, then summary evaluative score should do a good job of predicting both types of ratings in this group, with age moderating the impact of judgment type on evaluative score. Impression ratings were significantly higher than job ratings, $b = -.28$, $t(3395) = -5.10$, $p < .0001$, and ratings were positively associated with evaluative scores, $b = .13$, $t(3395) = 19.97$, $p < .0001$. An interaction between these two variables was also observed, $b = -.06$, $t(3395) = -6.23$, $p < .0001$. As expected, summary evaluative scores were better predictors of impression ratings ($b = .17$) than of job evaluations ($b = .07$). Once again, age did not moderate any of these effects (ps > .41), with the only age effects due to older adults' lower overall ratings, $b = -.18$, $t(145) = -2.59$, $p < .01$. (Note that similar results are obtained if this same analysis is conducted substituting the job-specific evaluative score—based on the subset of relevant traits only—for the summary score: the job-specific score is a better predictor of job ratings [$b = .22$] than of impression ratings [$b = .13$]). This model accounted for 69 % of the within-person variance present in the null model. Based on the results of these two analyses, older adults are similar to young and middle-aged adults in their ability to control the impact of irrelevant information on social judgments.

The second model examined job-evaluation judgments for short (referent) versus long descriptions as a function of job-specific evaluative scores. Remember that these two types of descriptions contained identical job-relevant information, with the only difference being the inclusion of traits of low relevance in the longer descriptions. Thus, there should be minimal differences in job judgments across description length if individuals are able to control the impact of irrelevant information and focus on the subset of relevant traits. We were specifically interested in whether age moderated the relationship between description length and evaluative score. Job judgments were positively associated with job-specific evaluative score, $b = .32$, $t(3395) = 36.32$, $p< .0001$, and ratings were lower for the longer descriptions, $b = -.24$, $t(3395) = -5.33$, $p< .0001$. Description length also moderated the task effect, $b = -.09$, $t(3395) = -8.83$, $p < .0001$, with the slope associated with evaluative scores being less steep for longer descriptions ($b = .22$). This weaker relationship most likely reflects the greater difficulty associated with the longer descriptions. Notably, in spite of the additional challenge posed by the irrelevant information in these description, participants in all age groups still made ratings that were systematically tied to the subset of relevant information (Figure 2). Importantly, age did not moderate any effects (ps > .12).The model explained 70% of the variance.

Ability and education: The absence of age effects might seem surprising given observed age differences in basic cognitive abilities. To explicitly examine the impact of these factors on performance, we included cognitive ability as an additional Level 2 predictor in the foregoing models using a composite score based on a principal components analysis conducted on the primary cognitive measures. This analysis revealed a single factor accounting for 51% of the variance, with relatively similar component scores associated with LNS (.71), DSS (.79), Stroop (.75), and Plus-Minus (.61) performance. Age was negatively correlated with this score, $r = -.61$. Models using the composite score revealed no effects due to ability. We also included education as an additional Level 2 predictor to examine the possibility that the relatively advantaged status of our sample might have masked any age effects. No effects involving education were obtained either.

Information content: Our next set of analyses focused on whether individuals differentially weight agentic versus communal traits in making judgments, and whether information use varied by age and task. Two models addressed these questions, one for each type of task. In each, ratings were predicted by evaluative scores associated with agentic traits and communal traits that were specific to the task (Level 1) and by age group and set size (Level 2). Cross-level interactions between each evaluative score and the Level 2 variables were also included, along with all Level 2 interactions. Only results involving trait type are reported.

In the impression task, both communal, $b = .32$, $t(3389) = 12.82$, $p < .0001$, and agentic, $b = .26$, $t(3389) = 9.98$, $p < .0001$, evaluative scores were positively associated with ratings. Set size moderated both of these effects (agentic, $b = -.21$, $t(3389) = 3.44$, $p < .0001$; communal, $b = -.20$, $t(3389) = 6.39$, $p < .0001$), with the slopes for both types of scores being smaller for longer descriptions (*b*s = .14). For job evaluations, participants once again used information relying on both types of traits, but the effect for agentic traits, $b = .37$, $t(3389) = 12.54$, $p < .0001$, was stronger than that observed for communal traits, $b = .27$, $t(3389) = 9.42$, $p < .001$. The impact of agentic traits was once again reduced ($b = .25$) for the longer descriptions, $b = -.11$, $t(3389) = -2.87$, $p = .004$. Importantly, age did not moderate the effects of trait type in either model (*p*s > .30). These two models accounted for 68% and 69% of the variance, respectively.

Power considerations: Given the paucity—and importance—of age-related effects in these analyses, we conducted a post hoc power analysis in order to determine if we had sufficient statistical power to identify reasonably sized age effects. Following procedures outlined by Hedges and Rhoads (2009) for two-level hierarchical MLM designs, we calculated the power to detect medium-sized effects ($\delta = .5$) for two-sided *t*-tests at $\alpha = .05$. Based on information obtained from our most complex model in this section, power was determined to be > .95.

