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Development of Preferences for Differently Aged Faces of Different Races

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Abstract

Children's experiences with differently aged faces changes in the course of development. During infancy, most faces encountered are adult, however as children mature, exposure to child faces becomes more extensive. Does this change in experience influence preference for differently aged faces? The preferences of children for adult versus child, and adult versus infant faces were investigated. Caucasian 3- to 6-year-olds and adults were presented with adult/child and adult/infant face pairs which were either Caucasian or Asian (race consistent within pairs). Younger children (3 to 4 years) preferred adults over children, whereas older children (5 to 6 years) preferred children over adults. This preference was only detected for Caucasian faces. These data support a "here and now" model of the development of face age processing from infancy to childhood. In particular, the findings suggest that growing experience with peers influences age preferences and that race impacts on these preferences. In contrast, adults preferred infants and children over adults when the faces were Caucasian or Asian, suggesting an increasing influence of a baby schema, and a decreasing influence of race. The different preferences of younger children, older children, and adults also suggest discontinuity and the possibility of different mechanisms at work during different developmental periods.

Keywords

children; experience; age preferences; other-race effect

From infancy, we respond to individuals based on salient social attributes extracted largely but not exclusively from faces. These attributes include age, gender, and race (e.g., Damon, Quinn, Heron-Delaney, Lee, & Pascalis, 2016; Kelly et al., 2007; Quinn, Yahr, Kuhn, Slater, & Pascalis, 2002) and are generally thought not to be processed independently (but see Bruce & Young, 1986). Instead, multiple dimensions may interact (e.g., Macchi Cassia, Luo, Pisacane, Li, & Lee, 2014b; Quinn et al., 2008). The current study investigates the

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development of face age preferences, as well as how another face attribute, race, may impact on such preferences.

Responding to Face Age: Preference, Recognition, and Categorization

Children experience changes in exposure to differently aged faces during the course of development. During early infancy, most faces encountered are not own-age faces, but adult faces (Rennels & Davis, 2008; Sugden, Mohamed-Ali, & Moulson, 2014). However, increased age, out-of-home care and schooling increase the exposure of children to faces of their own age. Also, unlike face race or species information, face physiognomy changes dramatically with age. These observations raise the question of how change in experience with differently aged faces age may influence preference for faces based on age.

In the past decade, the preference and recognition abilities of adults, children, and infants for differently aged faces have been investigated. It is important to distinguish between preference (preferring to attend to or choosing one age category over another) and recognition (processing and memory for faces encountered previously) given that findings sometimes differ depending on which construct is being assessed. Adults demonstrate a preference for infant over child and adult faces and child over adult faces (Luo, Li, & Lee, 2011), are more responsive to infantile face cues (Glocker et al., 2009; Hildebrandt & Fitzgerald, 1979; Little & Fusani, 2012), and have their attention captured more by infant faces than adult faces (Brosch, Sander, & Scherer, 2007; Proverbio, De Gabriele, Manfredi, & Adorni, 2011; Thompson-Booth et al., 2014). This pattern of performance may reflect a baby schema. The baby schema proposes that infantile facial characteristics (i.e., protruding forehead, round face, big eyes below the midline of the face) make the infant cute, elicit care-taking behaviour, and decrease aggression, thereby increasing the likelihood of the infant's survival (Lorenz, 1943). Glocker et al. (2009) directly assessed the baby schema by experimentally manipulating faces of infants to produce images with high and low baby schema features. The high baby schema faces were rated by adults as cuter than the low baby schema faces and elicited stronger motivation for caretaking. However, adults are typically better at recognizing adult faces than child or infant faces (Harrison & Hole, 2009; Kuefner, Macchi Cassia, Picozzi, & Bricolo, 2008; Macchi Cassia, Picozzi, Kuefner, & Casati, 2009b). Moreover, experience with other-age faces influences the ability of adults to recognise other-age faces, e.g., early childhood teachers are equally good at recognising child and adult faces (Harrison & Hole, 2009; Kuefner et al., 2008) and maternity nurses recognise adult and newborn faces with similar accuracy (Macchi Cassia et al., 2009b). Thus, experience with different age groups acquired in adulthood can impact on face-processing abilities.

For children, with respect to preference, 3- to 6-year-old children show evidence of a baby schema (i.e., preferring adults or infants who are more infantile in appearance) as reflected by gaze allocation and cuteness ratings (Borgi, Cogliati-Dezza, Brelsford, Meints, & Cirulli, 2014; Sanefuji, Ohgami, & Hashiya, 2007). With regard to recognition, children show a similar trend to adults in terms of typically being better at recognising adult faces. Three-year-olds without specific other-age experience are more accurate at recognizing adult faces than neonate or elderly faces (Macchi Cassia, 2011; Macchi Cassia, Kuefner, Picozzi, &

Vescovo, 2009a; Proietti, Pisacane, & Macchi Cassia, 2013). Similarly, 3-year-olds without an older sibling and 6-year-olds without a sibling are better at recognising adult than child faces (Macchi Cassia, Pisacane, & Gava, 2012; Macchi Cassia, Proietti, & Pisacane, 2013). However, 3-year-olds who have an older sibling are equally accurate in their processing of adult and child faces (Macchi Cassia et al., 2012). Thus, children show an advantage for recognizing faces from age groups with which they have experience. These findings and a review by Macchi Cassia (2011) indicate that adults and children are generally better at recognizing adult than child faces, unless they have specific experience with child faces (however, see Rhodes & Anastasi, 2012, for an alternative view).

