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Nine-month-old infants prefer unattractive bodies over attractive bodies

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Abstract

Infant responses to adult-defined unattractive male body shapes versus attractive male body shapes were assessed using visual preference and habituation procedures. Looking behavior indicated that 9-month-olds have a preference for unattractive male body shapes over attractive ones; however, this preference is demonstrated only when head information is obscured. In contrast, 6- and 3.5-month-olds did not show a preference for unattractive or attractive bodies. The 6-month-olds discriminated between the two categories, whereas the 3.5-month-olds did not. Because unattractive body shapes are more common than attractive/athletic body shapes in our everyday environment, a preference for unattractive body shapes at 9 months of age suggests that preferences for particular human body shapes reflect level of exposure and familiarity rather than culturally defined stereotypes of body attractiveness.

Keywords

Infancy; Body perception; Attractive bodies; Unattractive bodies; Visual perception; Knowledge level

Introduction

As adults, we judge other humans as attractive or unattractive on a daily basis. Such judgment is made not only about human faces but also about body shapes. A large corpus of research has focused on adults' perceptions of facial attractiveness (Rhodes, 2006) and, more recently, on children's perceptions (Cooper, Geldart, Mondloch, & Maurer, 2006). Developmental research has demonstrated that infants show a preference for attractive human faces from birth (Slater et al., 1998). Attractiveness judgments and the mechanisms

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driving their development are important to understand given that positive qualities and abilities are more likely to be attributed to attractive individuals than to unattractive individuals (e.g., Lemay, Clark, & Greenberg, 2010; Reingen & Kernan, 1993) and attractive individuals are generally treated more favorably (e.g., Kalick, Zebrowitz, Langlois, & Johnson, 1998).

In most existing studies on the emergence of the perception of facial attractiveness during development, whether a stimulus is deemed attractive has been largely based on adults' perception (e.g., Langlois, Ritter, Roggman, & Vaughn, 1991; Slater et al., 1998). Adults' judgments of a face's attractiveness are generally consistent with the typicality of the face or the extent to which the face is similar to the central tendency of all the faces in one's visual environment (Langlois & Roggman, 1990). This consistency between face typicality and adult-defined face attractiveness leaves open an important theoretical question: Can a preference for attractive humans develop based on visual experience alone, or are later developing culturally defined norms of attractiveness also necessary? Research addressing this question will shed light on the processes that underlie preferences for attractive humans. Infant studies should offer the best approach to address the question because the enculturation of beauty standards is presumably yet to have started at this young age. However, in nearly all infant studies of face attractiveness, the dimensions of typicality and adult-defined attractiveness have been confounded (Hoss & Langlois, 2003; Slater et al., 1998) due to the fact that both dimensions are intimately linked and difficult to disentangle. Thus, infants' judgments of facial attractiveness, like those of adults, are consistent with the typicality of the face (Rubenstein, Kalakanis, & Langlois, 1999). In the case of the human body, however, the disentanglement of these two dimensions is possible because body shape attractiveness is often culturally determined and changes across periods in history (Stearns, 1997; Tovée, Swami, Furnham, & Mangalparsad, 2006). The current study, therefore, investigated whether young infants have a preference for attractive male human bodies over the more commonly encountered unattractive or typical male human bodies.

What is known about the developmental course of perception of male body attractiveness? Extensive research demonstrates that women living in Westernized societies prefer male bodies that have a mesomorphic V-shaped torso (i.e., a narrow waist and a broad chest and shoulders) and a well-developed upper body but flat stomach (e.g., Maisey, Vale, Cornelissen, & Tovee, 1999; Swami et al., 2007). This preference is culturally specific to Westernized societies. Swami and Tovee (2005) reported that rural Malaysian females prefer heavier figures with a less triangular shape. The authors proposed that this preference is linked to socioeconomic status. In this non-industrialized Malaysian setting, body fat is believed to be an indicator of wealth, prosperity, and sexual capacity. Thus, females prefer a body type that indicates good mate selection (discussed below).