Study Times—We next examined how age and task influenced attention to different types of information by examining study times for individual traits. To do so, we eliminated all study times that were less than 100 ms as well as those that were +/- 3 *SD*s from the individual participant's mean for the remaining times.

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Short descriptions: Our first analysis used a 3 × 2 × 2 × 2 (Age Group × Task × Trait Domain × Trait Valence) analysis of variance (ANOVA) to examine mean study times for the 6-trait descriptions. (Two young and one older adult were identified as outliers and excluded from the analysis.) A significant age effect was obtained, $F(2,142) = 12.16$, $p < .001$, $\eta^2_{partial} = .15$, with younger adults having shorter study times ($M = 998$ ms) than both middle-aged ($M = 1279$ ms) and older ($M = 1236$ ms) adults. Significant effects were also observed for: task, $F(1,142) = 65.71$, $p < .001$, $\eta^2_{partial} = .32$; valence, $F(1,142) = 33.26$, $p < .001$, $\eta^2_{partial} = .19$; Task × Valence, $F(1,142) = 21.18$, $p < .001$, $\eta^2_{partial} = .13$; Domain × Valence, $F(1,142) = 6.67$, $p = .01$, $\eta^2_{partial} = .05$; and Task × Domain × Valence, $F(1,142) = 4.71$, $p = .03$, $\eta^2_{partial} = .03$. These effects reflected the facts that study times were longer when making impression judgments and when viewing negative traits. The interactions were due to the effect of valence being stronger when making job judgments than when forming impressions, with this effect being particularly strong for communal traits (Table 2, top). Age did not moderate any of these effects (*p*s > .19).

Long descriptions: A second ANOVA was performed on mean study times for the 12-trait descriptions, with the additional factor of trait relevance to the job being judged. (Remember that all traits were of high relevance in the shorter descriptions, as opposed to only half in the longer ones.) Once again, younger adults had significantly shorter study times ($M = 991$ ms) than either middle-aged ($M = 1260$ ms) or older ($M = 1249$ ms) adults, $F(2,1442) = 12.55$, $p < .001$, $\eta^2_{partial} = .15$. The following significant effects were also obtained, reflecting trends similar to those observed with the short descriptions: task, $F(1,142) = 42.77$, $p < .001$, $\eta^2_{partial} = .23$; valence, $F(1,142) = 49.40$, $p < .001$, $\eta^2_{partial} = .26$; Task × Domain, $F(1,142) = 17.19$, $p < .001$, $\eta^2_{partial} = .11$; and Task × Valence, $F(1,142) = 4.92$, $p = .03$, $\eta^2_{partial} = .03$.

Of greater interest are a series of interactions involving the relevance of the traits to the job task: Relevance × Domain, $F(1,142) = 12.22$, $p < .001$, $\eta^2_{partial} = .08$; Relevance × Valence, $F(1,142) = 21.50$, $p < .001$, $\eta^2_{partial} = .13$; Task × Relevance, $F(1,142) = 3.99$, $p = .048$, $\eta^2_{partial} = .03$; Task × Relevance × Valence, $F(1,142) = 4.15$, $p = .04$, $\eta^2_{partial} = .03$; and Task × Relevance × Domain × Valence, $F(1,142) = 7.41$, $p = .007$, $\eta^2_{partial} = .05$. The latter two interactions were of particular interest given the expectation that task would affect the attention devoted to relevant versus less relevant traits. When just job judgments are examined, agentic and negative traits were studied longer than communal and positive traits (*p*s < .01), with the effect of valence being stronger for irrelevant than for relevant traits ($p < .001$). In contrast, communal traits and negative traits were studied longer than agentic and positive ones when making impression judgments ($p < .02$), and the valence effect was particularly strong for irrelevant communal traits ($p < .03$) (Table 3, bottom).

The only additional effect associated with age was a significant Age × Task × Relevance interaction, $F(2,142) = 3.41$, $p = .04$, $\eta^2_{partial} = .05$. This was due to irrelevant information being studied somewhat longer than relevant information by all age groups in both tasks except for middle-aged participants in the job task, where the reverse trend (i.e., greater focus on relevant information) was observed.

Discussion

The results of this study revealed no age differences in the ability to use trait-based information to make social judgments. Participants were able to discriminate between traits based on their relevance to the type of judgment being made. Notably, in spite of poorer cognitive skills, older adults were no worse than young and middle-aged adults at controlling the impact of irrelevant information. The fact that neither age nor ability predicted discrimination between relevant and irrelevant information suggests that people may be able to rely on relevant social knowledge (e.g., beliefs about the characteristics that make a good police officer) to make such distinctions. This knowledge, in turn, may minimize the negative impact of aging and declining cognitive skills observed in similar situations where such knowledge is not present.