Infant preferences for and ability to recognize differently aged faces have been investigated recently. Three- and 6-month-old infants show a visual preference for adult over infant faces (Heron-Delaney et al., 2016). However, it should be noted that while infant looking times provide an inference of preference, longer looking time toward a stimulus is not necessarily indicative of true affiliative social preference (Aslin, 2007). Infants may attend more to adult faces because they are more familiar. Consistent with this interpretation are reports that 77% to 81% of an infant's interactions are with adults (aged approximately 20–49 years) in the first year of life (Rennels & Davis, 2008; Sugden, Mohamed-Ali, & Moulson, 2014). An additional processing consequence that may reflect lack of familiarity is in recognition. In terms of ability to recognise differently aged faces, 9-month-olds show superior recognition for adult versus infant faces, whereas 3-month-olds recognize infant and adult faces equally well (Macchi Cassia, Bulf, Quadrelli, & Proietti, 2014a).

Further research has investigated infant ability to categorise differently aged faces. Nine- and 12-month-olds have provided evidence of forming distinct categories of adult and infant faces, demonstrated in a visual familiarization/novelty-preference paradigm (Damon et al., 2016). Twelve-month-olds also formed distinct categories of child and infant faces; however, 9-month-olds only formed a category of child faces, which excluded infant faces, but not the reverse. Furthermore, 12-month-olds who received more exposure to infant faces demonstrated greater novel category preference for child faces after familiarization with infant faces. The findings suggest that 12-month-olds have a more exclusive representation of face age, which may be influenced by prior experience with infant faces.

An Influence of Face Race

Children and infants additionally process race information. Three-month-old infants prefer the race of face with which they have had predominant experience, which are typically own-race faces (e.g., Bar-Haim, Ziv, Lamy, & Hodes, 2006; Kelly et al., 2005). However, as was the case with face age, longer looking time toward own-race faces may simply reflect greater familiarity with such faces, given estimates that infants may experience over 90% own-race faces in the first year (Rennels & Davis, 2008; Sugden et al., 2014). Moreover, for face race (like face age), recognition is affected by such asymmetrical experience. Infants, children, and adults who do not have extensive experience with other-race faces demonstrate a superior ability to recognize own- versus other-race faces (e.g., Goodman et al., 2007; Kelly et al., 2007; Meissner & Brigham, 2001), referred to as the other race effect (ORE).

Recent research has investigated the influence that age and race have in combination on child recognition of faces. Age and race experiences were found to interact in influencing 3-year-old children's ability to recognize adult and child own- and other-race faces in a study that included Caucasian and Asian children with and without older siblings (Macchi Cassia et al., 2014b). Children who did not have an older sibling were better at recognizing adult faces, and children with at least one older sibling were equally good at recognizing adult and child faces, but importantly, this only occurred for own-race faces. The fact that superior adult face recognition was confined to own-race faces and that the preference for own-race faces was only observed for adult faces suggests that race and age information are represented at the same hierarchical level for 3-year-olds (Macchi Cassia et al., 2014b). Additionally, a study investigating infant preferences when both age and race are involved, shows that 3.5- and 6-month-old infants prefer adult over infant faces only when the faces are own- (Caucasian) and not other-race (Asian) (Heron-Delaney et al., 2016).

Experientially-Based Tuning to the Social Attributes of Faces: Why Important?

Why is our experience with and ability to process faces important? Face processing, inclusive of the processing that facilitates language development, is essential to help us to interact with others. We need to be able to process age, gender and race information, to identify people we encounter, to communicate successfully, and to adapt to our social world (Pascalis et al., 2014; see also Keating, 2016). Perceptual tuning or narrowing refers to the process whereby infants maintain the ability to differentiate among stimuli from frequently experienced classes, but display a decline in the ability to differentiate among stimuli from infrequently experienced classes (Maurer & Werker, 2014). As noted, such tuning has been observed for both face age and race, and construed more broadly, is also manifested in preference behaviour. This experientially driven reorganization of sensitivities may be regarded as adaptive, given that greater facility with the faces predominant in one's environment should enhance learning and social interaction, thereby facilitating integration into one's social group.

Face Perception Versus Social Preference

While the above-referenced studies generally speak to how children and infants process age and race information in face perception tasks (i.e., looking time preference, recognition), they are less informative with regard to the development of social preferences based on age and race. Although we are unaware of any studies that directly assess children's preferences for different age groups, tasks which assess social preference in children indicate that 3- to 5-year-olds believe that adults are generally more knowledgeable about the world than children (Jaswal & Neely, 2006; Taylor, Cartwright, & Bowden, 1991; VanderBorght & Jaswal, 2009). However, pre-schoolers view other children (versus adults) as most knowledgeable about toys (VanderBorght & Jaswal, 2009) and 3-year-olds prefer objects and actions when they are endorsed by another child versus an adult (Shutts, Banaji, & Spelke, 2010).