Several theories, which are not mutually exclusive, have been proposed to explain preferences for particular body types in Westernized societies. Attractiveness enhances mating and reproductive success in adult humans (Rhodes, Simmons, & Peters, 2005). Evolutionary psychologists argue that traits that are perceived as attractive signal mate quality, such that preferences for them may be adaptations for finding good mates (Penton-Voak et al., 1999; Thornhill & Gangestad, 1993). Male muscularity may signal the ability to protect a potential mate (Buss, 2003). Although this is not as important in contemporary societies, sexual selection during human evolution may explain deep-seated female preferences for muscular body types (Dixson, Dixson, Bishop, & Parish, 2010). Furthermore, mesomorphy (V-shaped torso) is associated with better cardiac function than an endomorphic constitution (Katzmarzyk, Malina, Song, & Bouchard, 1998). Attractive individuals can also be good mates because benefits can be gained by partnering with an

attractive individual given that they are generally treated more favorably (Kalick et al., 1998; Udry & Eckland, 1984).

A preference for mesomorphic males emerges as early as 6 years (Jarvie, Lahey, Graziano, & Framer, 1983) to 10 years of age (Connolly, Slaughter, & Mealey, 2004) in Westernized societies. These early emerging preferences in part reflect a bias away from overweight figures and may be due to a mesomorphic build being associated with a highly favorable stereotype (Jarvie et al., 1983) and/or hormone secretions driving sexual development at 10 years of age (Connolly et al., 2004). To our knowledge, there are no studies on infants' preferences for attractive bodies. Investigating whether infants have preferences for particular body types would shed light on when body type preferences first emerge and the nature of these preferences (i.e., if infant preferences are evident, are they consistent with adult preferences?). Although prior research has not investigated this question, a literature exists on infants' knowledge about the human body shape.

At 3 or 4 months of age, infants appear to have knowledge that biological form, which generalizes across both humans and nonhuman animals, is inclusive of a head and body with adjoined skeletal appendages in a particular configuration (Quinn, 2004; Quinn, Lee, Pascalis, & Slater, 2007). However, knowledge about the locations of body parts and the overall shape of the human body is relatively late developing during infancy (Heron & Slaughter, 2010). Unlike the precocious knowledge of faces that is demonstrated from birth (Johnson, Dziurawiec, Ellis, & Morton, 1991), the earliest evidence of knowledge about the human body shape is demonstrated at 4 to 6 months of age (Slaughter, Heron-Delaney, & Christie, 2012) and only under specific conditions. In Slaughter and colleagues' (2012) study, infants were habituated to a series of different normal human body postures and then presented with scrambled human bodies (e.g., arms lowered to hips) on test trials. The human model was a real live human moving naturally who could be manipulated to look both normal or scrambled with the aid of a curtain and a second experimenter. Infants dishabituated to the scrambled bodies, indicating recognition of typical and scrambled bodies as distinct categories. However, movement is crucial to early detection of violations of the configuration of the body shape. When the same habituation–dishabituation procedure was used, with the key difference that the real human bodies remained static, the earliest response to scrambled static human bodies was at 9 months of age (Heron & Slaughter, 2010). Consistent with this finding, Zieber and colleagues (2010) reported that 9-month-olds are sensitive to the relative proportions of human body parts, whereas 5-month-olds are not. Infants demonstrated a preference for photos depicting a normal body over those depicting a proportionally distorted body (created by lengthening the neck and torso and shortening the legs).

A recent study suggests further that infants may be sensitive to the size of people. At 10 to 13 months of age, but not at 8 months of age, infants used the relative size of two novel agents to predict which one would win a dominance contest when the agents had conflicting goals (Thomsen, Frankenhuis, Ingold-Smith, & Carey, 2011). Infants expected that the larger agent had the right of way over the smaller agent and were surprised when the reverse outcome occurred. Together, these studies show the emergence of knowledge about the appearance of the human body shape (configuration and size) at around 9 months of age.