Surprisingly, this relatively clear discrimination between general and job-specific information displayed in judgments was not evident in study times. We expected participants to spend more time studying high versus low relevant traits when making job evaluations than when making general impression ratings. This pattern was only observed in the middle-aged group. Since a corresponding age-related trend was not observed when ratings were examined, however, we are reluctant to make much of this relatively small trend.

We also found that the type of information attended to varied as a function of task. As expected, the relative weighting of agentic to communal information increased when comparing job evaluations with impression judgments, with agentic information increasing in importance in the former task. This same difference in weighting was observed for study times associated with the long descriptions. Valence also had a stronger effect on study times when making job evaluations, suggesting that negative information was emphasized more than when participants were simply forming impressions. There was some variation in this effect across information domain and relevance, with the impact of valence in the job condition appearing particularly strong for irrelevant information. There was, however, little evidence of any age differences in performance, and the fact that we did not observe a stronger focus on communal information with increasing age was inconsistent with expectations and previous findings (Hess & Kotter-Grühn, 2011).

EXPERIMENT 2

In spite of age differences in basic cognitive skills, Experiment 1 found no evidence that older adults were less able than young or middle-aged adults to control the impact of irrelevant information on social judgments. There was also no evidence of age differences in the type of information used in constructing social judgments. We decided to conduct a second experiment to see if these results replicated. We also wanted to more cleanly examine the role of different categories of information in making judgments. Although we were able to examine the influence of agentic and communal information in the first study, there were relatively strong correlations between the evaluative scores associated with these two types of traits across descriptions (rs > .8). This may have negatively affected our ability to examine the independent influences of agentic and communal traits across both age and task conditions. To counter this, we constructed the stimuli in a manner that decreased the interrelationships between the evaluative scores of the two trait categories, providing a more rigid test of their relative influences.

Method

Participants—31 younger adults (18 women; 20 – 39 years) and 35 older adults (19 women; 65 – 84 years) were recruited and compensated as in Experiment 1. Sample characteristics are presented in Table 1 (bottom), and age differences in health and ability are relatively typical.

Measures and Procedure—The methods were similar to those of Experiment 1, with the following exceptions. First, in the social judgment task, we only used long (i.e., 12-trait) descriptions, with participants viewing 16 descriptions in each task condition. Second, we restructured the descriptions in an attempt to minimize the correlations between the evaluative content associated with different categories of information. We were relatively successful in this regard, with the correlations between evaluative scores for agentic and communal traits across descriptions being .38 for all traits and -.06 for job-relevant traits. Third, we restricted the range of evaluative scores across descriptions (8 to -8 for all traits, 4 to -4 for job-relevant traits), which allowed us to create more independent subsets of traits within descriptions. This also should increase the between-person variability by eliminating the restricted range of responses associated with extremely positive or negative descriptions (e.g., 11 positive and 1 negative trait). Finally, participants completed a computerized version of the Wisconsin Card Sorting Task (Heaton & Psychological Assessment Resources Staff, 2000) to provide another common index of executive functioning.

Results

Judgments—We once more employed MLM analyses to examine predictors of social judgments. Ratings for each of the 32 descriptions were used as DVs, with the different types of evaluative scores and task (impression = referent) serving as Level 1 predictors, and age group (young = referent) as a Level 2 predictor. All cross-level and Level 2 interactions were also included in the models.

General predictors: We first examined the differential predictive power of overall evaluative scores and job-specific scores with respect to each type of task. Once again, we expected the overall scores to be more predictive for impression ratings, whereas the job-specific score should be more predictive of job ratings (Figure 2). Prior to running these models, we ran a fully unconditional null model on the ratings data, and found significant within-subject ($p < .0001$) and between-subject ($p = .0008$) variability, with the vast majority of variance (96%) once again being within subjects.

The first model examined overall evaluative scores as predictors. These scores were positively associated with ratings, $b = .11$, $t(2040) = 12.73$, $p <.0001$, and ratings were higher for the impression task than for the job task, $b = -.38$, $t(2040) = -6.48$, $p <.0001$. As expected, the Evaluative Score × Task interaction was also significant, $b = -.03$, $t(2040) = -3.06$, $p =.002$, due to the predictive power of overall evaluative scores being reduced for the job task ($b = .07$). Replicating the results of Experiment 1, we also found that age did not moderate any of these effects (*p*s > .29). We next performed an identical analysis using job-specific evaluative scores as Level 1 predictors. The same effect of task was once again obtained, b = -.38, $t(2040) = -6.59$, p <.0001, and ratings were positively associated with job-specific scores, b = .14, $t(2040) = 8.14$, $p < .0001$. The Task × Job-specific score interaction was also significant, b = .09, $t(2040) = 4.25$, $p < .0001$, due to job-specific scores being stronger predictors of job ratings (b = .23) than they were of impression ratings (b = .14). Importantly, there was no evidence that age moderated the obtained effects (*p*s > .10). These two models accounted for 28% and 30% of the variance, respectively.

