Sex-age stereotyping: Social perceivers as lay adaptationists

Oliver Sng[a,*], Keelah E.G. Williams[b], Steven L. Neuberg[c]

[a] University of California, Irvine, Department of Psychological Science, Irvine, CA, United States
[b] Hamilton College, Department of Psychology, Clinton, NY, United States
[c] Arizona State University, Department of Psychology, Tempe, AZ, United States

A B S T R A C T

Why do perceivers categorize and stereotype others by their biological sex and age? We suggest that perceivers do so because sex and age interactively shape adaptive goals (e.g., mating, parenting) and strategies. And because such goals and strategies pose different fitness-relevant opportunities and threats, social perceivers use others' sex-age as a cue for predicting others' behaviors. This perspective has multiple implications, which we test in a range of U.S. undergraduate and online survey samples. First, we find that perceivers categorize others not by sex and age independently, but by the interaction of their sex and age (i.e., people mentally group others as females and males of specific ages) (Studies 1 and 2). Second, perceivers hold stereotypes of men and women of specific ages as being differentially oriented towards short- and long-term mating as well as parenting goals (e.g., women are stereotyped to be more oriented towards long-term mating goals than men are, but only at younger ages) (Studies 3 and 4). Finally, providing perceivers with direct information about others' adaptive goals can influence the extent to which perceivers apply stereotypes of agency, communion, and competence, and can even override typical sex stereotypes (e.g., men are generally stereotyped to be more agentic than women, but this sex stereotype disappears when both men and women are presented as engaging in short-term mating goals) (Studies 5 and 6). The current findings challenge existing thinking about sex and age stereotyping, and demonstrate the value of an adaptationist approach for thinking about social perception and stereotypes.

1. Introduction

We hold general beliefs about what someone is like based on their sex and age. In other words, people stereotype others by their sex and age. Why? Intuitively, this may seem like a strange question with an obvious answer. We argue that it is in fact a meaningful question, with an answer that has not been obvious to existing thinking. Specifically, we propose that one reason why we think about, and stereotype, others by their sex and age is because the adaptive goals of others vary by the interaction of their sex and age. Given that it is important for social perceivers to predict the goals and behaviors of others, perceivers should (1) think about (categorize) others in terms of the combination of their sex and age, (2) hold general beliefs about the adaptive goals/likely behaviors of females and males of specific ages (sex-age stereotypes), and that (3) these stereotypes can be predictably changed by providing perceivers with direct information about others' adaptive goals.

The current perspective integrates an affordance management approach (Gibson, 1979; McArthur & Baron, 1983; Neuberg, Kenrick, & Schaller, 2010) with parental investment (Trivers, 1972) and life

history theories (Del Giudice, Gangestad, & Kaplan, 2015; Stearns, 1992). The affordance management approach conceives of social categorization and stereotyping, and person perception more broadly, as functioning to manage the potential social opportunities and threats (or affordances) others pose. To the extent that different groups pose different affordances, the mind should mentally represent these groups as distinct social categories, coupled with specific stereotypes. But what determines the affordances that individuals might pose? We draw upon parental investment and life history theories to generate predictions about the adaptive goals (i.e., mate seeking, offspring care) that males and females at different ages might hold, which in turn influence their potential affordances for social perceivers and, thereby, the stereotypes associated with different sex and age groups.

Our central argument is thus: just as parental investment and life history theory predict that individuals will invest their time and energy into different goals depending on their sex and life stage, lay perceivers also attempt to predict the behaviors of others based on their sex and life stage, with these predictions taking the form of sex and age (as a proxy for life stage) stereotypes. In this sense, social perceivers can be viewed as *lay adaptationists*. A similar perspective has generated novel

insights into the nature and content of race stereotypes (Williams, Sng, & Neuberg, 2016). Here, we extend it to understanding sex and age stereotypes.

1.1. Sex and age stereotypes

The study of sex and gender stereotypes has a long history (e.g., Eagly & Steffen, 1984; Rudman, Greenwald & McGhee, 2001; Spence & Helmreich, 1978; Williams & Best, 1990). Males are typically stereotyped as possessing agentic traits, which focus on self-assertion (e.g., competitive, decisive, aggressive). Females, in contrast, are generally stereotyped as possessing communal traits, which focus on being in harmony with others (e.g., caring, helpful, understanding). Work on age stereotypes is also considerable (see Kite, Stockdale, Whitley, & Johnson, 2005, for a review), with older people stereotyped as less agentic, and more conservative and religious, amongst other traits (Hummert, Garstka, Shaner, & Strahm, 1995; Kite, 1996). Most existing literature has examined sex and age stereotypes independently of one another (for exceptions, see Brewer, Dull, & Lui, 1981; Fabes & Martin, 1991), with an implicit assumption that sex stereotypes are consistent across age groups, and vice versa.

Where do sex and age stereotypes come from? In existing literature, social role theory (e.g., Eagly & Steffen, 1984; Koenig & Eagly, 2014) proposes that stereotypes emerge from perceptions of groups being disproportionately represented in specific societal roles (e.g., occupations), with the consequence that the traits associated with those roles come to be viewed as characterizing the groups in these roles. For instance, from a social role perspective, to the extent that men are more likely to be law enforcement officers whereas women are more likely to be social workers, men are likely to be stereotyped as agentic because being an enforcement officer generally requires people to behave in assertive and independent ways. Women, on the other hand, are likely to be stereotyped as communal because being a social worker generally requires people to behave in caring and supportive ways.

Social role theory provides a proximate explanatory framework for the origin of stereotypes; it relies on perceptions of sex and age differences in social roles as an explanation, but does not necessarily provide an explanation for why these role differences exist in the first place, or why perceivers should pay attention to role differences. In contrast, our framework seeks a more ultimate explanation. From this perspective, sex and age differences in social roles may result from sex and age differences in adaptive goals (which have fitness implications for individuals engaging in these goals), and paying attention to these differences allows social *perceivers* to predict the behaviors of females and males of different ages (which has fitness implications for *perceivers*). Such ultimate and proximate explanations need not contradict one another, and may be complementary (Scott-Phillips, Dickins, & West, 2011).

1.2. Perceivers as lay adaptationists

An affordance management perspective characterizes social perceivers as actively identifying and managing the opportunities and threats afforded by others, so as to better achieve their own goals (e.g., Gibson, 1979; McArthur & Baron, 1983; Neuberg et al., 2010). Because the affordances of others are not always directly observable, social perceivers must rely on relevant cues to make inferences. To be useful, cues should be relatively easy to perceive and should be diagnostic, to some extent, of potential affordances. If such a cue enables prediction about not just one but multiple potential affordances, that would be especially useful (Neuberg & Sng, 2013). As suggested by parental investment and life history theory, cues of sex and age fit these criteria.

In our species, females have a higher minimum parental investment than males, as females are the sex that gestates and nurses offspring upon birth. From parental investment theory (Trivers, 1972), the sex with greater parental investment will tend to be choosier with mate

selection, being the sex that incurs greater costs from indiscriminate mating. The less-investing sex, on the other hand, will compete intrasexually for sexual access to the more investing sex. In our species then, males are expected to invest more effort in finding and competing for mates, whereas females will tend to invest more effort in parental care. Indeed, existing work suggests that males have stronger mating goals (i.e., wanting to seek sexual/romantic partners) than females, and females have stronger parenting goals than males (e.g., Buckels et al., 2015; Neel, Kenrick, White & Neuberg, 2015). It is important to note, however, that this greater mating motivation in males is specifically oriented towards *short-term* mating. With respect to seeking long-term committed partners, *females* are the sex more oriented towards such goals (Gangestad & Simpson, 2000; Schmitt, 2005), believing a long-term relationship is more important and also engaging more in long-term mate-seeking behaviors.

Life history theory is a broad framework for thinking about how organisms allocate their energy and time to different tasks (e.g., growth, mating, and parenting) to effectively survive and reproduce (Kaplan & Gangestad, 2005). The underlying assumption is that energy and time are finite and cannot simultaneously be allocated to multiple tasks; if an organism allocates energy to growth and development, it cannot simultaneously allocate the same energy to mating or parenting. Hence, all allocation decisions involve trade-offs.

Individuals who have not reached sexual maturity may invest in physical growth and accumulating embodied capital (e.g., skills, knowledge) that can enhance future resource acquisition ability (Del Giudice et al., 2015). Upon sexual maturity, individuals begin to divert resources from growth towards finding a mate; devoting resources solely to growth cannot lead to successful reproduction. Upon having offspring, however, resources again tend to be diverted, this time towards parental care. This is necessary given the high dependency of infants at birth and our relatively long developmental period (Kaplan, Hill, Lancaster, & Hurtado, 2000). Investments in mating effort further diminish when individuals move into typical post-reproductive ages, given female menopause (Dratva et al., 2009; van Keep, Brand, & Lehert, 1979) and reduced male fertility (Kidd, Eskenazi, & Wyrobek, 2001). Indeed, mate-seeking goals do seem to decrease with age, whereas the goal of caring for family members, in general, increases with age (Neel et al., 2015).

Putting sex and age together, then, males are likely to be more oriented towards short-term mating goals than females are, but most so during ages when mate-seeking goals are prioritized (sexually mature young adults) and less so during ages when parenting goals become prioritized (typical parenting and post-reproductive ages). One would expect to see the sex differences switch when considering long-term mating goals, with young adult females being more oriented towards long-term mating goals than young adult males, but less so during older ages when mating goals diminish in priority. Finally, females are likely to be more oriented towards parenting goals than males, but particularly so at typical parenting ages and less so at young adult ages (when mating goals are prioritized) or post-reproductive ages (when males also prioritize parenting goals).

An individual's adaptive goals can have implications for others' outcomes: Whether an individual is motivated towards mating or parenting potentially affords opportunities (e.g., a potential mate) or threats (e.g., potential mate competition) for others. If sex and age interactively shape the opportunities and threats that individuals afford others, then social perceivers should be sensitive to the interaction of sex and age in categorization and stereotyping. This picture paints a quite nuanced image of social perceivers—as individuals sensitive to the subtle ways in which others' sex and age interact to shape behavior, and not just as cognitive misers trying to simplify their social worlds. Specifically, perceivers should mentally categorize others in terms of the *combination* of sex-age (and less so by sex and age independently); we test this hypothesis in Studies 1 and 2. Perceivers should also hold interactive sex-age stereotypes that track how sex and age interactively

shape various mating and parenting goals, as outlined above; we test this hypothesis in Studies 3 and 4. Finally, if perceptions of various adaptive goals underlie existing sex-age stereotypes, providing perceivers with direct information about the adaptive goals of a target should influence the application of these stereotypes; we test this final hypothesis in Studies 5 and 6.

2. Study 1: Sex-age categorization

To test our first hypothesis that social perceivers categorize by sex and age interactively, we used the "who-said-what" paradigm, a method widely employed in the study of social categorization (e.g., Pietraszewski, Cosmides, & Tooby, 2014; Stangor, Lynch, Duan, & Glas, 1992; Taylor, Fiske, Etcoff, & Ruderman, 1978). Participants are typically presented with a series of target individuals manipulated to vary in certain features (e.g., sex, race), with each individual paired with unique statements. Perceiver memory is then tested by having them match each statement with the target individual it was paired with. The critical measure is the type of errors perceivers make.