In terms of race-based social preferences, children 3 years of age and younger typically do not demonstrate preferences based on race, while children 4 years and older do show such preferences. Supporting studies have involved presenting Caucasian children with pairs of photographs or videos of same- and other-race (e.g., African, Asian) individuals and asking children to select which individual they prefer (to befriend or interact with). Stimuli included upper body information (i.e., head, neck, shoulders) in some studies as well as movement and voice. Hair was visible and not cropped. Thus, additional cues beside face information were available. Under these kinds of conditions, Caucasian 3-year-olds did not show a race-based preference (Lam, Guerrero, Damree, & Enesco, 2011; Shutts, Pemberton, & Spelke, 2013); however, Caucasian 4- and 5-year-olds displayed a preference for Caucasian over African children (Kinzler, Shutts, DeJesus, & Spelke, 2009; Kinzler & Spelke, 2011; Lam et al., 2011; Zinser, Rich, & Bailey, 1981). Using a variation in the paradigm, Caucasian 2.5-year-old children gave toys equally to Caucasian and African individuals; however, Caucasian 5-year-old children indicated that infants would prefer to receive a toy from a Caucasian (versus African) individual (Kinzler & Spelke, 2011). Overall, the findings suggest a developmental progression, whereby race guides social preferences from 4 years of age. However, corresponding studies investigating social preferences based on age and whether any such preferences are affected by race, are lacking.

This Study: Linking Perceptual Processing of Face and Social Preference

The present study examined whether 3- to 6-year-old Caucasian children and adults show a social preference for adult versus child, or adult versus infant faces, and whether any age preferences detected are the same for own-race (Caucasian) versus other-race (Asian) faces. The aim was to contrast how children would respond when presented with older (adult) versus younger (infant or child) faces. The age range of children tested is consistent with the age groups assessed in previous relevant research (e.g., Macchi Cassia et al., 2014b; Macchi Cassia et al., 2012; Macchi Cassia et al., 2013). To our knowledge, this is the first study to directly examine preferences for face age beyond the infancy period. Preference was examined by presenting pairs of infant/adult and child/adult photographs (race consistent within pairs) and asking participants to indicate which face they preferred and would like the most.

All previous studies assessing Caucasian children's social preferences relating to race have used Caucasian versus African face stimuli, with the exception of one study, which included African and Asian stimuli (Lam et al., 2011). The current study included Caucasian and Asian stimuli, thus broadening the range of races systematically examined in social preference tasks with children. Moreover, no published studies known to the authors have examined age preferences in adults by presenting paired contrasts. All previous studies have used rating scales relating to level of attractiveness or likeability to assess preference (Luo et al., 2011).

Of note is that the developmental studies reviewed in this introduction reveal that research into preference has generally included studies measuring how infants respond to faces with differential looking time and investigations examining how children explicitly choose between different individuals based on information that can extend beyond that found in a

face. The current study sought to combine the two approaches by measuring explicit social preference in children using the kind of perceptually rich face stimuli that have been presented to infants. Linking these two different research approaches to investigate possible age-related social preferences in children is consistent with the broader attempt to conjoin the perceptual with the social when studying how individuals respond to one another based on group membership (e.g., Fincher & Tetlock, 2016; Freeman, Pauker, & Sanchez, 2016; Xiao et al., 2015).

Hypotheses

Our hypotheses regarding age preferences were tentative given the dearth of work on the issue. Children are generally better at processing adult than child faces (Macchi Cassia, 2011), due to greater experience with the former age category, and infants prefer adult faces (Heron-Delaney et al., 2016). Based on these findings, 3- to 6-year-old children may prefer adult faces. Alternatively, peers become increasingly important during the preschool and early school years, and social preference tasks provide some evidence of favoring other children's perspectives (e.g., Shutts et al., 2010); thus, there may be a preference for child faces over adult faces. Another possibility is that younger children may prefer adult faces, while older children may prefer child faces, as older children have more direct experience with peers, due to attending formal schooling five days per week.

It was also possible that children may show a preference for infant faces, since 3- to 6-year-olds show evidence of a baby schema (Borgi et al., 2014; Sanefuji et al., 2007). However, in the current study children were asked which faces they liked best, as opposed to which they thought were cutest (as in previous research). This difference in procedure may alter the likelihood of observing infant face preferences. It additionally seemed possible that any age preferences detected might be restricted to own-race (Caucasian) faces, given that superior recognition of adult (versus child) faces is confined to own-race faces in 3-year-olds (Macchi Cassia et al., 2014b) and 4- and 5-year-olds demonstrate a preference for own- over other-race individuals (e.g., Kinzler et al., 2009; Lam et al., 2011).

It was predicted that adults would prefer Caucasian infants and children over adults, consistent with previous findings indicating a preference for own-race infants and children over adults, when assessed using likeability ratings (Luo et al., 2011). This prediction is also in accord with the outcome that one would expect based on the activation of a baby schema (Glocker et al., 2009). Again, it seemed possible that age preferences may be restricted to own-race (Caucasian) individuals, due to the markedly superior recognition ability of adults for own- versus other-race faces (Meissner & Brigham, 2001). However, it seemed equally plausible that any adult age preferences detected would extend across race, due to the influence of the baby schema, which is strong and robust in adults (Glocker et al., 2009), as well as increased levels of experience with other-race faces.