Ability and education: We once again performed a principal components analysis on our cognitive variables, and obtained a single component accounting for 47% of the variance with the following loadings: LNS, .71; DSS, .76; Stroop, -.79; Plus-Minus, -.49; Wisconsin Card Sort, .57. As in Experiment 1, inclusion of the factor scores as additional Level 2 predictors revealed no effects due to ability. A similar set of analyses also revealed that education was not predictive of performance.

Information content: We next used evaluative scores associated with agentic and communal traits to examine the specific impact of each type of trait information across tasks and age groups. In the impression task, we used evaluative scores derived from all traits within each category as Level 1 predictors. Both types of traits were positively associated with impression ratings, with communal evaluative scores exhibiting stronger relations, b = .15, $t(986) = 12.07$, $p < .0001$, than agentic evaluative scores, b = .05, $t(986) = 3.18$, p = .002. A similar analysis using evaluative scores associated with job-specific agentic and communal traits to predict job ratings found that ratings were positively associated with both agentic traits, b = .19, $t(986) = 7.85$, $p < .0001$, and communal traits, b = .26, $t(986) = 11.96$, $p < .0001$. Once again, age was not observed to moderate any of these effects (*p*s > .54). These models accounted for 39% and 37% of the variance, respectively.

In sum, the results are similar to those of Experiment 1. Adults in both age groups were able to adjust their judgments and the information used to the task at hand. In addition, the types of information used for the two tasks varied, with agentic traits exhibiting a greater increase in importance than communal traits when predicting job fitness.

Power considerations: As in the previous study, we calculated power according to the methods and models of Hedges and Rhoads (2009) for our most complex model. We determined that the power to detect medium-sized effects (δ = .5) for two-sided *t*-tests at α = .05 was once again > .95.

Study Time—Study times for individual traits were once again used to examine attention allocation across different types of information. Mean study times were calculated as in Experiment 1, and analyzed using a 2 × 2 × 2 × 2 × 2 (Age Group × Task × Relevance × Domain × Valence) ANOVA. Data from one young and one older participant were identified as outliers and excluded from this analysis. Older adults had longer study times than did younger adults (*M*s = 1098 ms vs. 884 ms, respectively), $F(1,62) = 10.61$, p = .002, $\eta^2_{partial}$ = .15, study times were longer in the impression task than in the job task (*M*s = 1010 ms vs. 973 ms, respectively), $F(1,62) = 4.84$, p = .03, $\eta^2_{partial}$ = .07, relevant traits were studied longer than irrelevant traits (*M*s = 1045 ms vs. 938 ms, respectively), $F(1,62) = 71.02$, $p < .001$, $\eta^2_{partial} = .53$, and communal traits were studied longer than agentic traits (*M*s = 1024 ms vs. 959 ms, respectively), $F(1,62) = 40.63$, $p < .001$, $\eta^2_{partial} = .40$, The only other significant effect was the Task × Domain × Valence interaction, $F(1,62) = 5.05$, $p = .03$, $\eta^2_{partial} = .08$. Separate ANOVAs within tasks revealed that this interaction was due to the Domain × Valence interaction being significant for the job task ($p = .02$), but not for the impression task ($p = .55$). For the former task, participants studied negative agentic traits longer than positive ones (*M*s = 961 ms vs. 923 ms, respectively), but paid similar amounts of attention to negative and positive communal traits (*M*s = 1003 ms vs. 1004 ms, respectively).

The main effect of relevance along with its failure to interact with task was unexpected. This may be due to contamination across trials due to the interspersing of job and impression tasks, with participants learning to discriminate between those traits typically judged to be high versus low in relevance across descriptions. Although the Task × Relevance × Domain × Valence interaction was not significant, the general pattern of means is similar to that observed in Experiment 1 (Table 3).

Discussion

The results of this experiment were consistent with those of the first. Young and older adults were equally adept at using evaluative information associated with specific traits to make social inferences, with participants in both age groups demonstrating similar types of adjustments in study times and judgments to situational goals. Of particular note was the absence once again of age differences in the ability to filter out evaluative information associated with low relevance traits in making judgments, and the lack of relationship between this ability and basic cognitive skills.

The current results regarding task-specific information use were also more consistent with expectations than those observed in Experiment 1, with communal traits being the primary basis for evaluation when forming general impressions and agentic traits increasing in relative importance when making evaluations regarding suitability for a particular job. We had also hypothesized that the focus on communal traits will increase in later life, but once again age did not moderate the impact of information use.

GENERAL DISCUSSION

Our research was designed to further our understanding of adult age differences in the ability to make social inferences, with specific interest in the extent to which different-aged adults were able to control the impact of irrelevant evaluative information on constructing accurate inferences. Older adults in both studies exhibited typical decrements in executive functions, which might be expected to negatively impact their ability to ignore this irrelevant information. In contrast to these expectations, however, we obtained no evidence of age or ability effects on performance. Indeed, the within-participant variability in performance far exceeded the between-person variability in both studies, suggesting that judgments were largely uninfluenced by characteristics of the individual.