If sex and age *interactively* shape various mating and parenting goals, and if these goals have distinct affordance implications for others, then perceivers should categorize others by sex and age interactively, more so than by sex and age independently. To test this categorization hypothesis, we presented perceivers with four types of targets: young men, young women, older men, and older women. If perceivers categorize only by sex, then one would observe more within-sex errors (men being confused with men, and women with other women) than between-sex errors (men being confused with women, and women with men)—and this pattern would be observed regardless of the ages of the targets. Similarly, if perceivers categorize only by age, then one would observe more within-age errors than between-age errors, regardless of target sex. However, as we specifically hypothesize, if perceivers categorize by sex and age *interactively*, one would observe *more within-sex-within-age errors than any other error type*. This would mean, for example, that young women would be confused more with young women than they would be with young men, older men, or older women.

2.1. Participants

The sample consisted of 102 participants (44 females) from Amazon MTurk (M_{age} = 35.5 years; SD_{age} = 12.8). Sample size was calculated using effect size estimates (d = .4) from past work on interacting categorization effects of race and sex (Stangor et al., 1992), with desired power being .8 and α = .05. One participant was excluded from analyses because he had a perfect memory score (the key measure in the current study being memory errors).

2.2. Methods

We obtained 16 photographs of White individuals of varying sex and age from a photo database (Minear & Park, 2004). All photos displayed the face from the neck up, were taken against white backgrounds, and displayed neutral expressions. Depicted were four young men (actual ages ranging from 20-23), four young women (ages 20–22), four older men (ages 61–66), and four older women (ages 61–64). These age ranges were selected to capture reproductive and post-reproductive ages. The 16 photos were split into two sets of eight, allowing checks for potential stimulus effects.

Twenty-four statements were paired with the eight photos in each set. These statements were modified from statements used in previous research (Pietraszewski et al., 2014), and were presented to participants as taken from interviews each person ostensibly gave as part of a government-initiated survey (e.g., "It can be long and tedious, and can take weeks if not months. I promise it's not easy. We have to go over where we're going to be, buy supplies, and even worry about things like

roads"; See Supplement for all sentences). Each of the eight targets was randomly paired with three different statements.

Participants signed up for a "Group Impressions Survey." Participants previewing the task read the consent form and were directed to a link where they could take the survey. The cover story noted that the photos and statements were taken from a U.S. government interview study, and that they were simply to form impressions of the individuals based on that information. Each photo and corresponding statement were presented for 15 s.

After all 24 randomized photo-statement pairings were presented, participants completed a one-minute distracter task in which they attempted to remember as many U.S. state capitals as possible. Participants were then presented with the surprise memory task. They were shown each of the 24 sentences individually, along with the photos of all eight target individuals, and asked to identify which of the targets said each sentence. The presentation order of the 24 sentences was randomized.

2.3. Results and Discussion

We calculated the number of within-sex–within-age, within-sex-–between-age, between-sex–within-age, and between-sex–between-age errors for each participant.[1] A 2 (Participant Sex) X 2 (Stimulus Set) X 4 (Error Type: Within-sex–within-age, Within-sex–between-age, Between-sex–within-age, Between-sex–between-age)[2] mixed ANOVA revealed significant main effects of both participant sex, $F(1, 97)$ = 8.18, p = .005, η_p^2 = .078, and stimulus set, $F(1, 97)$ = 5.11, p = .026, η_p^2 = .050, with men making more errors than women and one stimulus set generating more errors than the other. However, there were no higher order interactions between participant sex and stimulus set with error type (all ps > .10). Hence, we do not discuss these two factors further.

The prediction was that perceivers would make more within-sex-within-age confusions than any other error type. This was indeed the case. As seen in Fig. 1, the number of within-sex–within-age confusions (M = 4.00, SD = 1.96) was significantly greater than the other three error types (within-sex–between-age: M = 1.89, SD = 1.15; between-sex–within-age: M = 1.63, SD = 1.16, between-sex–between-age: M = 1.49, SD = 1.13, all ps < .001, ds = 1.3, 1.5, and 1.6 respectively). Hence, perceivers categorize by sex and age in an interactive manner.

---

[1] To compare errors across these four error types, a correction needs to be applied because the number of possible within-sex–within-age errors expected by chance is half that of the number of possible errors for any of the other error types. For example, for a sentence said by one of the two young females, a participant only has one possible target for which a confusion can be made within-sex–within-age—the other young female. However, for each of the other three categories, there are two possible targets for which a statement by a young woman can be confused, because there are two young men, two older women, and two older men. Hence, the number of errors for each of the other three categories, besides within-sex–within-age, needs to be divided by 2. Such corrections are typical in work using the paradigm (e.g.,Pietraszewski et al., 2014; Stangor et al., 1992). Note that this correction has been recently discovered to generate bias when attempting to infer the relative strength of one dimension of categorization over another dimension (e.g., whether sex categorization is stronger than age categorization; see Bor, 2018;Pietraszewski, 2018). However, this is not an issue for the current work, which is focused on joint-error rates (i.e., the combination of both categorization dimensions). Nonetheless, the recently uncovered bias does require a somewhat different analysis approach, addressed below (see Footnote 2).

[2] We collapsed the four error types into a single factor rather than creating a Target Sex Error X Target Age Error factorial design, as is typically done in such work. Recent work has identified a bias with the error calculation procedures within this paradigm (Bor, 2018; Pietraszewski, 2018), preventing the main effects of sex categorization and age categorization from being accurately interpreted from the two-factor analysis. Hence, following Bor's (2018) recommendation, we collapse the four error types into a single factor.
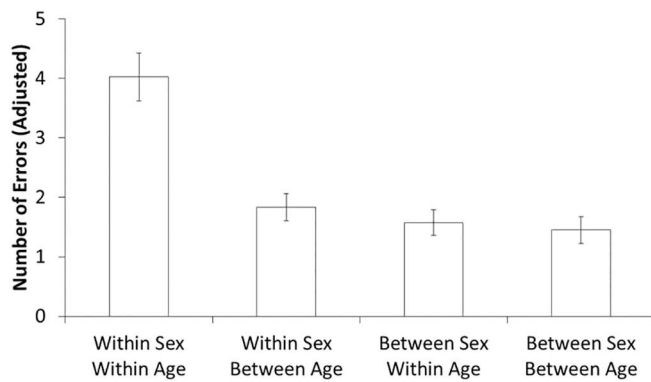
Fig. 1. Sex and Age error types. Error bars represent ± 2 S.E. (Study 1).

This pattern supports the hypothesis of interactive sex-age categorization, but is insufficient for demonstrating it. This is because a statistical interaction could still emerge as an additive result of independent sex and age categorization processes. To illustrate, consider a participant who makes 90% of her sex errors *within*-sex (simple sex categorization), and 90% of her age errors *within*-age (simple age categorization). This would mean that her expected proportion of *total* errors that are within-sex–within-age would be 81%. The rest of the errors would be distributed between within-sex–between-age (9%, from 90% x 10%), between-sex–within-age (also 9%), and, finally, between-sex–between-age (1%, from 10% x 10%). Such a pattern would also appear as a statistical interaction, with there being far more within-sex–within-age errors than the others.

One thus also needs to compute the *expected* number of within-sex–within-age errors, assuming only independent sex and independent age categorization occurred. We followed procedures used by Stangor et al. (1992), using the following formula: Estimated within-sex–within-age errors = proportion of between-age errors that are within-sex X proportion of between-sex errors that are within-age X total number of errors.[3] This gave each participant an expected number of within-sex–within-age errors, if they were simply categorizing by sex and age independently. We then compared this with the actual number of within-sex–within-age errors. As predicted, the actual number of within-sex–within-age errors ($M = 3.99$, $SD = 1.99$) was significantly higher than the expected number ($M = 2.97$, $SD = 2.56$), $t(97) = 3.52$, $p < .001$, $d = .44$.

If sex and age interact to influence the goals of others, and these goals represent important affordances for social perceivers, then social perception should be attuned to the interaction of sex and age. Consistent with this, we find that participants spontaneously categorize others by sex and age interactively. To test the robustness of this finding, we attempted to replicate it in Study 2.

3. Study 2: Sex-age categorization: replication

3.1. Participants and Methods

The sample consisted of 265 undergraduate participants (167 females) from an introductory psychology course ($M_{age} = 19.3$ years; $SD_{age} = 2.3$) who received credit for participation. The sample size was determined by the number of participants we were able to recruit from the participant pool. Using the effect size of the focal sex-age interactive categorization effect from Study 1 ($d = .44$), post-hoc power calculations showed that the current sample had .99 power for detecting the effect at $\alpha = .05$.

The methods of Study 2 were similar to Study 1, with the main difference being that Study 2 was an in-lab study. Undergraduate participants were brought into the lab in groups of three, and each participant was seated at an individual computer cubicle to complete the study. Also, given that there were no significant interactions of stimulus set with other variables in Study 1, we used only one stimulus set in Study 2. All study instructions were similar to Study 1.

3.2. Results and Discussion

We conducted similar analyses as in Study 1. The 2 (Participant Sex) X 4 (Error Type) mixed ANOVA showed a main effect of Error Type. There was also a significant Participant Sex X Error Type interaction, $F(3, 789) = 2.76$, $p = .041$, $\eta_p^2 = .010$. Given this, we tested the predicted differences between error types within each participant sex. As predicted, from pairwise comparisons, both male and female participants made more within-sex–within-age errors (male/female: $M = 3.37/3.60$, $SD = 1.92/2.14$) than any of the other three error types (within-sex–between-age: male/female $M = 1.70/1.55$, $SD = 1.08/1.01$; between-sex–within-age: male/female $M = 1.58/1.31$, $SD = 1.24/1.05$; between-sex–between-age: male/female $M = 1.56/1.12$, $SD = 1.23/.90$; all $ps < .001$, $ds = 1.1/1.2$, $1.1/1.4$, and $1.1/1.5$ respectively).

We also computed the expected number of within-sex–within-age errors (assuming independent sex and age categorization), and tested if the observed number of errors was different from the expected number.[4] Indeed, as in Study 1, the actual number of within-sex–within-age errors ($M = 3.54$, $SD = 2.06$) was significantly greater than the expected number ($M = 2.62$, $SD = 2.44$), $t(250) = 5.42$, $p < .001$, $d = .41$. Hence, Study 2 replicates Study 1's findings: Perceivers categorize others by the *interaction* of their sex and age.

4. Study 3: Sex-age perceived goals and stereotypes

If sex and age interact to shape individual goals, and consequently potential affordances for social perceivers, social perceivers should be sensitive to such interactions. Indeed, perceivers categorize others by the intersection of their sex and age (Studies 1–2). However, if perceivers are engaging in such categorization because of the different affordances that males and females of specific ages pose, then these interactions should also be observed in perceivers' *stereotypes*—in the beliefs about what males and females of different ages are like. We outlined these predictions earlier, and revisit them here.

First, for short-term mating goals, males will be more oriented towards such goals than females, but more so during ages when mate-seeking is a prioritized goal (sexually mature young adults) and less so during ages when parenting goals become the greater priority (parenting and post-reproductive ages). If affordance-managing social perceivers track this, then perceivers should stereotype men as more oriented towards short-term mating goals than women, but more so during younger than older ages.

The reverse pattern is expected for long-term mating goals. Females are more oriented towards long-term mating goals than males, but such mating goals are also expected to diminish at older ages when parenting goals increase in priority. If social perceivers track this sex-age interaction in long-term mating goals, perceivers should stereotype women as more oriented towards long-term mating goals than men, and more so during younger than older ages.

