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Do Toddlers Exhibit Same-Sex Preferences for Adult Facial Stimuli?

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Abstract

During the first year, infants exhibit visual preferences for female relative to male faces (Quinn, Yahr, Kuhn, Slater, & Pascalis, 2002). These visual preferences may reflect an adaptive behavior resulting from infants' greater experience with females during social interactions, particularly caregiving (McArthur & Baron, 1983; Rennels & Davis, 2008). As children learn they belong to a particular sex during toddlerhood, they become more active seekers of social knowledge and may begin to seek out members of that sex as models for determining appropriate activities and behaviors (Baldwin & Moses, 1996; Martin, Ruble, & Szkrybalo, 2002). The purpose of this investigation was to determine (a) if 18- to 36-month-old boys' and girls' visual preferences for male and female adults change after infancy to preferences for same-sex adults and (b) if children's development of self knowledge and knowledge about biological sex of self and others contributes to changes in these visual preferences. Results indicated that children showed visual preferences for low masculine males relative to high masculine males. Toddlers did not appear to be exhibiting visual preferences for same-sex faces; their level of self and gender knowledge did not appear to impact visual preferences. Eighteen- to 36-month-olds may still be exhibiting visual preferences based on familiarity with females.

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Section 1: Introduction

In order to begin to understand the complex world in which we live, children must learn to attend to certain items, events, and people over others. Not all stimuli are relevant to a child's biological and social needs; therefore, children attend more toward those stimuli that fulfill these needs (McArthur & Baron, 1983). Attending more toward one stimulus over another leads to a visual preference for that stimulus, thus visual preferences are what guide early cognitive and social development.

Individuals begin to piece together their social worlds based on who is familiar (Nelson, 2001) and who provides affordance (i.e. an opportunity to act and be acted upon by individuals in the environment; McArthur & Baron, 1983). During the first year, roughly 70% of infants' social interactions are with females (Rennels & Davis, 2008). This greater experience with females over males is not limited to primary caregivers being predominantly female, but includes infants having more interactions with familiar females (i.e., family friends) and female strangers compared to familiar males and male strangers. These data suggest that not only do infants engage in more interactions with females, but also that infants show greater attention toward females relative to males during actual social interactions (Rennels & Davis, 2008). Infants' visual preference for females, particularly those from familiar races, is also evident in the lab setting (Quinn, 2002; Quinn et al., 2002; 2008).

These visual preferences may change as infants develop into toddlers and begin to acquire more knowledge about their social worlds. During the second and third years, children develop gender specific toy preferences and prefer same-sex peers (e.g., Campbell, Shirley, Heywood, & Cook, 2000; Fein, Johnson, Kosson, Stork, &

Wasserman, 1975; O'Brien & Huston, 1985), and some evidence suggests that 2.5- to 5.5-year-olds model their behavior after same-sex adult models (Bussey & Bandura, 1984). Yet little is known about how visual preferences for adult males and females might develop or change during toddlerhood.

By 9 months infants appear to be aware of sex differences. They have begun to categorize adults using biological sex when the faces are highly sex-stereotypical (Leinbach & Fagot, 1993; Newell, Strauss, & Best, 2003; Younger & Fearing, 1999) and have begun to match dynamically presented male and female faces with voices (Patterson & Werker, 2002; Walker-Andrews, Bahrick, Raglioni, & Diaz, 1991). Infants as old as 10 months, however, still visually prefer females over males (Quinn et al., 2002). Perhaps children must be aware of themselves as separate and unique and must be aware of belonging to a particular sex category before they are able to utilize the knowledge they have acquired about the biological sex of others to form preferences and associations with members of their own group.

An understanding of self as unique and separate may be the first step toward developing an in-group social identity. The self is not simply a distinct, personal entity separate from others, but also consists of social factors that link the individual to immediate family and friends and incorporates the individual into a network of social groups based on in-group similarities and out-group differences (Brewer & Gardner, 1996). Much less research has been devoted to the developmental trajectory of the social selves related to interpersonal and collective group membership than research examining the development of a personal self (Ruble et al., 2004). Therefore, it is unclear when social identities begin to emerge. Although many researchers contend that a strong social

identity does not develop until mid- to late-childhood (Ruble et al., 2004; Sani & Bennett, 2009), cognitive-developmental theory and gender schema theory suggest that orientation to one's own group develops shortly after categorical identification with that particular group (Martin et al., 2002; Ruble et al., 2004).