The absence of age differences contrasts with other research suggesting that declining cognitive skills negatively influence social judgments, with older adults being generally poorer than younger adults at both making inferences about mental states and inhibiting inappropriate social responses (e.g., Bailey & Henry, 2008; von Hippel & Dunlop, 2005). It also contrasts with previous findings specific to the processing of evaluative information, whereby older adults were less able to control the impact of irrelevant information (e.g., Queen & Hess, 2010). A common thread between these studies and ours may relate to the extent to which activated social knowledge facilitates or impedes processing. In the present research, participants may have been able to use socially shared knowledge regarding the attributes associated with specific jobs to guide processing, reducing reliance on executive skills to focus attention. This may contrast with situations involving inappropriate social responses, where efficient executive skills may be necessary to inhibit automatically activated social knowledge regarding negative stereotypes. Indeed, Krendl et al. (2009) found that high-functioning older adults were as likely as younger adults to suppress stereotypic responses. A similar scenario may play out in theory of mind tasks, where there is no salient social knowledge available to guide inferences other than the participant’s personal perspective. Thus, cognitive ability may play an important role in disengaging from one’s own perspective and integrating situational information to make accurate inferences.

This tension between social knowledge and cognitive ability may not be the only source of age differences. Consistent with the notion of selective engagement (Hess, in press), age differences associated with ability may be attenuated if older adults are sufficiently motivated to engage cognitive resources to support performance. For example, Zhang, Fung, Stanley, Isaacowitz, and Ho (2013) found that age differences in theory of mind were attenuated when participants were either tested by a family member or primed to feel close to the experimenter. Age differences in social judgments may also be observed when available social knowledge varies across groups. This may occur when different-aged individuals actually have different social schemas or beliefs that they apply in constructing judgments (e.g., Blanchard-Fields et al., 1998; Stanley & Blanchard-Fields, 2011), or when expert declarative or procedural social knowledge structures develop over the course of adulthood (e.g., Hess et al., 2005). Given these parameters, the present results suggest that social knowledge regarding job-related attributes used in the present research was relatively simple (i.e., not requiring extensive social experience), readily available, and appropriate (i.e., did not need to be inhibited) for constructing judgments, resulting in minimal age effects.

Several issues could be raised relating to the current findings and our interpretations. It might be argued that the task used was too simple, and thus would be unlikely to result in age differences in performance even in the absence of beneficial knowledge. We believe, however, that performance patterns in the present study, as well as comparisons with other research, suggest that the present task is reasonably demanding. First, we argue that the less systematic relationship between job-specific evaluative scores in the long as opposed to short descriptions in Experiment 1 is indicative of the increased difficulty associated with the presence of irrelevant information. Second, we also note that two previous studies (Hess et al., 1996; Queen & Hess, 2010) in our lab used similar procedures involving judgments based on lists of positive and negative attributes. In both, no age differences were observed when performance was dependent upon processing evaluative information associated with all presented information, but older adults had more difficulty than younger adults when they had to either ignore evaluative content altogether or focus on a subset of information when familiar knowledge was unavailable to guide processing. Of specific interest in the Queen and Hess (2010) study was the fact that older adults were more likely to base decisions on summary evaluative information associated with all choice attributes as opposed to just a subset of relevant ones. Notably, this occurred even though the attribute lists contained only six pieces of information as opposed to the twelve attributes in the present research.

It might also be argued that the irrelevant traits used in the target descriptions were not of sufficient strength to capture attention and potentially interfere with processing. For example, the previously cited studies in which negative stereotypes were more likely to be applied by older than by younger adults focused on inappropriate information strongly associated with social groups to which the individuals being judged belonged (e.g., Radvansky et al., 2010). Such information may be particularly susceptible to declining executive functions in later life. We once again note, however, that previous research has shown that older adults' judgments, even in relatively simple situations (e.g., rating the likability of evaluatively neutral stimuli; Hess et al., 2000), are disproportionately susceptible to irrelevant—not just inappropriate—evaluative information. We also note that study times in the present experiments indicate that the valence of individual traits was similarly salient for both relevant and irrelevant traits, regardless of task. This, along with the absence of systematic differential effects of relevance across task type, indicates that participants were attending to the valence of both relevant and irrelevant traits.

We were somewhat surprised that differences in attention to high versus low relevance traits across tasks were not stronger than observed. When the relevance effects in Experiment 1 are considered more closely, valence effects are particularly strong for traits that are low in relevance when making job evaluations. This suggests that when irrelevant information is taken into consideration, negative information may be more influential than positive information. The lack of strong relevance effects on study times may also suggest that the differential weighting of high versus low relevance information may occur after initial processing of basic stimulus attributes. This separation of the characteristics of initial versus later stages of social information processing was also observed by Hess and Kotter-Grühn (2011), and is consistent with some models of social cognition (e.g., Wyer & Srull, 1989).