---

[3] There were three participants for which this estimated error score could not be computed, as they had zero within-sex–different-age and different-sex–different-age mistakes. Together with the participant who had zero errors, this meant that there were four participants excluded in this specific analysis.

[4] For similar reasons as in Study 1, there were some participants (14 in this study) for which the expected error score could not be computed. Thus, they were excluded from this analysis. Also, given that there was an interaction effect with participant sex in the ANOVA analyses, we examined if the pattern below held within each participant sex. It did; both male and female participants made significantly greater within-sex-within-age errors than the expected number (both $ps < .001$).

ARTICLE IN PRESS

O. Sng, et al.   Evolution and Human Behavior xxx (xxxx) xxx–xxx

Finally, females will also generally be more oriented towards parenting goals than males—but this should be particularly so at typical parenting ages, and less so at young adult ages (when mating goals are prioritized) or post-reproductive ages (when males also begin to prioritize parenting goals). Accordingly, social perceivers might stereotype females as more oriented towards parenting goals than males, but this stereotyped sex difference should be strongest at typical parenting ages, and weaker at younger ages (pre-parenting) when mating goals are prioritized and older ages (post-reproductive) when males also begin to focus on parenting goals.

As discussed in the Introduction, the dominant literatures in sex and age stereotyping have focused on stereotypes of agency and communion. What implications might the current perspective have for sex-age stereotypes of agency and communion? One possibility is that stereotypes of agency and communion derive from stereotypes of different adaptive goals, as engaging in each of these goals requires certain behaviors. Attracting short-term mates, for instance, requires competing, particularly with same-sex others. Dominance is also a desired trait, particularly in women's short-term mate preferences (Bryan, Webster, & Mahaffey, 2011; Li & Kenrick, 2006). Hence, one might expect individuals with short-term oriented mating goals to engage in more agentic behaviors.

However, quite different behaviors would be expected for individuals engaging in long-term mating goals. Kindness is a highly desired trait in long-term relationship partners (e.g., Buss, 1989; Li, Kenrick, Bailey, & Linsenmeier, 2002). One might expect that an individual engaging in long-term mating goals may be especially kind and friendly. Similarly, successfully achieving parenting goals may also require more communal behaviors, such as caring and nurturance. Earlier, we generated predictions about how perceivers may hold certain interactive sex-age stereotypes of these adaptive goals. If sex-age stereotypes of agency and communion are indeed associated with these goals, then we would expect them to generally track stereotypes of such goals.

Specifically, if stereotypes of agency derive, in part, from stereotypes of short-term mating goals, one should expect an interactive sex-age agency stereotype consistent with the pattern predicted for short-term mating goals. In other words, perceivers should stereotype men as more agentic than women, but more so at younger than older ages.

If communion stereotypes derive from stereotypes of long-term mating goals, perceivers should stereotype women as more communal than men, but this stereotyped difference should be larger at younger ages and smaller at older ages. In other words, sex-age stereotypes of communion should exhibit a (sex) reversed interactive pattern as the sex-age stereotypes of agency predicted above. A second, non-mutually exclusive, possibility is that communion stereotypes may derive from stereotypes of parenting goals. If so, one would predict perceivers to also stereotype women as more communal than men, but most so during typical parenting ages, and less so during younger pre-parenting ages or older post-reproductive ages. Hence, depending on whether communion stereotypes are associated with long-term mating and/or parenting goal stereotypes, different patterns might be observed.

4.1. Participants

Planned sample size was 100 participants, which provides 80% power of detecting an effect size d of .39 at $\alpha = .05$ for pairwise comparisons between two dependent means. One hundred participants were recruited on Amazon MTurk, using Turkprime (Litman, Robinson, & Abberbock, 2016). One participant did not complete the survey. Hence, the final sample of participants who completed the study was 99 (37 females; $M_{age} = 33.3$, $SD_{age} = 9.5$).

4.2. Method

Participants signed up for an "Attitudes Survey." Participants

previewing the task read the consent form and were directed to a link where they could take the survey. They were then told they would be asked about their impressions of 10 different groups: 18/28/40/60/80 year-old men and women. We chose these specific ages to cover a range of age groups that likely vary in the prioritization of adaptive goals.

Participants were then presented with the different groups and asked to rate their perceptions of the adaptive goals, agency stereotypes, and communion stereotypes of each group (details below). The agency/communion stereotype measures were presented first, and the measures of perceptions of adaptive goals second. Within each set of measures, the presentation order of the 10 target groups was randomized. After completing the various measures, participants completed a set of demographic questions.

4.2.1. Goal measures

To measure perceived adaptive goals, for each target group participants were asked: "How important do you think __ is for [target group]?" The short-term mating goal was measured by the item *finding short-term sexual partners*, the long-term mating goal measured by *finding/maintaining long-term romantic relationships*, and the parenting goal measured by *caring for one's children*, on a scale of 1 (*Not at all*) to 7 (*Extremely*). Presentation order of the goal items was randomized within each target group.

4.2.2. Agency/communion measures

For each target group, participants were asked: "How __ do you think [target group], in general, are?" This was followed by 8 traits comprising the Agency (*competitive, aggressive, assertive, dominant*; mean $\alpha = .80$) and Communion (*kind, nurturing, sincere, warm*; mean $\alpha = .86$) stereotype measures, on a scale of 1 (*Not at all*) to 7 (*Extremely*) (Koenig & Eagly, 2014). Presentation order of the traits was randomized within each target group.[5]

4.3. Results

4.3.1. Sex-age goal stereotypes
4.3.1.1. Short-term mating goal stereotypes. For stereotypes of short-term mating goals, the Sex X Age ANOVA showed main effects of both Sex and Age, qualified by a significant Sex X Age interaction, $F(4, 392) = 3.31$, $p = .011$, $\eta_p^2 = .033$ (Fig. 2).

To test the specific prediction that the stereotyped sex difference of men as more short-term mating-goal oriented would be larger at younger ages (when short-term mating goals are prioritized) than older ages (when parenting goals emerge in priority), we combined the perceived short-term mating goal scores of 18 and 28 year-olds (the two youngest groups), and 60 and 80 year-olds (the two oldest groups) within each sex, and performed a follow-up 2 (Male/Female) X 2 (18–28/60–80 year-olds) ANOVA on the combined scores. As predicted, the interaction was significant, $F(1, 98) = 10.92$, $p = .001$, $\eta_p^2 = .10$. Males were stereotyped as more oriented towards short-term mating goals than females, but this stereotyped sex difference was larger at younger than older ages.

4.3.1.2. Long-term mating goal stereotypes. For long-term mating goals, the main effects of Sex and Age were again qualified by the predicted Sex X Age interaction, $F(4, 392) = 9.51$, $p < .001$, $\eta_p^2 = .088$. (Fig. 3).

We performed a similar follow-up 2 (Male/Female) X 2 (18–28/60–80 year-olds) ANOVA on the combined scores of long-term mating goal stereotypes. As predicted, the interaction was significant, $F(1, 98) = 27.10$, $p < .001$, $\eta_p^2 = .22$. Females were stereotyped as more

---

[5] For exploratory purposes, we also included measures of perceived social roles for each of the 10 groups. Given the focus of the current paper, we do not report these data here.
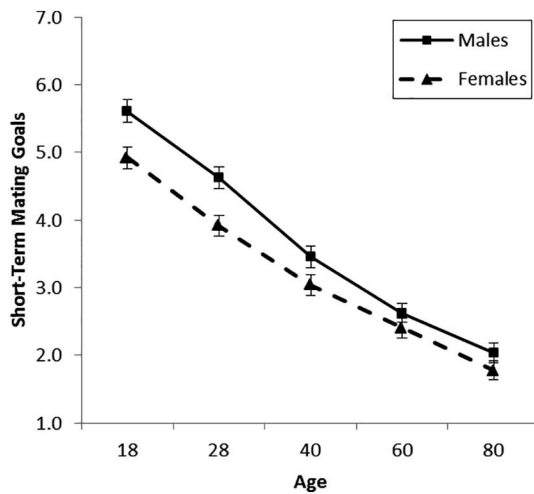
Fig. 2. Sex/Age stereotypes of short-term mating goals. Error bars represent 1 S.E. (Study 3).
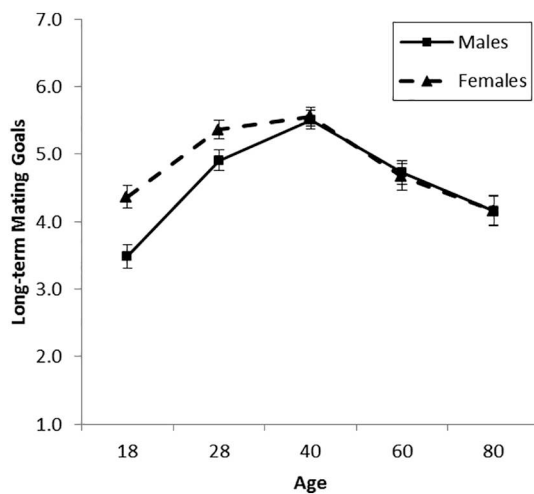

Fig. 4. Sex/Age stereotypes of parenting goals. Error bars represent 1 S.E. (Study 3).

Fig. 3. Sex/Age stereotypes of long-term mating goals. Error bars represent 1 S.E. (Study 3).

by 60–80 year-olds ($p < .001$), and 18 year-olds as the least parenting oriented (both $ps < .001$). Hence, for parenting goals, there did not seem to be any meaningful interactive sex-age stereotype. Females were stereotyped to be consistently more oriented towards parenting goals than males across all age groups. Of particular note is that the stereotyped sex difference in parenting goals was strong even when perceivers were thinking about 18 year-olds.

4.3.2. Sex-age agency/communion stereotypes
4.3.2.1. Agency stereotypes. A 2 (Male/Female) X 5 (18/28/40/60/80 years old) repeated-measures ANOVA on agency showed significant effects of both Sex and Age, qualified by the predicted Sex X Age interaction, $F(4, 388) = 6.19$, $p < .001$, $\eta_p^2 = .060$ (Fig. 5; left panel).

To probe this interaction, agency stereotype scores for 18 and 28 year-olds and for 60 and 80 year-olds were combined within each target sex, and a follow-up 2 (Male/Female) X 2 (18–28/60–80 year-olds) ANOVA was carried out on the combined scores. The interaction was significant, $F(1, 97) = 7.83$, $p = .006$, $\eta_p^2 = .075$. As predicted, males were stereotyped to be more agentic than females across ages (both $ps < .001$), but the stereotyped difference was larger at younger than older ages. The nature of this interaction is similar to the interaction observed for stereotypes of short-term mating goals.

4.3.2.2. Communion stereotypes. A similar 2 (Male/Female) X 5 (18/28/40/60/80 years old) repeated-measures ANOVA on communion showed significant effects of both Sex and Age [$F(1, 97) = 77.70$, $p < .001$, $\eta_p^2 = .45$, and $F(4, 388) = 92.40$, $p < .001$, $\eta_p^2 = .49$], but no significant interaction, $F(4, 388) = 1.33$, $p = .26$, $\eta_p^2 = .014$. Females were stereotyped as more communal than males at all ages (all $ps < .001$, η_p^2 from .23 to .37), and individuals were stereotyped as increasingly communal with age at every age group (all $ps < 0.001$) (Fig. 5; right panel).