Method

Participants

Participants were 60 Caucasian children (25 females) aged between 3 years, 3 months and 6 years, 0 months (*M* = 4 years, 3 months, *SD* = .76 years). Two children were excluded from the analyses, due to refusal to choose a stimulus on more than five trials during the study. Children were recruited from schools and day care centres in the local area. Written consent was obtained from each educational institution and each participant's parent. Additionally, parents completed a short questionnaire asking about the ages and gender of each child living in the home, as well as their child's level of exposure to Asian individuals (daily, weekly, fortnightly, monthly, or rarely). The areas where children lived and attended school or day care had a predominantly Caucasian population.

One hundred and twenty eight Caucasian adults (67% female, *M* age = 45.38 years, range = 18–81 years, *SD* = 16.12 years) also completed the study. Adults were recruited via an online advertisement and provided informed consent prior to participation. No adults were excluded from analyses. All of the adult participants lived in areas with a predominantly Caucasian population.

Stimuli

The stimuli presented to children were 16 pairs of colour images of faces. The face categories were Caucasian and Asian adults, children, and infants (see Figure 1). Adult face stimuli ranged from 25 to 45 years and infants were 5 to 11 months old. The child face stimuli presented differed depending on the age of the participant: 3-year-old children were presented with 3-year-old faces, while 5-year-old children viewed 5-year-old faces. All faces were presented against a white background, and in frontal orientation with neutral expression. Pictures were cropped so that hairlines were visible, but also fairly uniform. Stimulus pairs were matched on hair colour, eye colour, face shape, and skin colour. Face pairs were presented in the following contrasts: adult/child and adult/infant. Half the pairs for each age contrast were Caucasian, and half were Asian. Gender was consistent within a given pair and 50% of the stimulus faces were female (equally distributed across race). There were four pairs in each of the four age/race categories (i.e., Caucasian adult/child, Caucasian adult/infant, Asian adult/child, Asian adult/infant). The stimuli presented to adults were identical to those presented to children, with the exception that half of the child face stimuli presented were 3-year-olds and the other half were 5-year-olds (as opposed to being age-matched to the participant, which occurred for child participants), thereby allowing the adults to rate the same number of stimulus pairs as the children.

Procedure

Each child was tested individually while seated in front of a computer screen that displayed the images. The child was asked to verbally indicate or point to the face they preferred within each pair in response to the questions "Which face do you prefer?" and "Which face do you like the most?" Children were asked both questions on all trials (order of questions counterbalanced), unless a selection was made before both questions were asked (which occurred on later trials as children became familiar with the questions). The experimenter

recorded the child's selection and the next pair of faces was presented. No feedback regarding face selection was given. Four presentations were created. Adult and infant face stimuli were identical in all presentations. For the child participants, two of the presentations contained 3-year-old children's faces and two contained 5-year-old children's faces (matched to the age of the participant; split at 4.5 years). For the adult participants, the presentations contained both 3- and 5-year-olds child faces (50% of each). Left-right positioning of the adult/child and adult/infant faces was counterbalanced across participants. Presentation order of gender and race was counterbalanced. Adults completed the same task as child participants, i.e., indicating which of two faces they preferred/liked better in a forced-choice task. However, adults completed the survey online, instead of in person.

Data Analysis

Total face preference scores were calculated for each contrast: Caucasian adult/child, Caucasian adult/infant, Asian adult/child, and Asian adult/infant. As four face pairs were presented for each contrast, the maximum possible score for each category within a given contrast was four. These scores were relative, such that a maximum preference score of four for one category (e.g., Caucasian adult) necessarily indicated a preference score of zero for the contrasting category (e.g., Caucasian child). Thus, analyses were based on preference for adult faces, within the contrasts of adult versus child faces and adult versus infant faces. This score represents the proportion of trials in which adults were chosen over children or infants, and can be compared against chance using a one-sample *t*-test, with chance set at a value of two (for four choices). This method of analysis avoids inflating significance values, which can occur when both data points from the same contrast are included in analyses. The analyses investigated differences in face preferences based on age of participant (young children, older children, or adults) and stimulus race (Caucasian vs. Asian).

Results

Preliminary examination of the data revealed no significant participant gender differences, so the data were combined across male and female participants for further analyses. Moreover, there were no significant main effects or interactions involving gender of the stimuli, so this variable was also not included in subsequent analyses.