The current study tested whether infants, like adults, would prefer certain body types over others and when such a preference develops. If infants preferentially attend to attractive bodies, this would suggest inborn knowledge or rapid learning about adult-defined body attractiveness. However, studies with children (e.g., Connolly et al., 2004) suggest that preferences for specific human body shapes are not inborn or learned during early infancy, as are preferences for attractive human faces. If infants preferentially attend to unattractive

bodies, this would suggest that body preferences are shaped by experience or familiarity (see discussion below regarding the most commonly experienced bodies being overweight or unattractive by adult standards for this population of infants). In our study, unattractive bodies were defined as those that are nonmuscular, are of average weight or are slightly overweight, and do not have visible definition or tone (i.e., body shapes we encounter regularly in our everyday experiences). Young infants have previously demonstrated preferences for familiar face race (Kelly et al., 2007a) and gender (Quinn, Yahr, Kuhn, Slater, & Pascalis, 2002). Thus, it may be that infants' vast experience with unattractive bodies (or with both slender and overweight bodies, leading to an averaged representation that is unattractive), in contrast to their relatively limited exposure to attractive/athletic individuals, drives preferences toward unattractive male bodies. If an experience-based account is correct, we might not expect infants to demonstrate a preference for unattractive bodies until toward the end of the first year of life. It is not until 9 months of age that infants demonstrate knowledge about the static human body shape (Heron & Slaughter, 2010; Zieber et al., 2010), which is the same age that infants also manifest a full-blown other-race effect that includes above-chance responding to differences in same-race faces and only chance responding to differences in other-race faces (Kelly et al., 2007b).

Study 1

Method

Participants—The participants were 19 full-term 3.5-month-olds (9 girls and 10 boys, age range = 100–114 days), 19 6-month-olds (11 girls and 8 boys, age range = 180–190 days), and 18 9-month-olds (9 girls and 9 boys, age range = 264–277 days). An additional 4 3.5-month-olds were excluded due to side bias ($n = 3$) or fussiness ($n = 1$), and 2 6-month-olds were excluded due to side bias. Side bias was defined as looking at one side of the display for 95% or more of the total looking time.

Stimuli—The stimuli were six color photographs of Caucasian male adults who were standing upright and wearing black briefs/shorts (for an example, see Fig. 1, left panel). Three of these individuals had unattractive bodies, and three had attractive muscular bodies. Waist-to-chest ratios (WCRs) for attractive bodies ranged from .75 to .81, and those for unattractive bodies ranged from .91 to .96. WCR is a measure of upper body shape (smaller WCRs indicate larger chests relative to waists) and has been found to be the most important determinant of perceptions of male body attractiveness in adult judgments (Maisey et al., 1999). WCRs lower than .80 have been reported as attractive in previous studies (Dixson, Halliwell, East, Wignarajah, & Anderson, 2003). The three individuals with the unattractive bodies were 24, 27, and 34 years old; the three models with the attractive bodies were 24, 27, and 32 years old. Photographs were presented against a white background. Body type (from below the neck) was the only element that differed across photographs; the same male face and head were edited onto each of the six bodies using Adobe Photoshop. Male adults were chosen as stimuli rather than female adults because more of the body could be presented than would have been possible for female models. Stimuli were matched on head size (3.8 cm ear to ear) and height (30 cm).

The men with attractive bodies were models, and the men with unattractive bodies were friends of the experimenters. A sample of 214 adults from the United Kingdom and Australia (70% female, age range = 17–65 years, mean age = 38 years) rated each body individually on a scale from 1 to 6, with 6 being *highly attractive* and 1 being *unattractive*. Ratings were averaged across the three model bodies versus the three non-model bodies. A paired-samples two-tailed t test revealed that the model bodies ($M = 4.16$, $SD = 1.03$) were rated as significantly more attractive than the non-model bodies ($M = 2.26$, $SD = 0.76$),

$t(212) = 19.62$, $p < .001$. Thus, the male bodies selected to be attractive stimuli versus unattractive stimuli were perceived as significantly different by adults.

Procedure—Each infant was seated on the mother's lap approximately 60 cm away from a screen that displayed the images. The experimenter remained out of sight during testing, and both the mother and the experimenter remained silent. The infant saw two pairs of photographs. Each pair contained one man with an unattractive body and one man with an attractive body. The two pairs presented contained different unattractive and attractive bodies for each trial. Left–right positioning of the unattractive and attractive bodies was counterbalanced across infants on the first trial and then reversed on the second trial. The stimuli chosen for presentation were counterbalanced across infants. Each pair of photographs (two pairs in total) was presented until 10 s of cumulative looking had been obtained. An experimenter observed the infant's eye movements on a control monitor from a black-and-white closed-circuit television camera (specialized for low-light conditions) that was positioned above the screen. Time was recorded and displayed on the control monitor using a Horita II TG-50 time coder (Mission Viejo, CA, USA); video was recorded at 25 frames per second. Infant eye movements were recorded, and the film was subsequently digitized to be analyzed frame by frame on a computer using specialized software. An independent observer recoded 30% of the data for reliability. Both observers were blind to condition. The average level of interobserver agreement was high (Pearson's $r = .96$).