4.4. Discussion

We find that perceivers hold specific stereotypes about how adaptive goals vary by the interaction of sex and age. Perceivers stereotyped men as being more oriented than women towards short-term mating goals, and this stereotyped sex difference was larger when thinking about younger than older individuals. A sex-reversed pattern was observed for long-term mating goal stereotypes, with women being stereotyped as being more oriented towards long-term mating goals, but only at younger ages. Contrary to predictions, there was no interactive sex-age stereotype of parenting goals. Women were stereotyped as

oriented towards long-term mating goals than males at younger ages ($p < .001$) but not at older ages ($p = .74$).

4.3.1.3. Parenting goal stereotypes. For stereotypes of parenting goals, there were main effects of both Sex and Age [$F(1, 97) = 40.55$, $p < .001$, $\eta_p^2 = .30$, and $F(4, 388) = 65.47$, $p < .001$, $\eta_p^2 = .40$], and a non-significant Sex X Age interaction, $F(4, 388) = 2.23$, $p = .065$, $\eta_p^2 = .022$. (Fig. 4).

The specific prediction for sex-age stereotypes of parenting goals was that the stereotyped sex difference would be largest at typical parenting ages (28–40 years old), and less so at both younger ages (18) when mating goals are of greater priority, and older ages (60–80) when males also prioritize parenting goals. To test this, we combined the stereotyped parenting goal scores for 28 and 40 year-olds, and 60 and 80 year-olds within each sex, and carried out a follow-up 2 (Male/Female) X 3 (18/28–40/60–80 year-olds) ANOVA. The Sex X Age interaction was however not significant, $F(2, 194) = 1.97$, $p = .14$, $\eta_p^2 = .020$. Rather, main effects of Sex and Age emerged [$F(1, 97) = 42.86$, $p < .001$, $\eta_p^2 = .31$, and $F(2, 194) = 79.32$, $p < .001$, $\eta_p^2 = .45$, respectively]. Women were stereotyped as more parenting-oriented than men across age groups, and 28–40 year-olds were stereotyped as the age group with the strongest parenting goals, followed
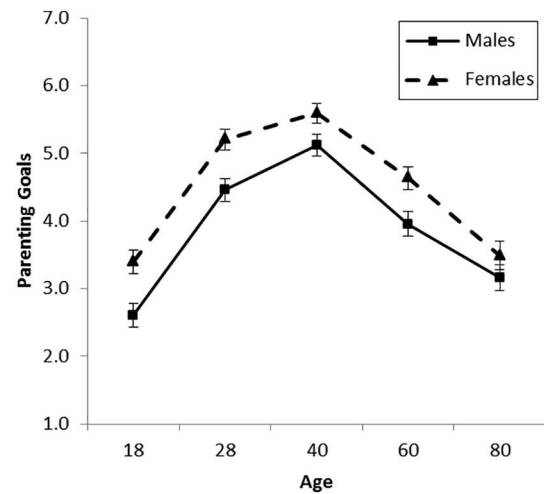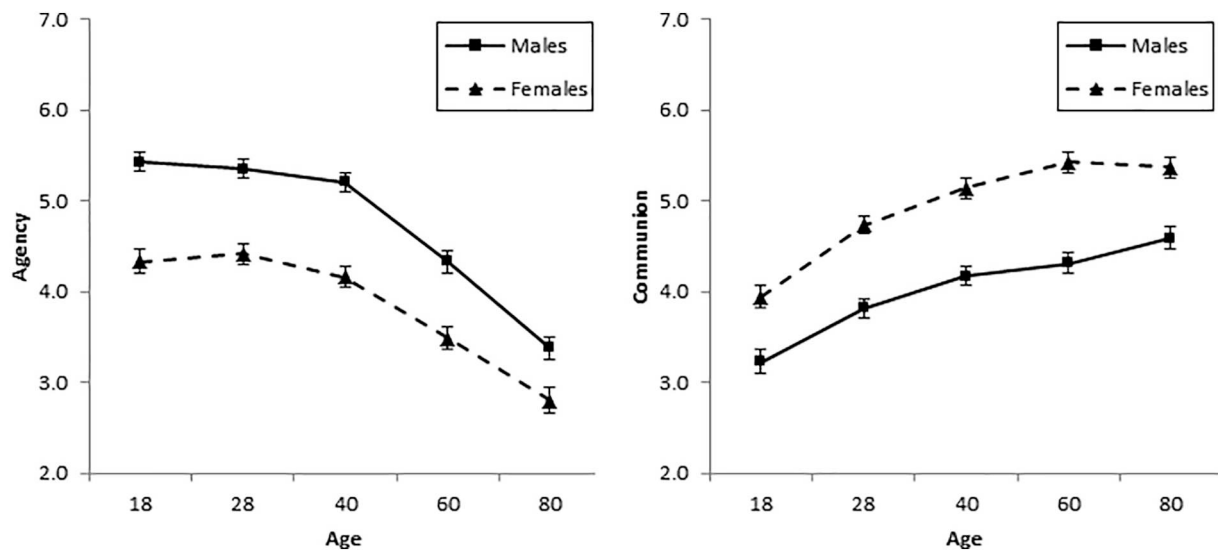
Fig. 5. Sex/Age stereotypes of agency (left panel) and communion (right panel). Error bars represent 1 S.E. (Study 3).

being consistently more oriented than men towards parenting goals, across ages.

Extending the lay adaptationist hypothesis to stereotypes of agency and communion, we found, first, that the stereotype of men as more agentic than women was stronger at younger than older ages. This pattern tracks the similar interactive pattern observed for short-term mating goal stereotypes, providing initial support for the idea that agency stereotypes may derive from short-term mating goal stereotypes.

In contrast, there was no interactive sex-age stereotype of communion. Instead, women were viewed as more communal than men across all ages. This does not seem to support the idea that communion stereotypes emerge from stereotypes of long-term mating goals alone (if so, an interactive sex-age communion stereotype would have been observed). This pattern is consistent, however, with the second possibility that communion stereotypes emerge from stereotypes of parenting goals (which also showed a similar general sex stereotype of women as more parenting-oriented than men across all ages).

Another way to examine the relationship between stereotypes of adaptive goals and agency/communion stereotypes is to test if the three goal stereotypes predict stereotypes of agency and communion, within each of the 10 sex-age target groups. Such an approach confronts the problem that certain stereotypes are already at a ceiling or floor (e.g., mean short-term mating goal stereotypes for 80 year-old females was 1.78 on a 1 to 7 point scale), which attenuates the ability to detect significant associations (see Eagly & Steffen, 1984, for similar issues). Despite this, stereotypes of greater short-term mating goals did predict stronger agency stereotypes in 5 of the 10 sex-age target groups (see Supplement). In other words, the more a group was stereotyped as oriented towards short-term mating goals, the more agentic they were also stereotyped to be. Stereotypes of greater parenting goals predicted stronger communion stereotypes in 5 of 10 sex-age groups. Finally, stereotypes of long-term mating goals only predicted stronger communion stereotypes in one sex-age group. Hence, from this secondary analysis, stereotypes of agency and communion also seem to partially track stereotypes of short-term mating and parenting goals, respectively.

Given the unexpected patterns with the parenting goal and communion stereotypes, and to further test the robustness of the current findings, we conducted a preregistered replication.

5. Study 4. Sex-age stereotypes preregistered replication

5.1. Participants and Method

One hundred participants were recruited through Prolific (Peer, Brandimarte, Samat, & Acquisti, 2017). The final sample consisted of 101 participants (60 females; M_{age} = 31.8, SD_{age} = 12.1). The procedure of Study 4 was identical to Study 3. The same measures of stereotypes of short and long-term mating goals, parenting goals, and agency (mean α across 10 sex-age groups was .81) and communion (mean α = 0.89) were used. The study design and analyses were preregistered at http://aspredicted.org/blind.php?x=52nq53.

5.2. Results

5.2.1. Goal stereotypes

For stereotypes of short-term mating goals, the Sex X Age ANOVA showed main effects of both Target Sex and Age, and, similar to Study 3, this was qualified by a Sex X Age interaction, $F(4, 400) = 13.05$, $p < .001$, $\eta_p^2 = .12$. As in Study 3, and as preregistered, we conducted a specific follow-up 2 (Male/Female) X 2 (18–28/60–80 year-olds) ANOVA. The follow-up interaction test was indeed significant, $F(1, 100) = 26.70$, $p < .001$, $\eta_p^2 = .21$. Males were stereotyped as more oriented towards short-term mating goals than females at all ages (both ps < .001), but this stereotyped sex difference was larger at younger than older ages.

For stereotypes of long-term mating goals, the Target Sex and Age main effects were also qualified by a Sex X Age interaction, $F(4, 400) = 16.04$, $p < .001$, $\eta_p^2 = .14$. The follow-up 2 (Male/Female) X 2 (18–28/60–80 year-olds) ANOVA also showed a significant interaction, $F(1, 100) = 38.26$, $p < .001$, $\eta_p^2 = .28$. As in Study 3, females were stereotyped as more oriented towards long-term mating goals than males at younger ages ($p < .001$) but not at older ages ($p = .12$).

Finally, for stereotypes of parenting goals, Sex and Age main effects were also qualified by a Sex X Age interaction, $F(4, 400) = 4.18$, $p = .003$, $\eta_p^2 = .04$. We note here that in our preregistration, we made no strong predictions for stereotypes of parenting goals, besides a general sex main effect. To remind, although an interaction pattern was predicted in Study 3, the interaction effect in Study 3 was non-significant.

ARTICLE IN PRESS

O. Sng, et al.   Evolution and Human Behavior xxx (xxxx) xxx–xxx

To explore the interaction effect here, we created a stereotyped sex-difference score at each target age by subtracting the stereotyped parenting goal score of males from females at that age. We then conducted a repeated measures ANOVA across Age on the sex-difference score. There was a significant effect of Age, $F(4, 400) = 4.18$, $p = .003$, $\eta_p^2 = .04$. From pairwise comparisons, this stereotyped sex difference was significantly larger for 18 year-olds compared to 80 year-olds ($p = .048$; Bonferroni-corrected). In other words, 18 year-old women were stereotyped to have much stronger parenting goals than 18 year-old men, but this stereotyped sex difference diminished at 80 years old.

5.2.2. Stereotypes of agency/communion

For stereotypes of agency, the full Sex X Age ANOVA showed main effects of both Target Sex and Age. This was qualified by the predicted Sex X Age interaction, $F(4, 400) = 8.16$, $p < .001$, $\eta_p^2 = .08$. Following Study 3, the planned follow-up 2 (Male/Female) X 2 (18–28/60–80 year-olds) ANOVA also showed a significant interaction, $F(1, 100) = 8.96$, $p = .003$, $\eta_p^2 = .082$. Males were stereotyped to be more agentic than females across ages (both $ps < .001$), but the stereotyped difference was larger at younger than older ages.

For communion, similar Sex X Age analyses showed significant effects of both Sex and Age [$F(1, 100) = 140.81$, $p < .001$, $\eta_p^2 = .59$, and $F(4, 400) = 83.14$, $p < .001$, $\eta_p^2 = .45$], and no significant interaction, $F(4, 400) = 1.43$, $p = .22$, $\eta_p^2 = .014$. Females were stereotyped as more communal than males at all ages (all $ps < .001$, η_p^2 from .27 to .51), and individuals were stereotyped as increasingly communal with age at every age group (all $ps < 0.002$).