Debate exists among the theories of gender development regarding the necessity of categorization prior to displaying preferential behavior toward one's own social category. Both cognitive-developmental theory and gender schema theory indicate the importance of children categorizing by sex prior to seeking additional information about gender related knowledge (Martin et al., 2002). In contrast, social-cognitive theory (revised version of social learning theory; Bussey & Bandura, 1999) does not emphasize the necessity of categorization prior to displays of gender-specific behavior (and presumably same-sex preferences, although this link is somewhat unclear). Neither cognitive nor social theories explicitly discuss visual preferences for adults; therefore, the purpose of this investigation is not to support or refute the leading theories of gender development but rather to explore how face processing might play a role in the broader acquisition of gender knowledge and self knowledge that take place during toddlerhood.

According to the ecological theory of social perception (ETSP), people actively seek out social information relevant to their own goals, interests, and needs (McArthur & Baron, 1983). In infancy a child's primary caregiver provides most biological and social needs, and given that females frequently serve as primary caregivers, infants should seek out females and consequently learn more about the structural invariants that constitute "femaleness." By the end of the first year, infants may have a fairly robust concept of what is "female" and may begin to parse their social worlds into what is familiar (i.e.,

feminine) and what is less familiar (i.e., masculine). With the onset of walking, however, infants become more active participants in their social worlds (Clearfield, Osborne, & Mullen, 2008). They also begin to gain a sense of autonomy (Stipek, Gralinski, & Kopp, 1990) and look toward others to determine appropriate behaviors (Baldwin & Moses, 1996). ETSP posits that the development of social perceptions must exist in conjunction with behavioral capabilities and that social attention will shift as a perceiver's goals and interests change (in an effort to maximize environmental affordance). As children begin to walk, acquire a sense of self, and develop knowledge pertaining to membership to a particular sex, their goals and interests may change as well as the social affordances they seek in others. Boys may begin to seek out males for information relevant to their social development while girls maintain or strengthen interest toward females as their social referents (Martin et al., 2002).

The development of self knowledge and knowledge of the biological sex of self and others are complex processes that develop gradually during childhood. First children become aware that they are separate and unique from their surrounding worlds (Lewis & Brooks-Gunn, 1979); then they begin to apply labels to themselves that reflect this separation (i.e. I, me; Stipek et al., 1990). It appears that only after a sense of self has developed do children begin to self-identify with a particular sex and label others by sex (Courage, Edison, & Howe, 2004; Leinbach & Fagot, 1986; Lewis & Brooks-Gunn, 1979). If these factors do play a role in children's development of same-sex preferences for adults, as ETSP may suggest, then it is important to determine not only if and when same-sex preferences develop but which components of self knowledge and knowledge of sex categories may influence these preferences.

Sex-Based Visual Preferences during Infancy and Toddlerhood

Gender is a very salient feature of children's early development. Children are labeled by sex almost immediately ("It's a girl!") and are often dressed in gender salient clothing and given gender specific toys. Although their experience with societal gender norms begins almost immediately after birth, children's experience with the actual sexes is more disproportionate. Infants have approximately 2.5 times more experience with females than males (Rennels & Davis, 2008). Therefore, even though a 1-year-old boy is dressed in blue and likes trucks, his representation of "What are males?" may be skewed or not as fully developed as his representation of "What are females?" These effects are no different for a 1-year-old girl. Societal norms have dressed her in pink and helped her develop an affinity for dolls, yet she has the same disproportionate exposure to females and males. As girls develop a gender group identity over the course of the next two years, they may maintain interest and attention toward females while boys may switch attention toward males in order to develop a social identity with their own gendered group. This potential switch in attention for male toddlers may lead to a lag in gender group identity formation as compared to their female peers.