Two separate ANOVAs, both assessing a different contrast of age categories (i.e., adult/child and adult/infant) were conducted. The variable 'Age of participant' was categorised as younger children (≤ 4 years, 8 months), older children (≥ 4 years, 9 months) and adults (≥18 years). The 4 years, 8 month cut-off was selected as it created a 44% versus 56% split in the data for 'younger' versus 'older' children, respectively (which was the closest possible split to 50%). Additionally, this cut-off ensured that most children in the 'older' age group had been exposed to peers daily, because 70% were attending school, as opposed to day care, which is typically less frequent because it is not mandatory like school attendance.[1]

[1]The cut-off of 4.8 years to represent younger children's age for analyses is slightly older than the 4.5 years used to dichotomise age for stimulus presentation purposes. This difference occurred because a decision was made a priori regarding the age cut-off for stimulus presentation for children, given that it was logical to split the child age variable directly in the middle. The decision to dichotomise children's age at 4.8 years for analysis purposes was made retrospectively, based on the age distribution of the child participants.

Adult Versus Child Contrast

A 2 (Stimulus race: Caucasian vs. Asian) × 3 (Age of participant: younger children, older children, adults) mixed model ANOVA was conducted on total face preference scores. It revealed a significant race × age of participant interaction, $F(2, 185) = 5.82$, $p = .004$, $\eta^2 = .06$. To follow up the significant interaction, simple contrasts were conducted using independent samples *t*-tests, with a Bonferroni correction for six contrasts ($p = .008$). Younger children had a significantly greater preference for the Caucasian adult faces than older children and adults, both ts > 3.36, both ps < .001. There was no significant difference in preference for the Caucasian adult faces for older children and adults, $t(160) < 1$, $p = .420$. Adults had a significantly greater preference for the Asian child faces than younger children and older children, both ts > 3.31, both ps < .001. There was no significant difference in preference for the Asian adult faces for younger and older children, $t(58) = 1.46$, $p = .150$ (see Figure 2).

To determine whether preferences were significantly different from chance (a score of two), one-sample *t*-tests were conducted. Younger children's mean preference for Caucasian adult faces was significantly above chance, $t(25) = 2.42$, $p = .048$, indicating a preference for adult faces (see Figure 2). The mean preferences of older children and adults for Caucasian adult faces were significantly below chance, $t(33) = -2.93$, $p = .006$ and $t(127) = -4.71$, $p < .001$, respectively. Thus, older children and adults showed a preference for Caucasian child over adult faces. The mean preference of adults for Asian adult faces was significantly below chance, $t(127) = -10.26$, $p < .001$, indicating a preference for Asian child faces. In contrast, older and younger children's mean preference scores for Asian adult faces were not significantly different from chance, $t(33) = -1.60$, $p = .171$ and $t(25) < 1$, $p = .566$, respectively.

Adult Versus Infant Contrast

A 2 (Stimulus race: Caucasian vs. Asian) × 3 (Age of participant: younger children, older children, adults) mixed model ANOVA was conducted on total face preference scores. It revealed a significant main effect of age of stimuli, $F(2, 185) = 16.59$, $p < .001$, $\eta^2 = .15$. No other main effects or interactions were significant, all Fs < 2.49, all ps > .161. To follow up the significant main effect, simple contrasts were conducted using independent samples *t*-tests, with a Bonferroni correction for three contrasts ($p = .017$). Adults had a significantly greater preference for the infant faces than younger and older children, both ts > 3.52, both ps < .001. There was no significant difference in preference for the adult faces for younger and older children, $t(58) = 1.42$, $p = .160$ (see Figure 3).

To determine whether preferences were significantly different from chance (a score of two[2]), one-sample *t*-tests were conducted. The mean preference of adults for adult faces was significantly below chance, $t(127) = -12.52$, $p < .001$, indicating a preference for child faces. In contrast, older and younger children's mean preference scores for adult faces were

[2]There were 8 pairs (4 Asian, 4 Caucasian); however, each preference score was divided by 2, making the maximum possible score 4, in line with the adult versus child analysis above.

not significantly different from chance, $t(33) = -1.38$, $p = .176$ and $t(25) < 1$, $p = .510$, respectively.

Influence of Experience with Siblings and Asian Individuals on Children's Preferences

The mean number of siblings (aged 0–12 years) living in the house with child participants was 1.38 ($SD = .89$), with a range of 0 to 4 siblings, with a mean age of 5.51 years ($SD =$ 3.27 years). There was no significant relationship between the number of siblings living in the house and preference scores for the Caucasian adult (versus child) or Caucasian adult (versus infant), both rs (58) < .15, both ps > .290. Thus, the presence of a sibling living in the home of the child participants did not influence younger or older children's preference for differently aged faces.

The vast majority of children had minimal exposure to Asian individuals: None/rarely = 61.8%; Monthly = 5.5%; Weekly = 9.1%; Daily = 23.6%. There was no significant relationship between the level of exposure to Asian individuals and preference scores for the Caucasian adult (versus child), Caucasian adult (versus infant), Asian adult (versus child), or Asian adult (versus infant), all r's (58) < .19, all ps > .192. Thus, level of exposure to Asian individuals did not influence children's preferences for differently aged own- or other-race faces[3] .