Hence, Study 4's stereotype patterns for both agency and communion replicate Study 3.

5.3. Discussion

Study 4 replicated nearly all of Study 3's findings. In both studies, men were stereotyped as more oriented towards short-term mating and women were stereotyped as more oriented towards long-term mating, and these stereotyped sex differences were particularly pronounced for stereotypes of younger individuals. Moreover, stereotypes of agency tracked a similar interaction pattern as stereotypes of short-term mating goals—men were stereotyped as more agentic than women, especially at younger than older ages. Finally, stereotypes of communion showed a consistent sex stereotype across age—women were stereotyped as more communal than men across ages.

The one pattern that was inconsistent across studies was Sex X Age stereotypes of parenting goals. We predicted a specific interaction pattern in Study 3, but the predictions were not borne out. In Study 4, however, a Sex X Age interaction emerged: Women were stereotyped to be more communal than men at 18 years-old, but this stereotyped difference was diminished at 80 years-old. We discuss this finding and its implications in the General Discussion.

As in Study 3, we also performed a series of exploratory analyses examining whether stereotypes of short–term mating goals, long-term mating goals, and parenting goals predict stereotypes of agency and communion (see Supplement). Stereotypes of greater short-term mating goals predicted stronger agency stereotypes for 4 of the 10 sex-age target groups. Stereotypes of greater parenting goals also predicted stronger communion stereotypes for 4 of the 10 sex-age groups. Last, greater long-term mating goal stereotypes only predicted greater communion stereotypes in one sex-age group. Hence, as in Study 3, the regression analyses also seem to indicate that stereotypes of agency and communion are partially tracking stereotypes of short-term mating and parenting goals, respectively.

The findings from Study 3 and 4 provide initial support for the hypotheses that stereotypes of short-term mating and parenting goals influence stereotypes of agency and communion, respectively. However, both studies are limited in that they are correlational. Studies 5 and 6 address this limitation by experimentally manipulating

information about a target's adaptive goals, and examining the effects of manipulated goal information on stereotypes of agency and communion.

6. Study 5: Stereotypes track adaptive goal information

In Study 5, we manipulate information about a target male or female's adaptive goals to assess its causal effects on stereotypes. Specifically, we present perceivers with a male or female target who is seemingly engaged in short-term mating goals, parenting goals, learning goals (we elaborate on this below), or with no goal information as a control. We also focus on stereotypes of one target age group—28 year-olds. We do so for two reasons. First, this is an age group for which the manipulations of the different adaptive goals are all relatively plausible. For instance, a short-term mating goal oriented 28 year-old would be more believable than a short-term mating goal oriented 80 year-old. Second, focusing on one target age group keeps our study design feasible, as manipulating goal information for every possible target age group would be impractical.

The main predictions are as follows. First, given that stereotypes of short-term mating goals and parenting goals seem to be associated with stereotypes of agency and communion, respectively (Study 3 and 4), a target presented as engaging in short-term mating goals will be stereotyped as more agentic (relative to a control target paired with no goal information), whereas a target presented as engaging in parenting goals will be stereotyped as more communal.

Second, if sex stereotypes of agency and communion are emerging from stereotyped sex differences in short-term mating goals and parenting goals, presenting direct information about a target male or female's relevant goals might reduce or even eliminate the application of corresponding sex stereotypes. In other words, if (28 year-old) men are stereotyped to be more agentic than women because they are assumed to be more oriented towards short-term mating goals, then male and female targets presented as oriented towards short-term mating goals should then both be stereotyped as similar in agency. Correspondingly, if women are stereotyped to be more communal than men because they are assumed to be more oriented towards parenting goals, then female and male targets presented as similarly oriented towards parenting should also be stereotyped as similar in communion.

We also extend the current perspective by examining a third goal: building embodied capital, which we refer to here as learning goals. Embodied capital refers to any form of organized somatic tissue (Kaplan & Gangestad, 2005), such as muscles and brains. In humans, skills and knowledge are also important forms of embodied capital—investments that can provide future benefits and enable successful social competition.

What stereotypes might follow from knowing that someone has invested greatly in embodied capital? Investment in embodied capital might increase competence—the ability of individuals to effectively pursue their goals. Perceivers should be sensitive to others' competence because competence enhances the opportunities or threats others can potentially afford. Indeed, the trait of competence has received considerable attention in the person perception literature (e.g., Fiske, Cuddy, Glick & Xu, 2002), and we expect that competence inferences and stereotypes should track beliefs about others' investments in embodied capital.

Finally, although a person investing in embodied capital should be stereotyped as more competent, we have no strong theoretical grounds for believing that this will differ by target sex. Hence, we have no a priori predictions for how information about learning goals might interact with sex stereotypes of competence, unlike the prior predictions for sex stereotypes of agency and communion.

To summarize, the key predictions are as such:

(1) Short-term mating goal-oriented targets will be stereotyped as more agentic.

ARTICLE IN PRESS

O. Sng, et al.											Evolution and Human Behavior xxx (xxxx) xxx–xxx

(2) Parenting goal-oriented targets will be stereotyped as more communal.
(3) Learning goal-oriented targets will be stereotyped as more competent.
(4) Men will be stereotyped as more agentic than women when no goal information is provided. However, this stereotyped sex difference in agency will be reduced or eliminated when both men and women are presented to be similarly oriented towards short-term mating goals.
(5) Women will be stereotyped as more communal than men when no goal information is provided. However, this stereotyped sex difference in communion will be reduced or eliminated when both women and men are presented to be similarly oriented towards parenting goals.

6.1. Participants

To estimate required sample sizes, we used existing work examining the effect of manipulated information on group stereotypes of agency and communion (Koenig & Eagly, 2014). The smallest relevant effect size was estimated at about $d = 1.00$. To detect such effects with 80% power, $\alpha = .05$, requires 14 participants per condition. We oversampled by planning for 30 participants per condition. This sample size provides similar power for detecting an effect size of $d = .65$. Given eight between-subject conditions, the total planned sample size was 240 participants. A total of 241 participants (97 female; $M_{age} = 34.2$, $SD_{age} = 11.0$) completed the survey on Amazon MTurk.

6.2. Method

General procedures were similar to Study 3. Participants were randomly assigned to one of eight conditions describing a target person and then asked about their general impressions of the person. In each condition, participants were asked: "Imagine a 28 year-old White [*man/woman*]." We hold target race constant as existing work has found that there are race stereotypes in agency and communion (Koenig & Eagly, 2014). This was then followed by either no additional statement (No Goals condition), the statement "He/she likes looking for new sexual and romantic partners" (Short-term Mating Goal condition), the statement "He/she likes spending time with his/her children" (Parenting Goal condition), or the statement "He/she likes spending time learning new skills and educating himself/herself" (Learning Goal condition). Hence, the study design was a 2 (Target Sex: Male/Female) X 4 (Goal: No Goal/Short-term Mating/Parenting/Learning) between-participant design.

Participants were then presented with the same agency and communion measures from Study 3/4. To assess competence, four new traits were added (*capable, skillful, intelligent, competent*) and a composite calculated (Koenig & Eagly, 2014). Presentation order of the traits was randomized. Reliability was high for all three stereotype measures (agency = .77, communion = .88, competence = .90).

6.3. Results and Discussion

6.3.1. Agency stereotypes

We first conducted a 2 (Target Sex: Male/Female) X 4 (Goal: No Goal/Short-term Mating/Parenting/Learning) ANOVA on the agency stereotype measure. There were significant main effects of both Target Sex, $F(1, 233) = 4.57$, $p = .034$, $\eta_p^2 = .019$, and Goal, $F(3, 233) = 19.92$, $p < .001$, $\eta_p^2 = .20$, with no significant interaction, $F(3, 233) = 1.37$, $p = .25$ (Fig. 6).

Specifically, targets with short-term mating goals were stereotyped as the most agentic (all $ps < .001$; Tukey HSD correction), followed by targets with no goals/learning goals (both perceived as similar in agency, $p = .99$), and least agentic were targets with parenting goals (all $ps < .005$). Hence, tracking Prediction 1, experimentally providing
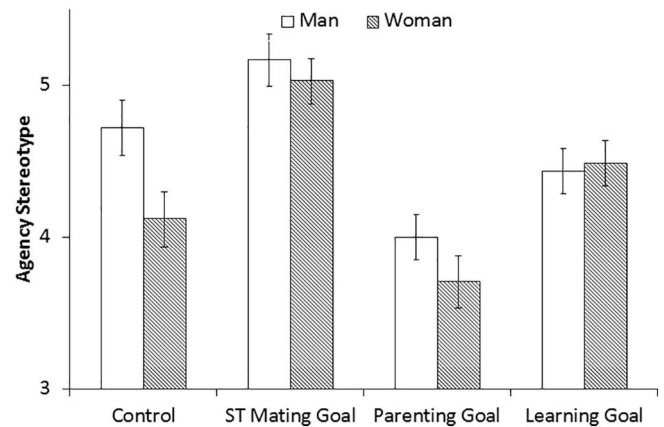

Fig. 6. Goal manipulation effects on agency stereotypes, with 1 S.E. error bars (Study 5).

perceivers with information about a target being oriented towards short-term mating goals increased stereotypes of agency. Interestingly, parenting goal information led to the opposite—a *decrease* in stereotypes of agency.

In addition, it was hypothesized that sex stereotyping in agency would be eliminated when male and female targets were represented by similar information about mating goals (Prediction 4). To test this, a focused 2 (Target Sex: Male/Female) X 2 (Goal: No Goal/Short-term Mating) ANOVA revealed significant main effects of both Target Sex and Goal [$F(1, 98) = 6.50$ and 21.83 respectively, both $ps < .05$, $\eta_p^2 = .06$ and $.18$]. However, there was no significant interaction, $F(1, 98) = 2.53$, $p = .12$ (Fig. 6). From pairwise comparisons, there was indeed significant sex stereotyping in the no goal condition, with males being stereotyped as more agentic than females ($p = .005$). However, when both male and female targets were presented as being short-term mating goal oriented, this sex stereotyping disappeared and both targets were viewed as highly, and similarly, agentic ($p = .49$).

6.3.2. Communion stereotypes

A similar 2 (Target Sex: Male/Female) X 4 (Goal: No Goal/Short-term Mating/Parenting/Learning) ANOVA showed significant main effects of both Target Sex [$F(1, 233) = 12.17$, $p = .001$, $\eta_p^2 = .050$] and Goal [$F(3, 233) = 32.32$, $p < .001$, $\eta_p^2 = 0.29$], and no significant interaction, $F(3, 233) = 0.54$, $p = .67$ (Fig. 7).