Much research has investigated toddlers' preferences for gender specific activities, toys, and same-sex playmates during the second and third year (e.g. Campbell et al., 2000; Fein et al., 1975; O'Brien & Huston, 1985), yet few studies have investigated toddlers' visual preferences for same-sex adults. Between the second and third year, children become active seekers of social information (Baldwin & Moses, 1996; Clearfield et al., 2008) and begin to show more referencing toward strangers than to primary caregivers when both are present (Walden & Kim, 2005). This latter phenomenon is

related to the hypothesized "expertise effect" in which a child will seek out a referent who is more likely to provide relevant knowledge (Feinman, Roberts, Hsieh, Sawyer, & Swanson, 1992; Walden & Kim, 2005). This hypothesized effect has yet to be tested directly (Walden & Kim, 2005), but it seems possible that children establish preferences toward same-sex models as referents for gender appropriate behavior. Gender may become particularly salient once toddlers begin to self-identify with a particular sex (Martin et al., 2002).

Researchers who have examined toddlers' preferences for males and females have found inconclusive results. Some research has found no visual preferences for male or female faces among 18- and 24-month-olds (Eichstedt, Serbin, Poulin-Dubois, & Sen, 2002). The preference trials, however, were brief (4.5 s) and consisted of only two pairs of male and female faces. In an examination of 24-month-olds' understanding of gender-specific activities, children looked longer toward females engaged in neutral activities than males engaged in the same activities (Serbin, Poulin-Dubois, & Eichstedt, 2002). The stimuli, however, included only one set of actors. Furthermore, the trials with neutral activities were randomly dispersed among trials with masculine or feminine activities, which may have influenced looking.

Boys aged 26 to 68 months with higher gender constancy (i.e., ability to label themselves and others by gender and understand that gender is stable and consistent over time) attended more toward a film of a male model than a film of a female model, whereas high gender-constant girls looked equally toward both models (Slaby & Frey, 1975). Interestingly, girls with lower gender constancy (i.e., inability to identify males and females or understand the constancy of gender over time) spent a higher proportion

of time attending to the male model (57.8%) than did boys with lower gender constancy (47.9%). The authors' explanation for these latter findings was the possibility that females attended more to the male model because he may have been perceived as more powerful than the female model (Slaby & Frey, 1975). Two methodological concerns may have also accounted for the discrepancy. The side of presentation of the male and female stimuli was not counterbalanced, nor was it mentioned that the activities the male and female models performed were controlled for gender-typed behavior. It is somewhat difficult to draw conclusions based on the lack of information. In fact, in a similar study with more methodological controls, 29- to 68-month-olds viewed multiple adult male and female models performing novel tasks (Bussey & Bandura, 1984). Children modeled their behavior after same-sex models regardless of their level of gender constancy (ranging from not having achieved gender identity to having gender identity, stability, and some signs of consistency; Bussey & Bandura, 1984).

No investigation has looked solely at toddlers' visual preferences for male and female faces, which may not be due to lack of theoretical interest but rather due to methodological limitations. The classic visual preference paradigm is a useful technique when working with infants (Fantz, 1964), but could become fairly tedious for a mobile and active toddler. A child sits in a darkened room or "chamber" and passively views multiple exemplars of stimuli that differ in subtle ways, which may make it difficult to maintain a toddlers' attention. Using a different type of preference measure in which the child has a more active role and physically chooses the stimulus she wishes to view may help maintain a toddler's attention. The act of picking a same-sex adult for further examination may parallel choosing to imitate same-sex adult referents in a novel game

(Bussey & Bandura, 1984). Choosing a stimulus should be an easier task than imitating a stimulus, so choice-preferences may be a precursor to same-sex imitation.

In this investigation, children were asked to point to or touch the person they liked best. Pointing is a behavior children develop around 11 to 12 months (Butterworth & Morissette, 1996), so even our youngest age group (i.e., 18-month-olds) was able to perform this task. Researchers have used pointing with similar aged children to examine their ability to label individuals in photos based on sex (Leinbach & Fagot, 1986; O'Brien & Huston, 1985; Thompson, 1975). Investigators have also used pointing via touch-screen technology to non-verbally assess performance of toddlers and children aged 12 to 66 months on various visual search and language acquisition tasks (Bavin, Wilson, Maruff, & Sleeman, 2005; Friend & Keplinger, 2003; Gerhardstein & Rovee-Collier, 2002; Scerif, Cornish, Wilding, Driver, & Karmiloff-Smith, 2007; Sutton, 2006; Worsfold, Davis, & De Bruyn, 2008).