Adult Ratings of Attractiveness of the Face Stimuli

To investigate the relationship between social preference and attractiveness of the face stimuli, 120 Caucasian adults (65% female, M age = 41.7 years, range = 18–80 years, $SD =$ 18.66 years) rated the study stimuli for level of attractiveness (where 1 = very unattractive, 6 = very attractive). A summary score was calculated for each age group within each race (see Table 1). A one-way repeated measures ANOVA indicated that the mean attractiveness ratings differed significantly across the differently aged faces, $F(3,357) = 72.91$, $p < .001$, $\eta^2 = .39$. Post hoc t-tests were performed with a Bonferroni correction of $p = .008$ to adjust for multiple comparisons. For both the Caucasian and Chinese face stimuli, Caucasian adult participants rated infant faces as more attractive than adult faces (both ts > 6.56, both ps <. 001), and 3- and 5-year-old faces were rated as more attractive than adult faces (all ts > 6.00, all ps <.001). Overall, adults consistently rated younger faces as more attractive than older faces.

Adult Ratings of Typicality of the Face Stimuli

To confirm that the face stimuli were typical of their particular category (e.g., female Caucasian adult, male Asian child), 80 Caucasian adults (70% female, M age = 42.6 years, range = 18–74 years, $SD = 13.74$ years) rated the study stimuli for level of typicality (where 1 = very unusual, 6 = very typical). A mean summary score was calculated for each category (i.e., Caucasian adult male, Caucasian adult female, Caucasian child male, Caucasian child female, Caucasian infant male, Caucasian infant female, Asian adult male, Asian adult female, Asian child male, Asian child female, Asian infant male, Asian infant female). The

[3]Adult participants did not provide information about their level of exposure to Asian individuals; however, it appears that adults have had sufficient other-race experience to allow age preferences for other-race faces to emerge.

mean ratings of typicality ranged from 4.80 to 5.20, indicating that participants perceived all categories of faces to be typical of their particular category. A 2 (Stimulus race: Caucasian vs. Asian) × 2 (Stimulus gender: male vs. female) × 3 (Stimulus age: adult, child, infant) repeated measures ANOVA did not reveal any significant main effects or interactions, all *F*s < 3.25, all *p*s > .075, indicating that the mean typicality ratings did not differ significantly across the different categories. To investigate the relationship between ratings of typicality and attractiveness of the face stimuli, bivariate correlations were conducted between typicality and attractiveness ratings for each category. There was no significant relationship between ratings of typicality and attractiveness, all *r*s (78) < .14, all *p*s > .235. Thus, it appears that there was no relationship between typicality of the face and level of attractiveness for the stimuli.

Discussion

The current study investigated the development of Caucasian children's social preferences for faces from different age groups, and examined how race would impact on any age preferences detected. Younger children (3 years, 3 months to 4 years, 8 months) preferred adult over child faces, whereas older children (4 years, 9 months to 6 years) preferred child over adult faces. These preferences were only detected for own-race faces (Caucasian), but not other-race faces (Asian). Additionally, no age preferences were found for either race when the face stimuli were adults versus infants. In contrast, adults preferred infants and children over adults, for both own-race Caucasian and other-race Asian faces.

Children's lack of preference for adult versus infant faces is of interest, and may reflect the following. While one might consider the possibility of a preference for adult over infant faces in the younger age group, it may be that infant faces are still interesting enough to draw attention away from the adult face stimuli, perhaps because they evoke a baby schema (Borgi et al., 2014; Sanefuji et al., 2007) or because the infant faces are viewed as novel. For the older children, one might expect a preference for infant over adult faces, due to the baby schema; however, the baby schema (based on cuteness) may not apply as strongly when children are asked about their social preferences for different individuals, as opposed to explicitly choosing a face based on cuteness. Additionally, children at the older age prefer peers, and neither adults nor infants are peers.

The current findings are consistent with previous research investigating preferences for differently aged faces across the lifespan. The developmental trajectory appears to be that infants (Heron-Delaney et al., 2016) and younger children prefer adult faces, whereas older children and adults favor faces younger than adult faces, i.e., child and infant/child faces, respectively. Thus, there is some continuity in age preferences from infancy to early childhood. There is also evidence of discontinuity, in that older children preferred children, while adults preferred infant and child faces.

The developmental course of the preferences may reflect a combination of experience with and importance of differently aged faces for different age groups. Infants and younger children have predominant exposure to adult faces; adult faces are focal in a young child's social world and 3- to 5-year-olds think adults are more knowledgeable about the world than

children (Jaswal & Neely, 2006; Taylor et al., 1991; VanderBorght & Jaswal, 2009). However, peers become increasingly important around school age (Rubin, Bukowski, & Parker, 2007), and older children have vast experience with peers, due to mandatory school attendance (e.g., 70% of the older child participants reported on here had been attending school for 6 months). Scherf and Scott (2012) argue that developmental changes in face recognition abilities regarding age are influenced by important age-appropriate goals. While the current study assessed preference, rather than recognition, it may still be the case that forming peer relationships at school is an important goal for the child, which may explain the shift in preference from adult to child faces around school age. Overall, there is plasticity in childhood, such that face preferences can be modified by current experience (Cooper, Geldart, Mondloch, & Maurer, 2006).

Adult preferences for the infant (and child) faces may reflect an influence of the baby schema, which evokes positivity and caregiving behaviour (Glocker et al., 2009). While the baby schema has been found in 3- to 6-year-old children (Borgi et al., 2014), it may be that it is not as strong in children as in adults or that it is not elicited when children are asked to choose an individual they prefer or both, as opposed to judging based on attractiveness or cuteness.