Following Prediction 2, targets with parenting goals were stereotyped as the most communal (all $ps < .001$), followed by targets with no goal information/learning goals (similar in communion, $p = .37$). Finally, targets with mating goals were stereotyped as less communal
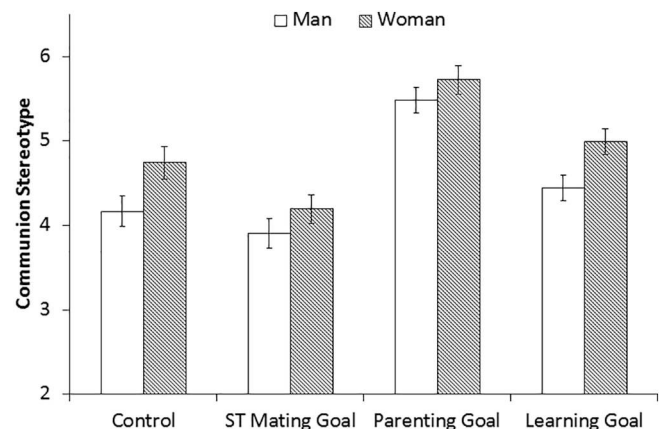

Fig. 7. Goal manipulation effects on communion stereotypes, with 1 S.E. error bars (Study 5).
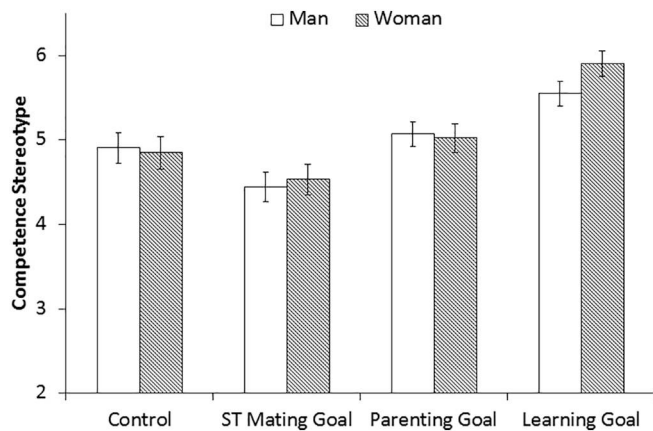
Fig. 8. Goal manipulation effects on competence stereotypes, with 1 S.E. error bars (Study 5).

than targets with parenting goals/no goal information (both $ps <$ .001), but similar to targets with learning goals ($p = .13$). Hence, providing perceivers with information about a target's parenting goals increased stereotypes of communion. Conversely, short-term mating goal information seemed to decrease stereotypes of communion.

We also predicted that sex stereotyping in communion would be eliminated when specific men and women are seen as similarly oriented towards parenting goals (Prediction 5). A focused 2 (Target Sex: Male/Female) X 2 (Goal: No Goal/Parenting) ANOVA showed significant main effects of both Target Sex and Goal [$F(1, 112) = 5.61$ and 44.81 respectively, both $ps < .05$, $\eta_p^2 = .05$ and $.29$], but no significant interaction, $F(1, 112) = .90$, $p = .34$ (Fig. 7). From pairwise comparisons, females were stereotyped as more communal than males in the no goal information condition ($p = .032$), but this stereotype was not significant when both targets were presented as oriented towards parenting goals ($p = .28$).

6.3.3. Competence stereotypes

The full 2 (Target Sex: Male/Female) X 4 (Goal: No Goal/Mating/Parenting/Embodied Capital) ANOVA showed a significant main effect of Goal [$F(3, 233) = 20.44$, $p < .001$, $\eta_p^2 = .21$], but no significant effect of Target Sex or interaction with Goal [Target Sex: $F(1, 233) = 0.48$, $p = .49$; interaction: $F(3, 233) = .72$, $p = .54$] (Fig. 8). Hence, in the current design, there was no significant sex stereotyping of competence.

Here, Prediction 3 was that learning goals would increase stereotypes of competence. Indeed, targets presented as having learning goals were stereotyped to be the most competent (all $ps < .001$), followed by targets with no goal information/parenting goals (perceived as similar, $p = .75$). Finally, targets with mating goals were stereotyped as less competent than targets with learning and parenting goals (both $ps < .01$), but similar to targets with no goal information ($p = .13$).

In sum, the three goal information manipulations each showed the predicted effects: individuals presented with short-term mating goals were stereotyped as especially agentic (Prediction 1), those with parenting goals as especially communal (Prediction 2), and those with learning goals as especially competent (Prediction 3). Mating goals also seemed to lead to a *decrease* in perceptions of communion, and parenting goals *decreased* perceptions of agency. We further predicted that typical sex stereotyping in terms of agency and communion would be eliminated when relevant goal information was provided (Predictions 4 and 5). Indeed, although perceivers stereotyped female targets as more communal and less agentic than male targets when no goal information was present, this sex stereotyping was not observed when males and females were presented as holding similar adaptive goals. However, we note that the interaction tests for these specific predictions were not statistically significant.

To further test the robustness of these findings, Study 6 employs a larger, better-powered sample with a preregistered design.

7. Study 6: Stereotypes track adaptive goal information II

In Study 6, we again manipulate goal information and examine its effects on stereotyping in terms of agency and communion. Specifically, we focus on the effects of short-term mating goal and parenting goal information on stereotypes of male and female agency and communion. We substantially increase the sample size in each condition to enhance statistical power for detecting the proposed interactions. As there were no sex stereotypes of competence in Study 5, we do not examine learning goals in Study 6.

In this study, we also revisit our earlier theorizing on stereotypes of long-term mating goals. As outlined in the introduction, we hypothesized that perceivers would have specific stereotypes of how long-term mating goals would vary across others' sex and age. And indeed, they did: perceivers stereotyped women to be more oriented than men towards long-term mating goals, but specifically at younger and not older ages (Studies 3 and 4). However, we did not find support for the hypothesis that sex-age stereotypes of communion would track these stereotypes of long-term mating goals. We revisit this hypothesis with Study 6's experimental design.

First, providing perceivers with information that a target is oriented towards long-term mating goals should lead to greater stereotypes of communion. Second, parallel to the other two goals, if sex stereotypes of communion derive in part from stereotyped sex differences in long-term mating goals, the application of sex stereotypes of communion should be reduced or eliminated when perceivers are presented with direct information about a target's long-term mating goals. Hence, to summarize Study 6's predictions:

(1) Short-term mating goal-oriented targets will be stereotyped as more agentic.
(2) Men will be stereotyped as more agentic than women when no goal information is provided, but this stereotyped sex difference in agency will be reduced or eliminated when both men and women are presented to be similarly oriented towards short-term mating goals.
(3) Long-term mating goal-oriented targets will be stereotyped as more communal.
(4) Parenting goal-oriented targets will be stereotyped as more communal.
(5) Women will be stereotyped as more communal than men when no goal information is provided, but this stereotyped sex difference in communion will be reduced or eliminated when both women and men are presented to be similarly oriented towards long-term mating OR parenting goals.

7.1. Participants and Method

The study design and all analyses were preregistered at http://asspredicted.org/blind.php?x=5cc2k7. From Study 5, the smallest effect size of interest was $d = .65$ (stereotypes of females as more communal than males). Detecting this at 80% power with $\alpha = .05$ requires a sample of 40 per condition. As our key hypotheses are interaction predictions (i.e., that sex stereotypes will disappear or diminish with relevant goal information), the recommended sample is double the n per cell (80) for detecting the simple effect (see http://datacolada.org/17). With 8 conditions, our target total sample size was 640. A total of 643 participants (299 female; $M_{age} = 34.1$, $SD_{age} = 12.5$) completed the survey on Prolific.

General procedures were similar to Study 5. The study design was a 2 (Target Sex: Male/Female) X 4 (Goal: No Goal/Short-term Mating/Long-term Mating/Parenting Goal) between-participant design. Participants were randomly assigned to one of the eight conditions. As

in Study 5, participants were first asked: "Imagine a 28 year-old White [*man/woman*]." This was then followed by either no other information (No Goals condition) or one of the three goal descriptions. We made slight modifications to the manipulations from Study 5, to more clearly differentiate the short-term mating goal manipulation from the new long-term mating goal manipulation, and to maintain consistency across manipulations. The Short-Term Mating Goal description was: "He/she spends his/her time looking for short-term sexual relationships." The Long-Term Mating Goal description was: "He/she is currently in a long-term committed relationship, and spends time with his/her partner." Finally, the Parenting Goal description was: "He/she spends his/her time with his/her children."

Participants were then presented with the same agency and communion stereotype measures from Study 5 (agency α = .80, communion α = .93). Other stereotype traits (e.g., intelligent, educated) were included for filler and exploratory purposes. Presentation order of all traits was randomized.

8. Results and Discussion

We sequentially present the relevant analyses for each goal manipulation.[6]

8.1. Short-term mating goals and agency stereotypes

We first conducted the full 2 (Target Sex: Male/Female) X 4 (Goal: No Goal/Short-term Mating/Long-term Mating/Parenting) ANOVA on the agency stereotype measure. There were significant main effects of both Target Sex and Goal, and a significant interaction, $F(3, 635) = 6.37$, $p < .001$, $\eta_p^2 = .029$ (Fig. 9).

From the simple main effects of Goal, targets with short-term mating goals were stereotyped as the most agentic (all $ps < .001$; Tukey HSD correction), followed by targets with no goals, and least agentic were targets with long-term mating and parenting goals (all $ps < .001$). Long-term mating and parenting goals were stereotyped similarly ($p = .85$). Hence, tracking Prediction 1—and similar to Study 5—targets presented as short-term mating goal oriented were stereotyped as more agentic.

To test whether sex stereotypes of agency might be reduced or eliminated in the presence of information that both sexes are oriented towards short-term mating (Prediction 2), we conducted a focused 2 (Target Sex: Male/Female) X 2 (Goal: No Goal/Short-term Mating) ANOVA. The main effects of Target Sex and Goal were qualified by the predicted interaction, $F(1, 319) = 13.87$, $p < .001$, $\eta_p^2 = .042$. From pairwise comparisons, there was a significant sex stereotype in the no goal condition, with males being stereotyped as more agentic than females ($p < .001$). However, as predicted, when both male and female targets were presented as being short-term mating goal oriented, this sex stereotype in agency disappeared ($p = .74$) and both targets were stereotyped as equally agentic (Fig. 9).

8.2. Long-term mating goals and communion stereotypes

The full 2 (Target Sex: Male/Female) X 4 (Goal: No Goal/Short-term Mating/Long-term Mating/Parenting) ANOVA on communion stereotypes showed significant main effects of both Target Sex and Goal, and also a significant interaction, $F(3, 635) = 7.31$, $p < .001$, $\eta_p^2 = .033$ (Fig. 10).

From simple main effects, communion stereotypes for every goal condition significantly differed from each other (all $ps < .001$). Targets with parenting goals were stereotyped as most communal,
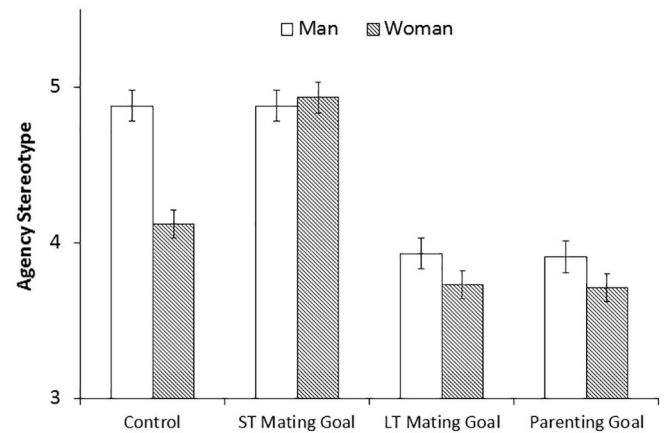
Fig. 9. Goal manipulation effects on agency stereotypes, with 1 S.E. error bars (Study 6).
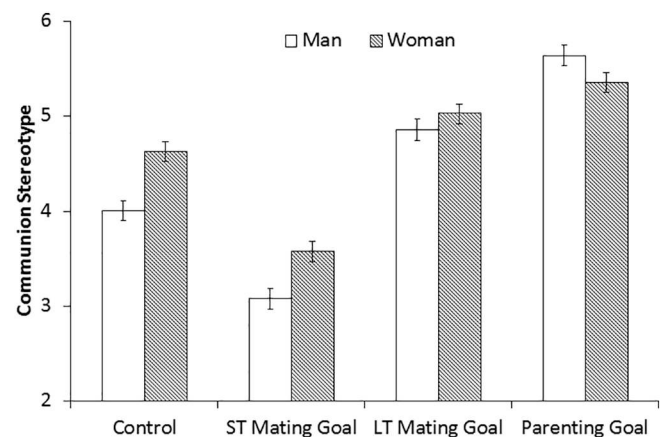

Fig. 10. Goal manipulation effects on communion stereotypes, with 1 S.E. error bars (Study 6).

followed by targets with long-term mating goals, and then followed by control targets. Targets with *short*-term mating goals were stereotyped as the least communal. Hence, as per Prediction 3, targets presented as long-term mating goal oriented were stereotyped as more communal.