Development of Self Knowledge

During the second and third year children's social and cognitive skills develop quite rapidly, so one cannot simply examine one aspect of social development (i.e., same-sex preferences for adults) without also examining other aspects of development that may be related. Self recognition, as measured by children's behavior in front of mirrors, appears to be one of the first milestones that may impact visual preferences for others. A child may need to realize first that she is separate from others before she begins to prefer others who are similar to the self. Other aspects of self awareness such as a child's use of personal pronouns and self evaluative terms and her ability to identify her own image develop somewhat later than mirror self recognition (Campbell et al., 2000; Courage et

al., 2004; Lewis & Brooks-Gunn, 1979; Stipek et al., 1990). These components of the self concept may be important to same-sex preferences because they do not simply show that the child is aware of herself as a distinct object separate from the surrounding environment, but show that the child is able to give the object a label (i.e., I, me, mine), evaluate it in terms of self worth (i.e., good or dirty), and distinguish it from similar objects (i.e., other same-age, same-sex children). These concepts are more complex aspects of self awareness and suggest deeper, cognitive processing. This more robust understanding of the self may be necessary prior to establishing preferences for others who are similar to the self (i.e., same-sex adults).

Mirror self recognition. Children acquire the ability to recognize the self as separate and distinct from the surrounding world midway through the second year (Courage et al., 2002; Lewis & Brooks-Gunn, 1979). Recognition is thought to be one of the first signs of self concept development and can be demonstrated behaviorally (Rochat, 2001). Self recognition develops gradually over the first two years through interactions with others, motor skill development, and mirror play (Bahrick, Moss, & Fadil, 1996; Legerstee, 1998; Rochat, 2001). It culminates midway through the second year into what many believe to be the defining moment of a child's understanding of the self as distinct from the surrounding environment: mirror self recognition (Brooks-Gunn & Lewis, 1984).

Around 15 to 18 months children begin to place themselves in a social context as separate from other people (Lewis & Brooks-Gunn, 1979; Thompson, 1975). Even though not all children can use personal pronouns effectively at this age, they have an understanding of self knowledge by their behavior in front of mirrors (e.g., Lewis &

Brooks-Gunn, 1979; Nielsen, Dissanayake, & Kashima, 2003; Rochat, 2001). The Mirror Self Recognition (MSR) task or "mark test" has become the standard measure of self awareness in preverbal children (e.g. Bard, Todd, Bernier, Love, & Leavens, 2006; Nielsen et al., 2003), and is related to personal pronoun use, pretend play, and synchronic imitation (Asendorpf, Warkentin, & Baudonniere, 1996; Lewis & Ramsay, 2004; Nielsen & Dissanayake, 2004). Although variations of the task exist, the basic principle behind the task is that a child is placed in front of a mirror with a spot (sticker, rouge, paint) somewhere (usually on the nose or face) on his body. If the child notices the spot and engages in self directed behavior (i.e., touching on or near the spot, becoming more self conscious, shy, or coy in the presence of the spot, or verbally acknowledging the spot), then the child is thought to understand that the reflection is not the self nor a playmate but a representation of the self, which is distinct and separate from the environment surrounding the child (Bard et al., 2006; Lewis & Brooks-Gunn, 1979).

Some children as young as 12 months exhibit signs of mirror self recognition (Nielsen et al. 2003; Pipp, Fischer, & Jennings, 1987). These instances, however, are rare with less than 10% of children showing self-directed behavior. Because variations of the MSR task are prevalent, criteria for determining what constitutes MSR behavior are also quite diverse. Some researchers use a strict criterion that the child must touch the spot directly or within a very small radius (c. 2 cm) of where the rouge, paint, or sticker was applied (Fasig, 2000; Lewis & Ramsay, 2004; Nielsen et al., 2003; Nielsen, Suddendorf, & Slaughter, 2006; Pipp et al., 1987; Suddendorf, Simcock, & Nielsen, 2007). Others are less stringent about the behavior necessary to infer mirror self recognition and conclude that some recognition was exhibited if the child orally indicated