The current results also support previous findings that recognition and preference for differently aged faces can differ. For example, adults are generally better at recognizing adult faces (e.g., Kuefner et al., 2008), but prefer infant faces (e.g., Luo et al. 2011). In addition, children are typically better at recognizing adult faces (Macchi Cassia et al., 2012), but the current data indicate that older children prefer child faces. In contrast, infant and younger children's recognition ability and preferences are consistent, i.e., they show superior recognition for adult versus other-age faces and prefer adult faces (Heron-Delaney et al., 2016; Macchi Cassia et al., 2014a; Macchi Cassia et al., 2012). Thus, it appears that after the developmental periods of infancy and early childhood, recognition ability and preferences for differently aged faces may follow different ontogenetic trajectories.

The finding that age preferences among the Caucasian child participants were confined to own-race (Caucasian) faces converges with previous research indicating that Caucasian children from 4 years of age demonstrate a preference for Caucasian over African or Asian faces (Kinzler et al., 2009; Kinzler & Spelke, 2011; Lam et al., 2011; Zinser et al., 1981). Similarly, an adult face preference is no longer evident in infants when faces are other-race (Heron-Delaney et al., 2016). Thus, as is the case with age preferences in infancy, changing to other-race faces blocks children's age preference. Again, experience seems to be important in shaping preferences: Adults and peers are more likely to be own- than other-race. Parental reports of children's exposure to Asian individuals indicated that exposure to Asian faces was minimal, with a majority of children having either no or rare exposure. Furthermore, the area where children were assessed had a predominantly Caucasian population (Australian Bureau of Statistics, 2012).

In contrast, adult preferences for infants and children over adults extended to both own- and other-race faces. Thus, while race seemingly blocks the age preferences of children, it appears to have minimal influence on the age preferences of adults, perhaps because the

baby schema elicited in adults is strong enough to be applicable across faces from different races (Proverbio et al., 2011).

Exposure to Asian individuals did not influence children's preferences for differently aged faces. While this null outcome may appear to contradict an experiential account of the data, even those children who had daily exposure to Asian individuals mostly encountered these individuals in day care or at school. Thus, exposure to Asian individuals, relative to Caucasian individuals, was still minimal. This raises the question of what ratio of experience with same versus other-race faces in different age groups is needed for children to show age preferences for other-race faces, and might indicate that experience needs to surpass a threshold amount to influence age preferences (for a related discussion of how experience may need to surpass a threshold amount to influence gender-based preference in infants, see Liu et al., 2015). Further research should explore the level of experience with differently aged other-race faces required to produce an age preference for other-race faces.

The presence of a sibling living in the home did not influence children's preferences for differently aged faces. However, sibling exposure did not necessarily provide extensive experience with children of an age that matched the age of faces assessed in the current study. Instead, siblings ranged in age from infants to 12-year-olds.

Adult ratings of face attractiveness were consistent with adult social preferences. These ratings provide further evidence consistent with a baby schema operating for the infant faces and possibly generalizing to the child faces, and indicate that attractiveness may have been a factor influencing adult performance. Of interest is that performance in the child age groups did not follow the adult ratings of face attractiveness. However, because we do not have attractiveness ratings for the child age groups, we do not know whether face attractiveness (as perceived by younger and older children) was a factor influencing performance for those groups. Future research could aim to determine whether younger and older children's ratings of face attractiveness are consistent with their social preferences, although pilot work indicated that these age groups had difficulty understanding the task and using the rating scale. Another option for further work could be to endeavour to pair less attractive younger faces with more attractive older faces to determine if social preferences would be maintained if attractiveness differences were minimized.

The absence of a relationship between adult ratings of face attractiveness and typicality is consistent with some previous research (see Sofer, Dotsch, Wigboldus, & Todorov, 2015), but inconsistent with other findings (see Rhodes, 2006 for a review). Nevertheless, it seems unlikely that typicality of the face stimuli could account for the observed pattern of social preferences, given that adult ratings of typicality did not vary across the various stimulus categories. Of course, this conclusion is offered tentatively, given that typicality ratings were not obtained from younger and older children. As was the case for the attractiveness ratings, it may be difficult to obtain typicality ratings for children in the age range at issue.

Limitations of the study include having only tested Caucasian children, and future research should endeavour to test children of other races. Forthcoming investigations should also test children who are from a minority race (and thus have strong exposure to other-race faces) to

see how extensive experience with two races influences age preferences across different races. In addition, future research should investigate whether the preference for child faces in the older child age group would still be evident when child faces are contrasted with faces other than adult faces, i.e., infant faces. It is possible that different age groups had different motivations for selecting a particular face, e.g., older children and adults may have selected faces for playful interaction, while younger children may have been seeking competent-looking caregivers. Upcoming studies could ask participants to make an explicit face selection based on specific factors, e.g., a preference based on caregiving, friendship, dominance, etc. These data would shed light on the specific motivation for preferring a given face at different points in development.