Our interpretation that the availability of shared social knowledge facilitated older adults' processing of social information is dependent upon null age effects in the present research, which requires attention to both statistical power and effect sizes. Unfortunately, little consensus exists regarding the estimation of power or effect sizes from multi-level models. Nonetheless, two sources of information in the present study suggest that age effects in social inferences are trivial. First, the amount of between-person variance in both studies was extremely small ($\leq 4\%$), suggesting that the characteristics of individuals—including age and ability—had little impact on performance. Second, when we used mean ratings in each age group to predict mean ratings of the other age groups across all descriptions in each study (48 in Experiment 1, 32 in Experiment 2), correlations ranged from .96 to .99, indicating substantial performance variance shared across age groups.

The other focus of our research was on whether the type of information processed to make social judgments varied systematically as a function of either age or task. Based on previous research (e.g., Hess & Kotter-Grühn, 2011; Wojciszke & Abele, 2008), we predicted communal information would form the primary basis for making general impression ratings as individuals generally focus on personal characteristics associated with interactions with others. In contrast, assessing fitness for a particular job was expected to increase the emphasis on agentic traits that would help guarantee the target's success in the specific situation. This general pattern was observed in both studies, with adults of all ages adjusting their ratings in response to situational goals.

We also observed differences across tasks and information types when study times were examined. In general, participants paid more attention to negative than to positive information. However, this valence-based effect was stronger when participants were making job evaluations. That is, negative traits were considered longer than were positive traits when judging a target's fitness for a particular job, suggesting that participants were less lenient than when making impression judgments. This task-based effect in focus on negative information was reflected in judgments as well, with impression ratings being more positive than job ratings.

We also did not observe age differences in the type of information used in making judgments. Consistent with hypothesized shifts in chronic goals emphasizing the affective consequences of social relationships (Carstensen et al., 1999), we predicted that older adults would be more likely than younger adults to focus on communal traits given the other-profitable nature of these personal characteristics, regardless of the task context. The obtained null effects appear inconsistent with earlier work in our lab (e.g., Hess & Auman, 2001; Hess & Kotter-Grühn, 2011). This inconsistency, however, may relate to differences in the bases for social inferences across studies. In this earlier work, participants were presented with behaviors—which formed the basis for trait inferences—as opposed to the traits themselves. Differences regarding the certainty of trait implications from behavioral versus specific trait information may have played a role in the absence of age effects. Although target descriptions in our earlier work contained both positive and negative agentic and communal behavioral information, the trait implications of this information were biased by the differential diagnosticity of positive and negative behavioral information across these two domains (Skowronski & Carlston, 1989). For example, negative communal behaviors result in greater certainty regarding inferences of dishonesty than positive communal behaviors do with respect to honesty. Thus, even in cases where there are equal numbers of positive and negative communal behaviors, evaluation is weighted toward the negative end of the trait dimension, particularly for middle-aged and older adults. In contrast, presenting actual traits—as in the present research—presumably implies accuracy in assessment. Therefore, positive information may carry as much weight as negative information, regardless of trait category. This may eliminate any age effects based in salience of behaviors or accuracy in making trait inferences from behaviors, which in turn may

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minimize age differences in the relative influences of agentic versus communal behaviors on judgments.

In conclusion, the present studies add to a growing body of research regarding age differences in social-cognitive abilities. Our findings suggest that the availability of social knowledge structures may allow people to maintain valuable social cognitive skills into later life. In light of research in other domains demonstrating disproportionate benefits of knowledge in supporting older adults' cognitive performance, the present results may not seem that surprising. Taken in the context of previous work on social inference processes, however, our findings help to identify boundary conditions associated with age effects. Specifically, the match between the situation and activated available knowledge appears to be an important determinant of age effects, with age decrements in performance being more probable in situations where irrelevant or inappropriate knowledge is activated. Importantly, our research extends previous work by demonstrating that older adults are also able to use social knowledge to filter out irrelevant evaluative information that has been shown in previous research to be processed relatively automatically by adults of all ages but to be disproportionately disruptive to their social information processing.

Acknowledgments

Support for this study was provided by NIA grant AG05552 awarded to Thomas M. Hess.

The authors would like to thank Logan Collins for her assistance in recruitment and scheduling of participants. We also acknowledge the assistance of Lauren Popham, Julie Hafer, Paul Dennis, Elizabeth Gabel, Chelsey Hartzler, Katelin Bigelow, Kristen Salerno, Kristi Phillips, Mystimarie Geiger, Ashleigh Griffin, Molly Phillips, Chelsea Burnell, Shirley Puente, Lee McLeod, and Bailey Green during data collection.