something about his nose, acted shy or embarrassed (Courage et al., 2004), or showed self directed behavior after a prompt from a parent (Campbell et al., 2000). Despite these variations, the majority of research suggests that the age of onset for MSR is around 18 months with at least 50% of children engaging in some form of self directed behavior in the presence of a mirror (Campbell et al., 2000; Courage et al., 2004; Nielsen et al., 2003, 2006; Pipp et al., 1987). By 24 months, 90% or more of toddlers engage in MSR (Courage et al., 2004; Lewis & Ramsay, 2004; Nielsen et al., 2003, 2006; Suddendorf et al., 2007). For this reason I chose to begin the investigation with 18-month-old children. MSR was projected to be the task mastered by the youngest children in this investigation. Because it was not achieved by all children at this age, MSR could be used to better predict if self-recognition is a necessary component for same-sex visual preferences.

Self development questionnaire. The Self Development Questionnaire (SDQ) is a 25-item measure parents use to report their child's self-concept acquisition (Stipek et al., 1990). It highlights four factors relevant to children's development of self: self-recognition (Factor 1), self description and evaluation (Factor 2), emotional response to wrongdoings and self-regulation (Factor 3), and autonomy (Factor 4). The order of these factors corresponds to a developmental trajectory of empirically observed behavior. Self-recognition was a precursor to both self description/evaluation (Factor 2) and emotional response to wrongdoings/self-regulation (Factor 3). Although Factors 2 and 3 showed considerable overlap, Factor 2 developed more quickly. The items related to autonomy did not show developmental differences, and at least 90% of the autonomy items were passed by children aged 14 to 40 months (Stipek et al., 1990). Of most interest to this investigation was whether Factors 2 and 3 contribute to development of same-sex

preferences. Because these factors develop later than self-recognition, such concepts may involve more complex forms of self awareness.

Investigators have used the SDQ (or portions of the SDQ) as a self-evaluative measure to predict 3-year-olds' recall of conversations with their mothers, cognitive and social competence, and understanding of ownership (Fasig, 2000; Houck, 1999; Wang, 2006; Welch-Ross, 2001). The SDQ has also been used in conjunction with MSR to examine self descriptions and evaluations, in general, and personal pronoun use in particular (Fasig, 2000; Lewis & Ramsay, 2004). Interestingly, these latter two investigations found differing results. Fasig (2000) found no difference between use of self descriptive and evaluative terms for 18- to 28-month-old self-recognizers and non-recognizers, whereas Lewis and Ramsay (2004) found significant differences between the use of personal pronouns for self-recognizers and non-recognizers among children studied longitudinally at 15, 18, and 21 months. This discrepancy could be due to a number of factors related to differences in methodology or because Fasig (2000) used the full 12-item factor of self descriptions and evaluative terms, whereas Lewis and Ramsay (2004) relied on only six items related to personal pronoun use. Therefore, I may want to look more closely at what components of the SDQ are relevant in predicting same-sex preferences, although I started by using the entire 25 item scale.

Photo identification. A child's ability to identify himself in a photo represents a complex differentiation between self and other that may serve as a precursor to the development of same-sex preferences. Photograph recognition is considered a more taxing task than MSR because contingency cues are not present in photos, and the child must rely on featural configuration alone to identify himself. The child must also be able

to generalize from one situation to another (Bigelow, 1981; Lewis & Brooks-Gunn, 1979) and understand the dual representation of pictures as objects and pictures as symbols (DeLoache, Pierroutsakos, & Uttal, 2003; DeLoache, Pierroutsakos, Uttal, Rosengren, & Gottheb, 1998). Although children as young as 3 to 5 months show differential attention toward images of self and other, this variation in responding may not be due to recognition of self as much as recognition of a familiar object (from prior experience with mirror images; Bahrick et al., 1996; Legerstee, Anderson, & Schaffer, 1998). When a child physically identifies a photo of himself, this action is possibly more comparable to actual self-identification than differential looking toward self and peer.