Results

In all experiments, preliminary examination of the data revealed no significant gender differences, so the data were combined across male and female infants for further analyses. In addition, there were no significant main effects or interactions involving trial order. Because preference for a particular body type was not related to whether it was presented in the first or second trial, this variable was not included in analyses. Finally, there were no significant main effects or interactions involving individual exemplars within the attractive or unattractive category; thus, looking times for the three exemplars within each category were combined for further analyses.

All looking times were converted to percentages so as to indicate the percentage of time the infant attended to the unattractive bodies as a proportion of the total looking time. A one-way analysis of variance (ANOVA) indicated that there was no significant effect of age group on percentage of total looking time to the unattractive bodies, $F(2,53) < 1$, $p = .977$, $\eta^2 = .002$. These results indicate that infants in the different age groups did not respond differently to the unattractive body types (see Table 1). In addition, to determine whether preference scores were significantly different from chance level (i.e., 50%) for each age group, a two-tailed one-sample t test was applied. The findings were that none of the individual age group preferences was significantly different from chance (all t values between 0 and 1, all p values > .680).

Discussion

The results suggest that 3.5- to 9-month-olds do not detect a difference or do not have a preference for unattractive body types over attractive body types. However, another possibility is that infants were focusing on the faces and not processing the bodies; thus, any preference would go undetected. This is a valid hypothesis because a wealth of previous research demonstrates infants' attraction to face stimuli (Johnson & Morton, 1991). The decision was made to include body stimuli with heads in the first study so as to avoid the possibility that the body stimuli might not be perceived as human. However, in light of the results, Study 2 presented the exact same body stimuli with the key difference that the heads were obscured so that they would not distract infants from attending to the rest of the bodies.

Study 2

This study investigated whether infants would attend more to unattractive or attractive body types when the images were presented without head information.

Method

Participants—Participants were 18 full-term 3.5-month-olds (7 girls and 11 boys, age range = 104–114 days), 18 6-month-olds (10 girls and 8 boys, age range = 183–195 days), and 18 9-month-olds (9 girls and 9 boys, age range = 266–275 days). An additional 3 3.5-month-olds and 1 6-month-old were excluded due to side bias.

Stimuli—The stimuli were identical to those used in Study 1 except that the models' heads were obscured with a gray strip (see Fig. 1, middle panel). Bodies were visible only from the neck downward.

Procedure—The procedure was identical to that of Study 1. The average level of interobserver agreement was high (Pearson's $r = .98$).

Results and discussion

A one-way ANOVA indicated that there was a significant effect of age group on percentage of total looking time to the unattractive bodies, $F(51) = 3.15$, $p = .048$, $\eta^2 = .08$. In addition, as in Study 1, to determine whether preference scores were significantly different from chance (50%) for each age group, a two-tailed one-sample t test was applied. The 9-month-olds' mean preference for the unattractive bodies (see Table 1) was significantly above chance, $t(17) = 2.44$, $p = .025$. In contrast, the 3.5- and 6-month-olds did not demonstrate preferences for the unattractive body types that were significantly difference from chance, $t(17) = 0.29$, $p = .779$, and $t(17) = 1.69$, $p = .108$, respectively. Thus, when 9-month-olds are prevented from focusing on facial and head information, they demonstrate a preference for unattractive male body types over attractive ones. The results suggest a preference that is driven by familiarity given that infants have more experience in viewing unattractive bodies than in viewing attractive bodies, a claim that is supported by the 2009 Health Survey for England, which reported that 66% of men were overweight or obese as indicated by a body mass index (BMI) ≥ 25 (NHS Information Centre, 2011). The 3.5- and 6-month-olds did not demonstrate a preference for either body type; however, it is possible that these younger infants simply did not recognize the bodies as human without the heads. Study 3 was designed to test this possibility by presenting infants with bodies containing schematic faces.