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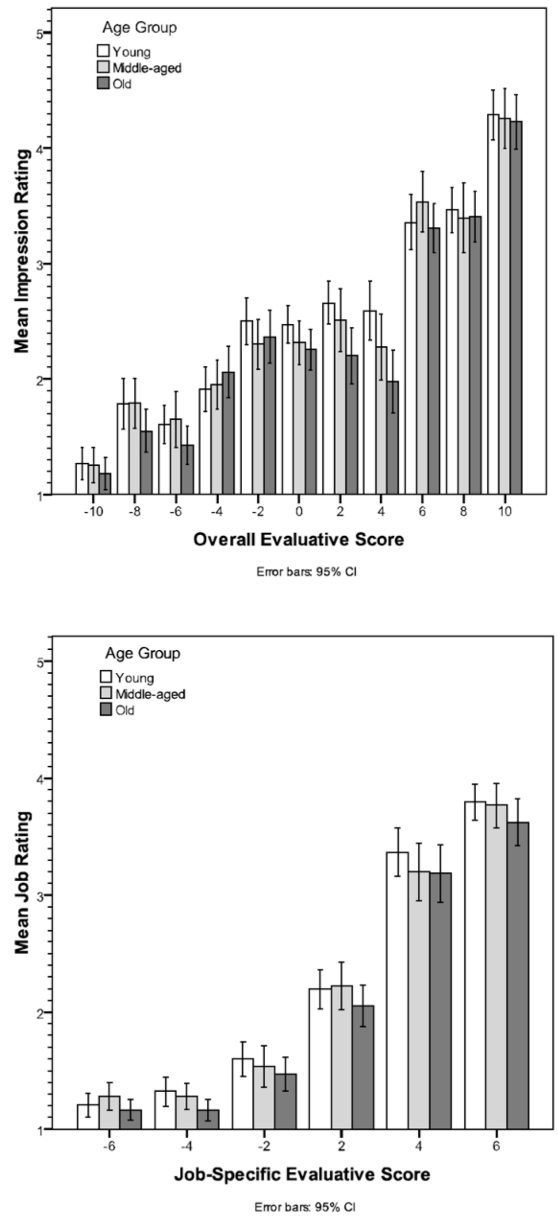

Figure 1.
Mean ratings from Experiment 1 as a function of impression (top) or job (bottom) ttask.

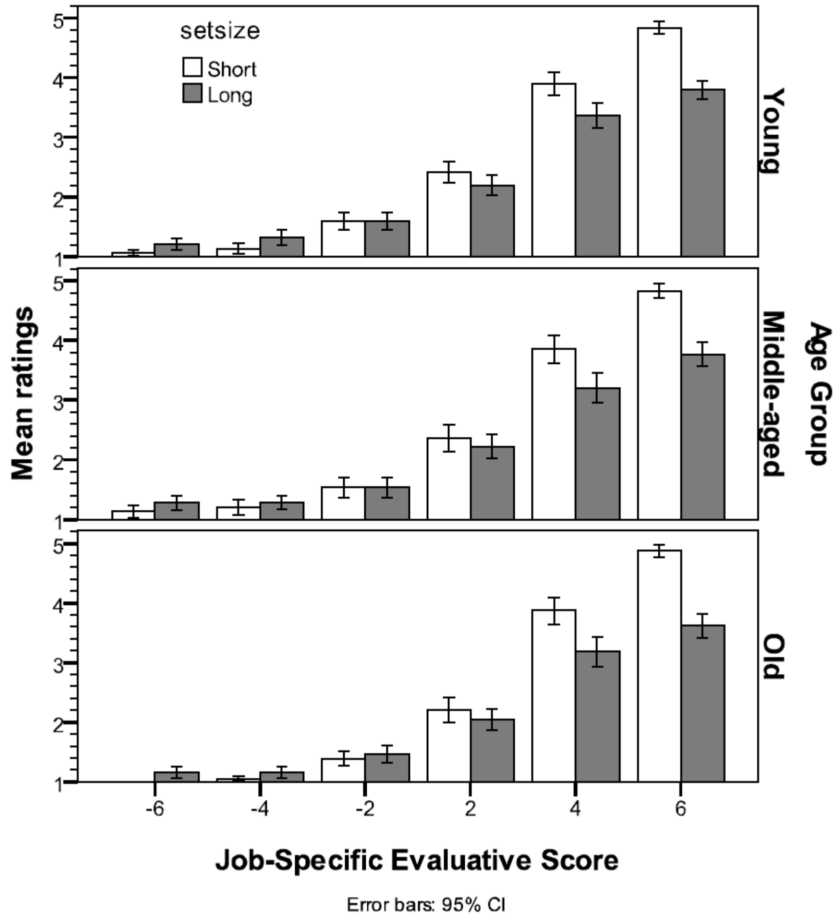

Figure 2.
Mean job evaluations for short and long descriptions in Experiment 1.