Photo identification of the self develops later than MSR (Bigelow, 1981; Courage et al, 2004; Lewis & Brooks-Gunn, 1979). When 18-, 21-, 24-, 30-, and 36-month-olds were asked to point to a recent picture of the self among pictures of a same-sex peer and an opposite-sex peer, 43%, 60%, 90%, 87%, and 100%, respectively, were able to do so (Lewis & Brooks-Gunn, 1979). Children who did not point to self rarely pointed to a different picture, but rather did not point to any picture; therefore, "incorrect" responding was consistent across all ages. Similar results were found for 15- to 23-month-old children. The mean age for photo identification was 21.5 months with a dramatic increase between 21 months (20%) and 22 months (70%), and almost all children (95.5%) who were able to identify their photos did so during three consecutive trials (Courage et al., 2004).

In summary, self-identification may be an important precursor to the development of same-sex visual preferences because it is likely that the child must be aware of herself as distinct from those around her before she is able to identify with a particular group.

Self-identification, however, is a complex process that emerges slowly during the first two years and involves not only self distinction in the presence of mirrors but also the use of self referent terms and the ability to recognize the self in more symbolic contexts that are not necessarily temporally or spatially contingent (i.e., photos).

Development of Biological Sex Knowledge

Although children can discriminate between images of males and females within the first year (Leinbach & Fagot, 1993; Younger & Fearing, 1999), they do not accurately apply sex labels to these images until almost the end of the second year (Leinbach & Fagot, 1986). Labeling males and females by sex appears to develop somewhat later than self-recognition (Courage et al., 2004; Leinbach & Fagot, 1986; Lewis & Brooks-Gunn, 1979), and therefore may reflect a more complex understanding of social identity. Cognitive theories of gender development suggest that a child must first be able to apply labels to a group before she can form preferences for these groups (Martin et al., 2002; Ruble et al., 2004). Between the time when children first discriminate between the sexes (9 months) and the time when they accurately apply labels to the sexes (23-26 months), children acquire much knowledge about the sexes, including metaphorical associations (Eichstedt et al., 2002). Children may rely on distinctions between the sexes to help guide their interests and goals even before they can clearly label the sex of others. It is not clear from the literature if labeling self and others by sex will precede, develop in conjunction with, or follow same-sex preferences. This investigation further examined this relationship.

Sex labeling of adults. To measure toddlers' abilities to label the sex of others I used a task developed by Leinbach and Fagot (1986) in which children see two pictures, a

male and a female, and pick one of the pictures based on the label (e.g., "mommy" or "daddy"). Leinbach and Fagot (1986) proposed this task as an accurate measure of the onset of sex labeling competence because the task is fairly simple (relying only on a forced-choice decision) and is not dependent on children's verbal abilities, which are still developing during toddlerhood. Although Thompson (1975) proposed a nonverbal, forced-choice gender discrimination task, his use of many different labels (e.g., he-she, brother-sister, father-mother) and intermixing child and adult dyads into a single, 17-trial task made interpretation of results difficult and did not leave room to measure chance performance. The task proposed by Leinbach and Fagot was developed to account for chance performance by using more trials and fewer labels. Using this measure, Leinbach and Fagot (1986) found that roughly 35% of 16- to 23-month-olds, 80% of 23- to 26-month-olds, and over 95% of children 27 months or older could accurately label the sex of adults.

Sex labeling of self. Another important component of gender identity is the ability to label the self as male or female. Unfortunately, a dominate measure of self-labeling for toddlers has not surfaced from the literature. Although most children can sort their own picture into the appropriate "boy" or "girl" box by 30 to 31 months (Thompson, 1975; Weinraub et al., 1984), sorting may be too difficult for younger children. Other investigators have used forced-choice methods. Campbell, Shirley, & Caygill (2002) asked 24- to 28-month-olds to point to either a picture of self or same-age, opposite-sex peer in response to "Point to the boy/girl" and then to point to self or a same-age, same-sex peer in response to "Point to the picture of you." It was implied that accurately choosing the self to both questions meant that the child could "label the sex to