Study 3

This study investigated whether infants would attend more to unattractive bodies than to attractive bodies when the images were presented with schematic faces. The presence of a schematic face may aid 3.5- and 6-month-olds in detecting the stimuli as humans while not being perceptually salient enough to be distracting.

Method

Participants—The participants were 18 full-term 3.5-month-olds (9 girls and 9 boys, age range = 106–116 days), 18 6-month-olds (9 girls and 9 boys, age range = 180–190 days), and 18 9-month-olds (10 girls and 8 boys, age range = 262–275 days). An additional 7 3.5-month-olds were excluded due to side bias ($n = 4$) or fussiness ($n = 3$), and 1 6-month-old and 1 9-month-old were excluded due to fussiness.

Stimuli—The stimuli were identical to those used in Study 1 except that the models' heads were obscured with a schematic smiley face (see Fig. 1, right panel).

Procedure—The procedure was identical to that of Study 1. The average level of interobserver agreement was high (Pearson's r = .95).

Results and discussion

A one-way ANOVA indicated that there was a significant effect of age group on percentage of total looking time to the unattractive bodies, $F(51) = 5.53$, $p = .007$, $\eta^2 = .16$. Moreover, a two-tailed one-sample *t* test revealed that 9-month-olds' mean preference for the unattractive bodies (see Table 1) was significantly above chance, $t(17) = 2.88$, $p = .010$, consistent with Study 2 findings. In contrast, 3.5- and 6-month-olds did not demonstrate preferences for the unattractive body types that were significantly different from chance, $t(17) = 0.94$, $p = .362$, and $t(17) = 1.77$, $p = .092$, respectively.

To conclude that a preference for unattractive body types emerges between 6 and 9 months of age, it was necessary to directly compare 6- and 9-month-olds' preferences for particular body shapes. The data from Studies 2 and 3 were combined to increase power to detect significant effects. Difference scores were created to indicate the difference in total looking times to the unattractive bodies compared with chance (chance equals zero difference in looking time), such that a positive score indicated greater looking to the unattractive bodies compared with chance. An independent-samples two-tailed *t* test revealed that the difference score for the 9-month-olds ($M = 2.47$ s) was significantly greater than the difference score for the 6-month-olds ($M = 0.21$ s), $t(70) = 2.25$, $p = .027$.

The outcomes indicate that 3.5- and 6-month-olds do not demonstrate a preference for unattractive or attractive body shapes when schematic faces are presented. Together, the three studies provide a robust finding that younger infants do not have a preference for unattractive or attractive body shapes. Thus, it appears that capacity to demonstrate a preference for particular body shapes emerges between 6 and 9 months of age, which is consistent with previous work on infants' body shape knowledge (Heron & Slaughter, 2010). As with all null preferences in preferential looking studies, it is impossible to determine whether the 3.5- and 6-month-olds can discriminate individual body exemplars from the two categories of unattractive and attractive bodies. Study 4 investigated this question.

Study 4

Study 4 was designed to test whether 3.5- and 6-month-olds could discriminate individual exemplars from unattractive versus attractive body categories. The results will allow us to ascertain whether younger infants' lack of preference for unattractive or attractive body types in the previous studies was because the infants could not discriminate the different body types.

Method

Participants—The participants were 17 full-term 3.5-month-olds (8 girls and 9 boys, age range = 100–112 days) and 16 6-month-olds (8 girls and 8 boys, age range = 178–189 days). An additional 5 3.5-month-olds were excluded due to side bias ($n = 4$)or error ($n = 1$),and 66-month-olds were excluded due to side bias.

Stimuli—The stimuli were identical to those used in Study 2 (see Fig. 1, middle panel).

Procedure—During the habituation phase, each infant was first presented with a single body image. The experimenter recorded infant attention to the body image by holding down the "z" key on a keyboard whenever the infant fixated the image. When the infant looked away from the image, the experimenter released the key. If infant attention was averted for more than 2 s, the image disappeared from the screen. The experimenter then presented the image again and repeated the procedure. The habituation phase ended when infant looking time on a presentation was equal to or less than 50% of the average looking time from the infant's first two presentations.