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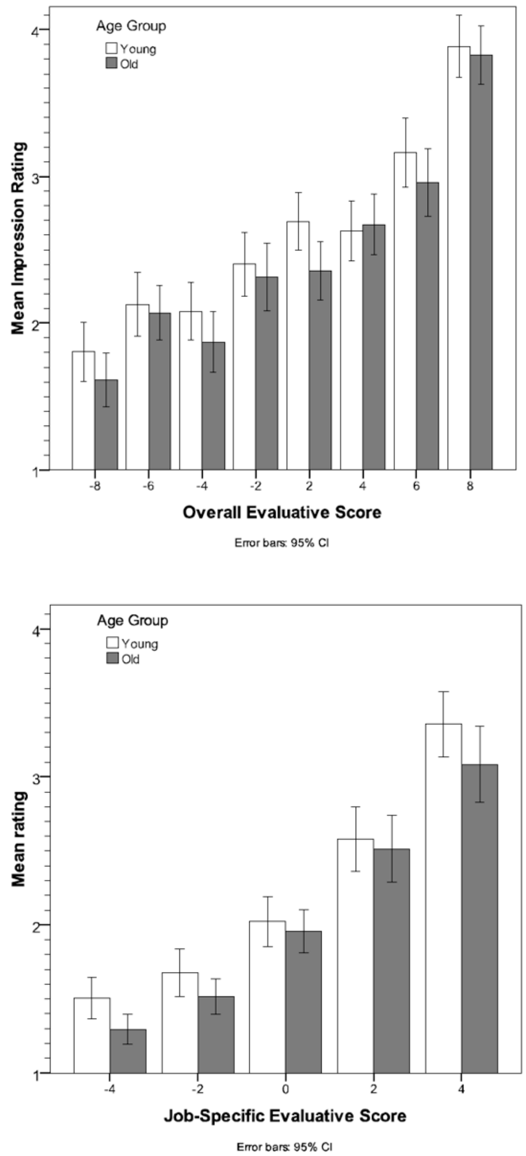

Figure 3.

Mean ratings from Experiment 2 as a function of impression (top) or job (bottom) rating task.

Table 1

Experiment 1 Sample Characteristics

	Young adults		Middle-aged adults		Older adults	
Measure	***M***	***SD***	***M***	***SD***	***M***	***SD***
Experiment 1						
Age*	32.9	7.2	54.3	5.2	72.7	5.0
Education	16.5	2.0	16.2	2.4	16.8	2.5
Physical Health*	50.3	5.8	46.8	9.3	44.7	7.9
Mental Health*	50.8	10.4	51.1	9.4	56.0	7.4
Vocabulary	51.2	11.9	52.6	7.7	50.2	11.5
Letter-Number Sequencing*	12.7	2.9	10.5	2.5	10.5	2.7
Digit-Symbol Substitution*	86.2	17.7	73.7	18.5	63.3	13.3
Plus-Minus*	25.0	16.4	31.4	30.9	40.7	26.3
Stroop*	15.0	5.5	17.6	5.0	27.9	9.6
Experiment 2						
Age*	29.2	5.9	-	-	70.3	5.0
Education	16.6	2.3	-	-	17.1	2.6
Physical Health*	51.3	6.6	-	-	44.0	10.7
Mental Health*	47.9	10.5	-	-	57.6	5.0
Vocabulary*	50.2	10.2	-	-	55.2	7.1
Letter-Number Sequencing*	11.4	2.8	-	-	9.9	2.0
Digit-Symbol Substitution*	91.8	11.6	-	-	70.8	13.6
Plus-Minus	24.5	26.4	-	-	25.9	19.8
Stroop*	14.1	6.0	-	-	20.9	6.6
Wisconsin card Sort Task*	50.5	8.8	-	-	43.8	11.5

* Significant age group effect ($p < .05$).

Table 2

Mean Study Times (ms) in Experiment 1

			Impression Task		Job Task	
Trait Relevance	**Trait Domain**	**Trait Valence**	***M***	***SE***	***M***	***SE***
Short Descriptions (6 traits)						
High	Agentic	Positive	1212	30	1092	25
		Negative	1221	31	1140	26
	Communal	Positive	1209	29	1083	25
		Negative	1222	30	1185	28
Long descriptions (12 traits)						
High	Agentic	Positive	1187	29	1136	26
		Negative	1200	29	1167	27
	Communal	Positive	1181	29	1123	26
		Negative	1206	31	1129	27
Low	Agentic	Positive	1152	27	1086	26
		Negative	1221	30	1182	26
	Communal	Positive	1205	29	1081	27
		Negative	1234	31	1178	26

Table 3

Mean Study Times (ms) in Experiment 2

Trait Relevance	Trait Domain	Trait Valence	Impression Task		Job Task	
			M	*SE*	*M*	*SE*
High	Agentic	Positive	1032	36	986	37
		Negative	1021	38	1007	38
	Communal	Positive	1105	42	1062	41
		Negative	1093	39	1051	41
Low	Agentic	Positive	925	32	860	30
		Negative	925	31	916	34
	Communal	Positive	981	36	946	35
		Negative	1000	36	954	37