which they belonged and recognize themselves as a distinct individual belonging to that category" (p. 206). Using this method Campbell et al. (2002) found that 67.4% of 24- to 28-month-olds could accurately label themselves as belonging to a particular sex category. Because children were always asked to respond to a picture of self, deducing that identification of self from other implies accurate sex labeling seems problematic. Still other investigators have used different sex labeling methods. Weinraub et al. (1984) asked children to provide a verbal label of "boy" or "girl" for a picture of the self. A significant number of children passed this task at 26 months, but the majority of children did not pass until 31 months. Pipp et al. (1987) asked children for a correct response to both "Are you a boy?" and "Are you a girl?" The mean age for passing this task was 28 months. Katz and Kofkin (1997) asked children to complete a number of tasks related to sex labeling including answering direct questions, choosing dolls, and sorting pictures. They reported that 30% of 24-month-olds, 70% of 30-month-olds, and 89% or 36-month-olds correctly used sex labels for the self.

Because a single measure of toddlers' sex identity of self has not emerged from the literature, I proposed to use a few simple questions. First I asked two yes-no questions: one asking the child if she was a boy, and the second asking if she was a girl. I also asked one forced-choice question in which the child was given the choice between boy and girl. Although children comprehend and respond to yes/no questions before *wh-* or *how* questions and generally acquire this ability by 2 years (Choi, 1991; Rodgon, 1979; Tyack & Ingram, 1977), some 2- and 3-year-olds tend to have a "yes" response bias for questions related to objects' properties and function or simulated forensic questions (Fritzley & Lee, 2003; Peterson & Grant, 1999). This bias, however, is reduced if

questions employ items and words that are familiar to the child (Fritzley & Lee, 2003). Because of the saliency of gender labels during development and the personal nature (familiarity) of the yes/no questions for this study, the "yes" bias should be less likely to occur. When a "yes" bias does occur, children do not respond in a biased manner to the same type of question asked in a two-alternative, multiple-choice format (i.e., "A or B"), nor do children show a bias toward simply repeating the last choice (i.e., "B"; Peterson & Grant, 2001). For this reason, I included the third question type ("Are you a boy or a girl?"). I also used the parental-report of the item #10 from the SDQ which asked if the child used the self-referent labels of boy/girl.

Societal Impact

One cannot simply examine how children develop within and react to their social environment without also taking a closer look at the environment. What components make up this environment and how the environment reacts toward the child are necessary factors to consider when determining how a child might learn and develop a social identity.

Facial experience. If 18- to 36-month-old boys do begin to seek out adult males as referents for social behavior, it is necessary to learn what kinds of opportunities they have to observe and interact with other males. Female faces dominate infants' social worlds (Rennels & Davis, 2008), and it is likely that females still make up a large component of toddlers' daily lives. It was important to determine if: (a) the proportion of time toddlers spent around males and females had changed since infancy, (b) boys attended more to males than girls attended to males, and (c) attention toward male and

female adults in the natural environment was related to same-sex visual preferences displayed in the lab.

Perceived masculinity/femininity. Society has enacted fairly clear distinctions regarding how girls should behave and be treated as compared to how boys should behave and be treated. These distinctions, however, are not necessarily based on strict adherence to children's biological sex membership. When adults predicted the gender-typed behavior of 3-year-old children, they relied more on facial masculinity/femininity than sex to do so (i.e., adults predicted a masculine-looking girl would be more likely to engage in masculine-typed activities than a feminine-looking girl; Rogers & Ritter, 2002). If adults' judgments of children's behavior carry over to their actual interactions with children, then adults may treat feminine-looking boys/girls differently than masculine-looking boys/girls. Differential treatment could cause children to socially identify with individuals who look similar to them because these individuals are treated similarly. It was therefore important to determine if children's facial masculinity/femininity (as judged by adults) impacted their visual preferences for masculine- or feminine-looking males and females.

Facial masculinity/femininity preferences may develop prior to same-sex preferences. Once children have an understanding of the self, they may self-identify with similar looking others on the bases of perceptual cues (i.e., masculinity/femininity) before they have a clear understanding of and ability to discriminate between the sexes. On the other hand, children may simply prefer the "best examples" of adults from a particular sex. To address these questions, this study not only investigated children's preferences

for same-sex adults, but also their within-sex preferences for masculine- or feminine-looking individuals.