There were two test trials. First, two body images (novel and familiar) were presented in a left–right relation. When the infant first looked at the images, the experimenter pressed a key to begin a 5-s countdown. The images were presented for 5 s, and after this time elapsed the images disappeared from the screen (thus, the infant did not necessarily look at the images for the full 5 s). The bodies then appeared with their left–right position on the screen reversed. As soon as the infant looked at the images, another 5-s countdown was initiated. The six body images (three unattractive and three attractive) served as the habituation stimuli, and each unattractive body was paired with each attractive body during the test, counterbalanced across infants. Each infant viewed only one unattractive body and one attractive body. An independent observer recoded 30% of the data for reliability. The average level of interobserver agreement was high (Pearson's $r = .98$).

Results and discussion

Each infant's looking time to the novel stimulus was divided by the looking time to both test stimuli and converted to a percentage score. Percentage of time spent looking at the novel stimulus was combined from both test trials for analyses. An independent-samples t test indicated that 6-month-olds attended more to the novel bodies ($M = 58.75\%$, $SD = 13.12$) than the 3.5-month-olds ($M = 49.69\%$, $SD = 14.33$), $t(32) = 2.55$, $p = .048$. The 6-month-olds' mean preference score for the novel stimulus was reliably above chance (50%), $t(15) = 2.40$, $p = .03$ (two-tailed). In contrast, the 3.5-month-olds' mean preference score for the novel stimulus was not significantly different from chance, $t(16) = 0.22$, $p = .829$ (two-tailed).

The findings indicate that 6-month-olds can discriminate individual attractive and unattractive bodies even if they do not demonstrate a preference for a particular body type. The null preference may be because they do not have enough experience in viewing bodies in their entirety to develop a concept or template of the body type that is most frequently occurring in their environment. Taken together, the results are consistent with the view that additional experience is necessary to develop a concept of the most frequently occurring body type, which may in turn drive the preference for unattractive bodies. Finally, 3.5-month-olds do not discriminate the different body types; thus, not surprisingly, they do not show a preference for particular body types.

General discussion

The current studies show that 9-month-olds demonstrated a preference for unattractive male bodies over attractive male bodies, as rated by adults, whereas 6- and 3.5-month-olds did not demonstrate a preference for a particular male body type across a variety of conditions (head on the body, head obscured, or schematic face). However, 6-month-olds discriminated individual attractive and unattractive bodies, whereas 3.5-month-olds did not. Thus, 6-month-olds' lack of preference is not due to an inability to discriminate the different body types.

The finding that 9-month-olds preferentially attend to unattractive bodies suggests that the preference is driven by familiarity because unattractive body shapes are more common than attractive/ athletic body shapes in our everyday environment. It should be noted that data on each infant's specific experience with different body types were not collected due to the sensitivity surrounding collection of height and weight data from mothers who have given birth recently. However, as mentioned, population data indicate that two thirds of men in England are overweight (NHS Information Centre, 2011). Therefore, it is likely that most infants in the study had parents who were overweight and/or had unattractive bodies (direct experience with the parental participants by the experimenters support this observation). Thus, 9-month-olds' preference for unattractive bodies may reflect a preference for bodies that match more closely with infants' early body concept, presuming that this concept is based on experience in viewing many unattractive human bodies in their everyday environment while infrequently encountering muscular attractive bodies. It is unclear whether infants' preferences are driven by an averaged body type representation (i.e., an average of the slender, overweight, and typical bodies encountered) or a commonly experienced exemplar body type (i.e., vast experience with many slightly overweight individuals). In either case, the results appear to be best explained by an experience-based/ familiarity account. Young infants have previously demonstrated preferences for female and same-race faces that are familiar (Kelly et al., 2007a). A slight variation on this explanation, which is not mutually exclusive, is that 9-month-olds may prefer unattractive male bodies because they have more body fat and, therefore, more closely resemble female bodies that, like female faces, are more frequently encountered by most infants than male bodies and faces (Rennels & Davis, 2008). Finally, it is possible that there may be low-level features that 9-month-olds, but not younger infants, are sensitive to and that the effects of these low-level features are negated in the presence of faces (Study 1). However, we do not favor this account of the results given the nuanced pattern of performance among the various age groups and conditions.