Prediction 5 hypothesized that sex stereotypes of communion may be reduced or eliminated when both sexes are presented as oriented towards long-term mating goals. To examine this, we conducted a 2 (Target Sex: Male/Female) X 2 (Goal: No Goal/Long-term Mating) ANOVA. Main effects of Target Sex and Goal were again qualified by the predicted interaction, $F(1, 319) = 5.20$, $p = .023$, $\eta_p^2 = .016$. Females were indeed stereotyped as more communal than males in the no goal information condition ($p < .001$). However, when both male and female targets were presented as being long-term mating goal oriented, this sex stereotype in communion was eliminated ($p = .24$) (Fig. 10).

8.3. Parenting goals and communion stereotypes

As just presented in the analyses above, targets presented with parenting goals were indeed stereotyped as more communal than control targets. This bears out Prediction 4.

Returning to Prediction 5, that sex stereotypes of communion will be reduced or eliminated in the presence of parenting goal information, a 2 (Target Sex: Male/Female) X 2 (Goal: No Goal/Parenting) ANOVA was conducted. A significant main effect of Goal was qualified by the predicted Target Sex X Goal interaction, $F(1, 329) = 19.08$, $p < .001$, $\eta_p^2 = .055$. As expected, females were stereotyped as more communal

than males in the no goal information condition ($p < .001$). However, when both targets were presented as being parenting goal oriented, the sex stereotype was again eliminated, and if anything, exhibited a reversal (although not statistically significant)—parenting goal-oriented men were stereotyped as *more* communal than parenting goal-oriented women ($p = .055$) (Fig. 10).

In summary, we find that targets presented as engaging in short-term mating goals are stereotyped as more agentic. Targets engaging in long-term mating or parenting goals, on the other hand, are stereotyped as more communal. The patterns for the short-term mating and parenting goal manipulations replicate what was found in Study 5. In addition, we find that typical sex stereotyping on agency and communion are eliminated when relevant goal information is provided. Specifically, although men are typically stereotyped as more agentic than women, this sex stereotype is no longer applied when both sexes are shown as engaging in short-term mating goals. Similarly, although women are generally stereotyped as more communal than men, this sex stereotype is also not applied when both sexes are shown as engaging in long-term mating or parenting goals. Again, the cancelling out of typical sex stereotyping in the presence of short-term mating and parenting goal information replicates Study 5's patterns, with the critical interaction tests being statistically significant here.

9. General Discussion

Conceptualizing social perceivers as lay adaptationists led us to test a series of predictions. First, we find that perceivers categorize by sex and age interactively—mentally grouping others as younger or older males and females (Studies 1 and 2). Second, perceivers hold predictable stereotypes of the adaptive goals that males and females of different ages/life stages have (Studies 3 and 4). For instance, men are stereotyped to be more oriented towards short-term mating goals than women, and particularly so at younger than older ages. A sex-reversed but similar interactive pattern emerged for stereotypes of long-term mating goals. Additionally, sex-age stereotypes of agency and communion seem to derive partly from sex-age stereotypes of short-term mating and parenting goals, respectively. These final hypotheses were tested experimentally, and extended, in Studies 5 and 6. Specifically, presenting direct information that an individual is oriented towards short-term mating goals leads to a stereotype of greater agency, and can also eliminate stereotyped sex differences in agency. Information that an individual is long-term mating or parenting goal oriented, on the other hand, increases stereotypes of communion and also seems to eliminate sex stereotypes of communion. Finally, information that an individual is engaging in learning goals leads to stereotypes of greater competence (Study 5).

These predictions and findings emerge from the integration of affordance management with parental investment and life history theories, applied to thinking about sex and age stereotyping. To the extent that sex and life stage (age) shape how individuals invest their time and energy in adaptive goals, and that these goals afford certain opportunities and threats to perceivers, perceivers should pay attention to the sex and age of others in order to predict the affordances of others. For social animals, successful survival and reproduction requires identifying the potential opportunities and threats others pose. Being able to represent these different affordance groups as distinct social categories, and holding specific stereotypes about these groups, facilitates this process.

We have examined sex-age categorization (Studies 1 and 2) and stereotyping (Studies 3–6) separately, in different studies. The sequence of these studies might be taken to imply that sex-age categorization precedes sex-age stereotypes. However, the current framework does not assume so. In fact, the reverse could also be occurring—perceivers observe interactive sex-age differences in adaptive goals and behaviors, and subsequently categorize others by the interaction of sex and age due to the unique affordance information carried by these categories.

To be clear, what is expected from the current framework is that *both* interactive sex-age categorization and stereotyping should occur. It is currently agnostic about whether one process necessarily precedes the other.

The current approach builds novel connections between two broad literatures that have been generally separated—social psychological work on sex and age perception and stereotyping, and evolutionary psychological work on sex and life stage differences in adaptive goals. Regarding work on social perception and stereotyping, the current approach highlights how certain sex and age stereotypes may actually be interactive in nature (e.g., sex-age stereotypes of agency) rather than independent. That certain categories interact in social perception is not a new argument (e.g., Johnson, Freeman, & Pauker, 2012; Kang & Bodenhausen, 2015; Schug, Alt, & Klauer, 2015; Stangor et al., 1992), and some work has also descriptively explored the intersection of gender and age stereotypes (Koenig, 2018). However, the current framework provides unique predictions about the specific content of people's stereotypes for different sex-age intersections (e.g., women stereotyped as being more long-term mating oriented than men, but only at younger ages). Moreover, the current approach provides an ultimate explanation for *why* sex and age stereotypes should interact—because individuals at different sex-age intersections pose distinct affordances and social perceivers have evolved to be sensitive to these differences.

This is not to say that all sex and age stereotypes are interactive. Contrary to predictions, perceivers seem to hold independent sex and age stereotypes of communion (Study 3 and 4): Women were stereotyped to be consistently more communal than men across all ages, and older individuals were stereotyped to be more communal than younger individuals. Our original prediction was that communion stereotypes would also interact by sex and age, tracking a prediction of similarly interactive sex-age stereotypes of parenting goals. However, stereotypes of parenting goals by sex and age did not exhibit a consistent pattern across Studies 3 and 4. Study 3 found no meaningful sex-by-age interaction. In Study 4, however, perceivers seemed to stereotype women as more parenting oriented than men at 18 years-old, but this sex stereotype diminished when perceivers reported their stereotypes of 80 year-olds.

The pattern from Study 4 is consistent with one aspect of our original prediction—that these older ages are when men also invest considerably in parenting (as mating goals have diminished in priority). What is more surprising, though, is that even 18 year-old women were stereotyped, more than men, as parenting oriented. Why? One possibility is that participants were thinking about the conditions under which an 18 year-old female would have a child. Presumably, given the inexperience of such a young mother, perceivers might assume that it may be particularly important for her to be investing in parental care, hence the attribution of strong parenting goals even at such an age.

The findings in Studies 5 and 6 provide experimental support that presumed key adaptive goals may underlie prominent social stereotypes. Accordingly, providing perceivers with direct information about a target's goals significantly alters stereotypes of agency, communion, and competence. For instance, individuals who are oriented towards short-term mating goals are stereotyped as more agentic, and those oriented towards parenting goals are stereotyped as more communal. Furthermore, to the extent that existing sex stereotypes might derive partly from presumed sex differences in adaptive goals, providing direct information about a target's goals might override the application of these sex stereotypes. Indeed, this seems to be the case. For example, although men are stereotyped to be more agentic than women in the absence of goal information, when both sexes are presented as engaging in short-term mating goals, the stereotyped sex difference in agency disappears. This novel insight—that adaptive goal information can override sex stereotypes—is similar in nature to work on coalitional information overriding race categorization (e.g., Pietraszewski, 2016), and work on ecology information overriding race stereotyping

(Williams et al., 2016). Just as race is an indirect cue of another's coalition or home ecology, a person's sex and age may also be indirect cues to their adaptive goals, and it is the latter that carries critical fitness-relevant information for social perceivers.

We note that one interpretation of these findings is that *any* kind of individual information about a target male or female would prevent sex stereotypes from being applied. Some aspects of our data suggest against this interpretation. For instance, although the communion sex stereotype is eliminated in the parenting goal condition, it remains in the short-term mating goal condition (Fig. 10). That is, short-term mating-goal-oriented women are still stereotyped as more communal than short-term mating-goal-oriented men ($p = .001$). Hence, each adaptive goal manipulation may have stereotype-specific effects.

It is also interesting to note that the goal manipulations had certain effects about which we had no strong a priori predictions. For instance, as predicted, parenting goal information led to greater communion stereotypes. But parenting goal information also led to weaker *agency* stereotypes. A similar pattern occurred with short-term mating goal information. Targets engaging in short-term mating goals were stereotyped as more agentic (as predicted) but also as *less* communal. One possibility is that these patterns reflect recognized life history trade-offs of mating versus parenting effort, but at the level of perceivers' stereotypes. In other words, a short-term-mating-oriented target might be stereotyped as less communal because they are also presumed to be *less* engaged in parenting goals, as a trade-off for their investment in mating effort. That perceivers may have an intuitive sense of life history trade-offs, and that these intuitions might manifest in social stereotypes, is an interesting area for future work.

The current framework also extends existing thinking on parental investment and life history theory into the domain of social perception. For instance, existing work inspired by life history theory has focused on the various individual and ecological factors that influence reproductive traits (Brumbach, Figueredo, & Ellis, 2009), risky behavior (Griskevicius, Tybur, Delton, & Robertson, 2011), learning (Frankenhuis, de Vries, Bianchi, & Ellis, 2019), and many other social traits. The current framework explores the flip side of the proverbial coin, examining how social *perceivers*—tasked with predicting others' actions so they may enhance their own fitness—must be attuned to the same factors that influence these social traits. We have focused on sex and age here, as they shape the key goals of mating (both short and long-term) and parenting. Elsewhere, we have demonstrated that the current perspective can also generate useful insights for understanding other stereotypes, such as those of ecology and race (Williams et al., 2016; also see Sng, Williams, & Neuberg, 2016).