The current study assessed explicit preference for different age groups, for Caucasian and Asian faces. Additional work could assess implicit preference, either through the addition of behavioural measures of implicit preference (i.e., looking time) or using an implicit association test (IAT), to determine whether results are consistent on implicit and explicit tests of preference. Previous research has demonstrated the utility of using an IAT when assessing the emotional valence associated with adult versus infant face stimuli in adult participants (Senese et al., 2013) and when assessing ingroup race preference and bias in Caucasian 7- to 11-year-olds (Newheiser & Olson, 2012).

Overall, this study is the first to investigate the development of preferences for differently aged faces in Caucasian children and adults. Findings indicated that younger children preferred adults, while older children preferred other children, but only when the faces were own-race and not other-race. In contrast, adults preferred younger faces when the faces were both own- and other-race. These data suggest that experience with other aged individuals shapes social preferences relating to age in childhood (adults have predominant influence in early childhood and peers are more influential in later childhood) and that racial information influences these age preferences. In adults, the evidence points to the influence of a baby schema that extends across race.

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Figure 1.
Examples of the Caucasian and Asian infant, child, and adult male faces presented to Caucasian children.

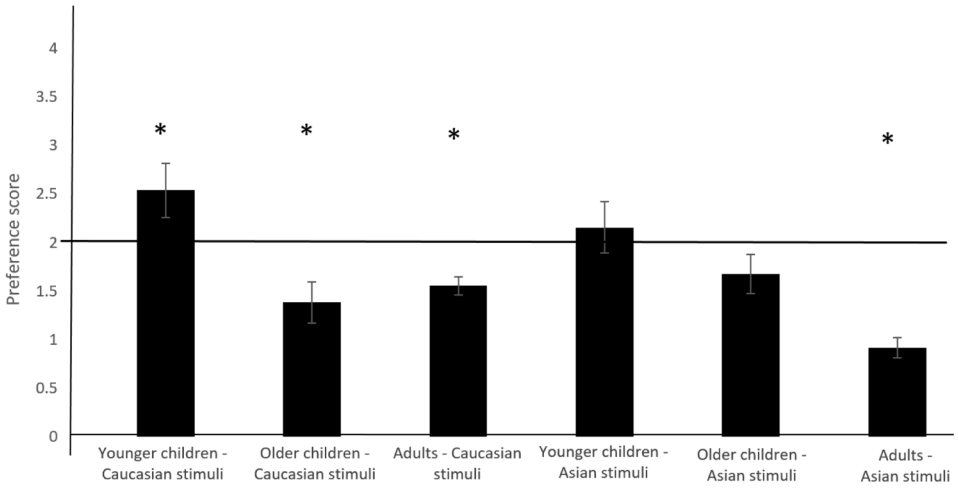

Figure 2.

Mean preference scores and standard errors for Caucasian and Asian adult (versus child) stimuli (with the horizontal line indicating chance, $*p < .05$).

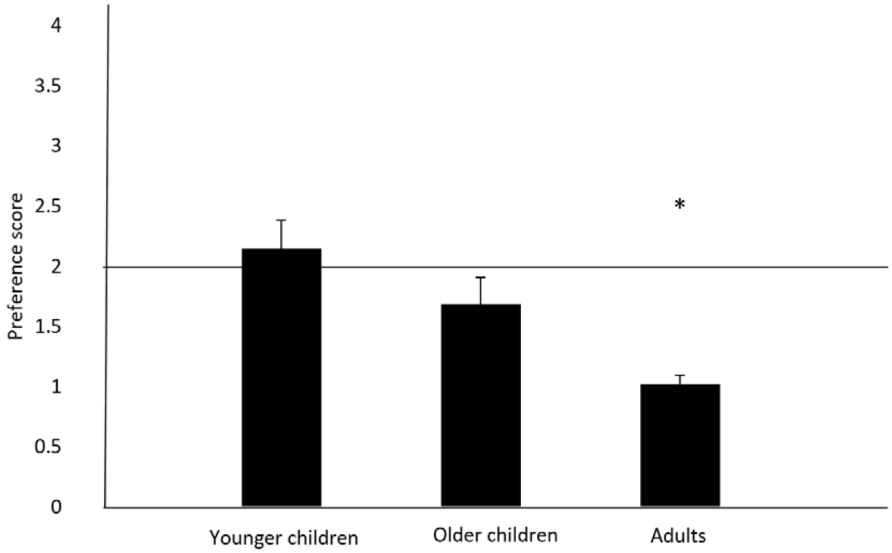

Figure 3.

Mean preference scores and standard errors for adult (versus infant) stimuli (with the horizontal line indicating chance, $*p < .001$).

Table 1

Adult Mean Attractiveness Ratings (Standard Deviations) for the Face Stimuli

Age and race of stimuli	Mean attractiveness rating
Caucasian adults	3.17 (.75)
Asian adults	2.65 (.87)
Caucasian infants	3.98 (.90)
Asian infants	3.17 (.90)
Caucasian 3-year-old children	3.66 (.79)
Asian 3-year-old children	3.76 (.78)
Caucasian 5-year-old children	3.39 (.84)
Asian 5-year-old children	2.95 (.81)