Despite being able to discriminate attractive and unattractive male bodies, 6-month-olds do not demonstrate a preference for a particular body type. This may be because 6-month-olds do not yet have enough experience in viewing whole human bodies to develop a concept of the body type that is most frequently occurring in their environment. By the experiential account proposed here, an additional 3 months of experience may be necessary to develop a concept of the typical body shape encountered, which in turn drives the preference for unattractive bodies.

Our finding that the capacity to demonstrate a preference for particular body shapes emerges between 6 and 9 months of age is consistent with previous work on infants' body shape knowledge (e.g., Heron & Slaughter, 2010). It is not until 9 months that infants begin to notice violations of static human body configurations (Heron & Slaughter, 2010) or become sensitive to the relative proportions of human body parts (Zieber et al., 2010). Notably, this timing corresponds with the tuning period that has been observed for same-species and same-race faces (Kelly et al., 2007b; Pascalis, de Haan, & Nelson, 2002).

When the body stimuli contained a face, no preference for male unattractive body types was detected; however, when the face was occluded or replaced with a schematic face, 9-month-olds demonstrated a preference for unattractive body types. Based on this finding, one might question whether the results extend to real-world situations, where human bodies contain heads. We argue that the findings may generalize to real-world situations for the following reasons. In the current experiments, infants were given a maximum of only a cumulative 10 s to demonstrate a preference for typical or attractive bodies. Thus, if infants have a strong preference to look at faces (which previous research suggests), infants may spend the short period of time provided in the experiment focused on the face region. If infants were

provided with longer trial durations, and thus had time to examine the face and then move onto explore other parts of the body, they may well have demonstrated a preference for the typical bodies after their initial engagement with the faces subsided. We did not employ longer duration trials because of concerns with infant fussiness levels and the possibility of higher attrition rates. However, in real-world situations, infants typically have a longer period of time than 10 s to view bodies and live human stimuli are richer in detail, thereby preventing infants from becoming bored as quickly as they would in an experimental setting when presented with photographs. Although it is a valid concern for all infant research as to whether infants demonstrate real-world knowledge when presented with photographic stimuli in laboratory settings, previous research has shown that responses to experimental stimuli and their real-life equivalents are similar during infancy even before representational understanding is achieved (e.g., DeLoache, Strauss, & Maynard, 1979; Dirks & Gibson, 1977) and that infant responses to photographic stimuli in the laboratory are influenced by experience with the real-world counterparts of those categories of stimuli (e.g., Quinn et al., 2002).

It should be recognized that the current findings may be applicable only to infants raised in Western societies. In such societies, adults are typically seen fully clothed by infants. Although it is possible to infer body shape from silhouette information, it is probably difficult for younger infants to make such an inference. In some countries, particularly those near the equator, it is common that adults are semi-naked or naked in front of infants. If our experiential account is accurate, infants living in these societies might show an earlier onset of preference for the most frequently occurring body shapes in their environment. To take this experiential account further, in many parts of the world, obesity has become an epidemic (Wang, 2001). An increasing number of individuals in the infants' environment who are overweight should skew infants to prefer even "fatter" body shapes than usual in households and neighborhoods with more overweight adults. Extensive exposure to such body shapes could presumably move infants' body concepts toward larger sizes, which in turn could be a contributing reason for why being overweight has become a new standard of normality for children.

Given that infants do not demonstrate a preference for attractive bodies, the suggestion is that we are not born with a template for attractive bodies and instead this stereotype develops with age and sociocultural influences. Thus, the evidence from infants is consistent with a wealth of empirical evidence demonstrating that peers, media, and cultural transmission may strongly influence perceptions of body attractiveness in children, adolescents, and adults (e.g., Groesz, Levine, & Murnen, 2002; Ricciardelli & McCabe, 2001). Future research should investigate when preferences for adult-defined attractive bodies first emerge. Eye-tracking experiments should also be conducted to determine where infants focus attention when presented with unattractive and attractive models. Finally, it would be interesting to investigate infants' preferences for particular body shapes in different cultures where infants are predominantly exposed to human bodies that are smaller (e.g., in Japan) or larger (e.g., in Samoa).