We note some limitations and future directions. First, we examined a limited set of adaptive goals in the current work. A wide range of fundamental goals have been argued to promote fitness (Kenrick et al., 2010), and lay adaptationists may also pay attention to a wider range of goals in social perception. For instance, perceivers may have specific stereotypes of those who are engaging in status seeking or resource acquisition goals, and these other goal perceptions may also play into existing sex and age stereotypes, or into stereotypes of other social categories (e.g., occupation, race). Second, the current samples are limited to American adult perceivers and it is unclear how generalizable the findings may be to other societies. The current perspective does generate predictions about potential cross-societal variation, though. For instance, if sex stereotypes of agency stem from stereotypes of sex differences in short-term mating goals, one might predict that sex stereotypes of agency will be weaker in societies where sex differences in short-term mating orientations are also smaller. Finally, we have attempted to examine how sex-age stereotypes might derive from perceptions of adaptive goals. We are not suggesting, however, that sex-age stereotypes stem *only* from perceptions of such goals. We have focused on a more ultimate level of analysis, but it is likely that more proximal processes not derivable from our perspective also contribute to such stereotypes (e.g., gender stereotypes serve to justify the status quo of

gender roles in a society; Jost & Kay, 2005).

In sum, it is clear that people categorize by, and hold stereotypes about, sex and age. What has been less clear is *why* we categorize and stereotype in the particular ways we do. The lay adaptationist hypothesis provides one potential answer: Because we need to effectively predict the actions of others that have implications for our own fitness, we categorize and stereotype by sex-age, as representations of the different opportunities and threats males and females of specific life stages afford us.

References

Bor, A. (2018). Correcting for base rates in multidimensional "Who said what?" experiments. *Evolution and Human Behavior, 39*(5), 473–478.

Brewer, M. B., Dull, V., & Lui, L. (1981). Perceptions of the elderly: Stereotypes as prototypes. *Journal of Personality and Social Psychology, 41*, 656–670.

Brumbach, B. H., Figueredo, A. J., & Ellis, B. J. (2009). Effects of harsh and unpredictable environments in adolescence on development of life history strategies: A longitudinal test of an evolutionary model. *Human Nature, 20*, 25–51.

Bryan, A. D., Webster, G. D., & Mahaffey, A. L. (2011). The big, the rich, and the powerful: Physical, financial, and social dimensions of dominance in mating and attraction. *Personality and Social Psychology Bulletin, 37*(3), 365–382.

Buckels, E. E., Beall, A. T., Hofer, M. K., Lin, E. Y., Zhou, Z., & Schaller, M. (2015). Individual differences in activation of the parental care motivational system: Assessment, prediction, and implications. *Journal of Personality and Social Psychology, 108*(3), 497.

Buss, D. M. (1989). Sex differences in human mate preferences: Evolutionary hypotheses tested in 37 cultures. *Behavioral and Brain Sciences, 12*(1), 1–14.

Del Giudice, M., Gangestad, S. W., & Kaplan, H. S. (2015). Life history theory and evolutionary psychology. In D. M. Buss (Ed.). *The handbook of evolutionary psychology* (pp. 88–114). (2nd ed.). New York: John Wiley and Sons.

Dratva, J., Gomez, R. F., Schindler, C., Ackermann-Liebrich, U., Gerbase, M. W., Probst-Hensch, N. M., ... Zemp, E. (2009). Is age at menopause increasing across Europe? Results on age at menopause and determinants from two population-based studies. *Menopause, 16*, 385–394.

Eagly, A. H., & Steffen, V. J. (1984). Gender stereotypes stem from the distribution of women and men into social roles. *Journal of Personality and Social Psychology, 46*(4), 735–754.

Fabes, R. A., & Martin, C. L. (1991). Gender and age stereotypes of emotionality. *Personality and Social Psychology Bulletin, 17*, 532–540.

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*(6), 878–902.

Frankenhuis, W. E., de Vries, S. A., Bianchi, J., & Ellis, B. J. (2019). Hidden talents in harsh conditions? A preregistered study of memory and reasoning about social dominance. *Developmental Science.* https://doi.org/10.1111/desc.12835 e12835.

Gangestad, S. W., & Simpson, J. A. (2000). The evolution of human mating: Trade-offs and strategic pluralism. *Behavioral and Brain Sciences, 23*(4), 573–587.

Gibson, J. J. (1979). *The ecological approach to visual perception.* Boston, MA: Houghton Mifflin.

Griskevicius, V., Tybur, J. M., Delton, A. W., & Robertson, T. E. (2011). The influence of mortality and socioeconomic status on risk and delayed rewards: A life history theory approach. *Journal of Personality and Social Psychology, 100*(6), 1015–1026.

Hummert, M. L., Garstka, T. A., Shaner, J. L., & Strahm, S. (1995). Judgments about stereotypes of the elderly: Attitudes, age associations, and typicality ratings of young, middle-aged, and elderly adults. *Research on Aging, 17*(2), 168–189.

Johnson, K. L., Freeman, J. B., & Pauker, K. (2012). Race is gendered: How covarying phenotypes and stereotypes bias sex categorization. *Journal of Personality and Social Psychology, 102*(1), 116–131.

Jost, J. T., & Kay, A. C. (2005). Exposure to benevolent sexism and complementary gender stereotypes: Consequences for specific and diffuse forms of system justification. *Journal of Personality and Social Psychology, 88*(3), 498–509.

Kang, S. K., & Bodenhausen, G. V. (2015). Multiple identities in social perception and interaction: Challenges and opportunities. *Annual Review of Psychology, 66*, 547–574.

Kaplan, H., & Gangestad, S. (2005). Life history theory and evolutionary psychology. In D. M. Buss (Ed.). *The handbook of evolutionary psychology* (pp. 68–95). New York: John Wiley and Sons.

Kaplan, H., Hill, K., Lancaster, J., & Hurtado, A. M. (2000). A theory of human life history evolution: Diet, intelligence, and longevity. *Evolutionary Anthropology, 9*, 156–185.

van Keep, P. A., Brand, P. C., & Lehert, P. (1979). Factors affecting the age at menopause. *Journal of Biosocial Science,* (6), 37–55.

Kenrick, D. T., Griskevicius, V., Neuberg, S. L., & Schaller, M. (2010). Renovating the pyramid of needs: Contemporary extensions built upon ancient foundations.

Perspectives on Psychological Science, 5(3), 292–314.

Kidd, S. A., Eskenazi, B., & Wyrobek, A. J. (2001). Effects of male age on semen quality and fertility: A review of the literature. *Fertility and Sterility, 75*, 237–248.

Kite, M. E. (1996). Age, gender, and occupational label: A test of social role theory. *Psychology of Women Quarterly, 20*, 361–374.

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.

Koenig, A. M. (2018). Comparing prescriptive and descriptive gender stereotypes about children, adults, and the elderly. *Frontiers in Psychology, 9*.

Koenig, A. M., & Eagly, A. H. (2014). Evidence for the social role theory of stereotype content: Observations of groups' roles shape stereotypes. *Journal of Personality and Social Psychology, 107*(3), 371–392.

Li, N. P., & Kenrick, D. T. (2006). Sex similarities and differences in preferences for short-term mates: What, whether, and why. *Journal of Personality and Social Psychology, 90*(3), 468–489.

Li, N. P., Kenrick, D. T., Bailey, J. M., & Linsenmeier, J. A. (2002). The necessities and luxuries of mate preferences: Testing the tradeoffs. *Journal of Personality and Social Psychology, 82*(6), 947–955.

Litman, L., Robinson, J., & Abberbock, T. (2016). TurkPrime.com: A versatile crowd-sourcing data acquisition platform for the behavioral sciences. *Behavior Research Methods,* 1–10.

McArthur, L. Z., & Baron, R. M. (1983). Toward an ecological theory of social perception. *Psychological Review, 90*, 215–238.

Minear, M., & Park, D. C. (2004). A lifespan database of adult facial stimuli. *Behavior Research Methods, Instruments, & Computers, 36*(4), 630–633.

Neel, R., Kenrick, D. T., White, A. E., & Neuberg, S. L. (2016). Individual differences in fundamental social motives. *Journal of Personality and Social Psychology, 110*(6), 887–907.

Neuberg, S. L., Kenrick, D. T., & Schaller, M. (2010). Evolutionary social psychology. In S. T. Fiske, D. T. Gilbert, & G. Lindzey (Eds.). *Handbook of social psychology* (pp. 761–796). (5th ed.). New York: John Wiley & Sons.

Neuberg, S. L., & Sng, O. (2013). A life history of social perception: Stereotyping at the intersections of age, sex, and ecology (and race). *Social Cognition, 31*, 696–711.

Peer, E., Brandimarte, L., Samat, S., & Acquisti, A. (2017). Beyond the Turk: Alternative platforms for crowdsourcing behavioral research. *Journal of Experimental Social Psychology, 70*, 153–163.

Pietraszewski, D. (2016). Priming race: Does the mind inhibit categorization by race at encoding or recall? *Social Psychological and Personality Science, 7*(1), 85–91.

Pietraszewski, D. (2018). A reanalysis of crossed-dimension "who said what?" paradigm studies, using a better error base-rate correction. *Evolution and Human Behavior, 39*(5), 479–489.

Pietraszewski, D., Cosmides, L., & Tooby, J. (2014). The content of our cooperation, not the color of our skin: An alliance detection system regulates categorization by coalition and race, but not sex. *PLoS One, 9*(2), e88534.

Rudman, L. A., Greenwald, A. G., & McGhee, D. E. (2001). Implicit self-concept and evaluative implicit gender stereotypes: Self and ingroup share desirable traits. *Personality and Social Psychology Bulletin, 27*(9), 1164–1178.

Schmitt, D. P. (2005). Sociosexuality from Argentina to Zimbabwe: A 48-nation study of sex, culture, and strategies of human mating. *Behavioral and Brain Sciences, 28*(2), 247–275.

Schug, J., Alt, N. P., & Klauer, K. C. (2015). Gendered race prototypes: Evidence for the non-prototypicality of Asian men and black women. *Journal of Experimental Social Psychology, 56*, 121–125.

Scott-Phillips, T. C., Dickins, T. E., & West, S. A. (2011). Evolutionary theory and the ultimate–proximate distinction in the human behavioral sciences. *Perspectives on Psychological Science, 6*(1), 38–47.

Sng, O., Williams, K. E. G., & Neuberg, S. L. (2016). Evolutionary approaches to stereotyping and prejudice. In C. G. Sibley, & F. K. Barlow (Eds.). *Cambridge handbook of the psychology of prejudice.* Cambridge University Press.

Spence, J. T., & Helmreich, R. L. (1978). *Masculinity and femininity: Their psychological dimensions, correlates, and antecedents.* Austin, TX: University of Texas Press.

Stangor, C., Lynch, L., Duan, C., & Glas, B. (1992). Categorization of individuals on the basis of multiple social features. *Journal of Personality and Social Psychology, 62*(2), 207–218.

Stearns, S. C. (1992). *The evolution of life histories. Vol. 249.* Oxford: Oxford University Press.

Taylor, S. E., Fiske, S. T., Etcoff, N. L., & Ruderman, A. J. (1978). Categorical and contextual bases of person memory and stereotyping. *Journal of Personality and Social Psychology, 36*, 778–793.

Trivers, R. L. (1972). Parental investment and sexual selection. In B. Campbell (Ed.). *Sexual selection and the descent of man* (pp. 136–179). Chicago: Aldine-Atherton.

Williams, J. E., & Best, D. L. (1990). *Measuring sex stereotypes: A multination study.* Newbury Park, CA: Sage.

Williams, K. E., Sng, O., & Neuberg, S. L. (2016). Ecology-driven stereotypes override race stereotypes. *Proceedings of the National Academy of Sciences, 113*(2), 310–315.