In conclusion, the current study suggests that during infancy, preferences for particular human body shapes reflect level of exposure and resultant familiarity rather than culturally defined stereotypes of attractiveness. Precisely when and how children develop preferences for adult-defined attractive bodies remains a question for future research.

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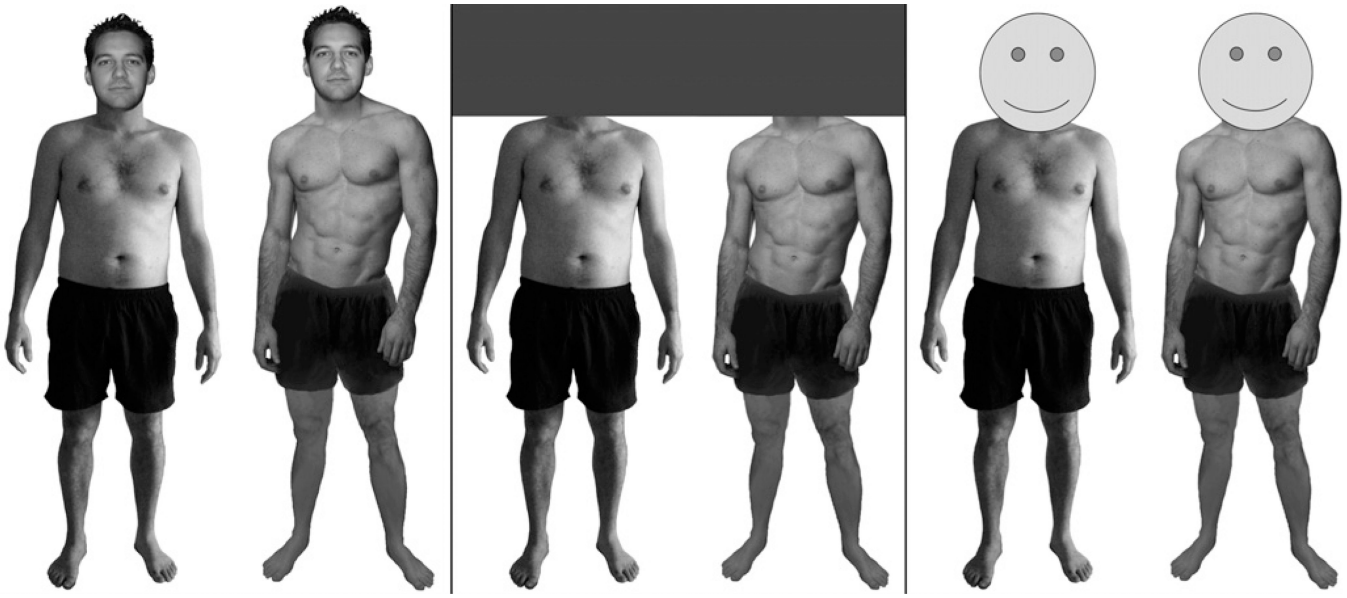

Fig. 1.
Example stimuli presented to infants in Study 1 (left panel), Studies 2 and 4 (middle panel), and Study 3 (right panel).

Table 1

Mean looking times (in seconds), standard deviations, and corresponding percentages of looking times for unattractive body shapes for each age group.

Stimuli	Age (months)	Attractive looking time	Unattractive looking time	Unattractive (%)
Normal head (Study 1)	3.5	9.91 (2.48)	10.09 (4.61)	50.43
	6	10.16 (2.70)	9.84 (2.70)	49.22
	9	10.21 (2.16)	9.79 (2.16)	48.94
Head obscured (Study 2)	3.5	10.22 (2.59)	9.88 (2.59)	48.93
	6	8.96 (2.60)	11.04 (2.60)	55.20
	9	9.04 (1.71)	10.96 (1.72)	54.81*
Smiley face (Study 3)	3.5	10.44 (2.43)	9.56 (2.98)	47.78
	6	10.83 (2.10)	9.17 (2.10)	45.84
	9	8.49 (2.44)	11.51 (2.22)	57.58*

Note: Standard deviations are in parentheses.

* $p < .05$.