Summary and Hypotheses

The main goal of this investigation was to examine 18- to 36-month-olds' same-sex preferences for adults and within-sex preferences for facial masculinity/femininity using forced-choice and looking-time preference tasks. This investigation sought to determine (a) if the proposed choice preference task produced similar results to those obtained by classic visual preference measures (Fantz, 1964) and (b) if same-sex preferences and within-sex preferences based on facial masculinity/femininity for adults developed during toddlerhood. I examined if preferences varied based on children's age, sex, and/or perceived facial masculinity/femininity.

If children do exhibit visual preferences for same-sex adults and/or for high or low masculinity/femininity, then some predictions can be made based on children's age and sex. Girls of all ages may maintain interest in females and exhibit visual preferences for females when paired with males, high feminine females when paired with low feminine females, and low masculine males when paired with high masculine males. Boys may show a lag in visual preferences for males, because they may have to "switch" from a female, familiarity preference that developed during infancy (Quinn et al., 2002). The 18- to 24-month-old boys may exhibit visual preferences similar to girls because of female familiarity, or they may show no visual preferences because they are in transition. The 25- to 30-month-old boys may show no sex or masculinity visual preferences because they are transitioning through the "switch" in visual preference from females to males. For 31- to 36-month-old boys, visual preferences for males may be well

established, and these children may show preferences for males when paired with females and high masculine males when paired with low masculine males. Boys of all ages should visually prefer the high relative to low feminine female faces, because of early female familiarity and the prototypicality of such faces.

Children's own facial masculinity/femininity may be a better indicator of children's preferences for adult models than actual sex, because it more strongly impacts adult judgments of children's likelihood in engaging in sex-typed behaviors (Rogers & Ritter, 2002). Such judgments may translate to actual treatment of children and subsequently impact to whom children look for social reference (i.e., individuals treated similarly due to similarities in facial appearance). For example, if a boy is perceived as feminine, he may be treated as more feminine, and in turn, seek out feminine looking referents.

A secondary goal of this investigation was to determine if various components of self knowledge, ability to label the sex of adults, ability to label the sex of self, and facial experience predicted the acquisition of these sex-based visual preferences. Children participated during ages when self knowledge and sex labeling abilities were still developing so as to better determine how each factor uniquely contributed to the development of same-sex and facial masculinity/femininity preferences. If same-sex visual preferences first develop based on the perceptual cues of facial masculinity/femininity, then a child may only need to possess an understanding of herself as a unique agent before she begins to seek out others who are similar to herself. Therefore, the predictors corresponding to self knowledge acquisition (MSR, SDQ, and photo identification) may serve as the best predictors of visual preferences for facial

masculinity/femininity. MSR, components of the SDQ, and photo identification should emerge somewhat sequentially during toddlerhood and represent an increasingly more complex understanding of the self (Campbell et al., 2000; Courage et al., 2004; Lewis & Brooks-Gunn, 1979; Stipek et al., 1990). Measuring which aspect of self development contributes most to visual preferences for facial masculinity/femininity will help determine how "intact" an understanding of the self must be for these preferences to emerge. In order for same-sex preferences to develop fully, children may need a more robust understanding of the categorical labels of sex for both the self and others. The predictors related to children's abilities to appropriately apply sex labels may serve as the best predictors for same-sex visual preferences.

If boys do show a lag in the development of same-sex preferences as compared to girls, then these predicted effects may vary between the sexes. Girls might always show strong visual preferences toward females and high feminine facial features, which may result in none of the predictors serving as unique contributors to same-sex or facial masculinity/femininity preferences. Because boys are predicted to show more variability in their visual preferences as they develop during toddlerhood, the hypothesized effects may be more accurate for the boys' data than for the girls' data.

Experience may play an important role in toddlers' preferences. Although toddlers' experience with males and females likely does not differ from infants' experience with males and females, their attention or interest toward the sexes may be changing. For example, 18- to 36-month-old boys may show more interest in males than 18- to 36-month-old girls show toward males. Examining a variety of components that may relate to individual differences in preferences may help illuminate this turbulent time

in development and could help us understand if, when, and how children begin to form associations with their own sex and develop early in-group identity.

Section 2: Method

Participants

Toddlers aged 18 to 36 months participated (N = 109). Participants were 18 to 24 months (24 girls, 21 boys; M_{girls} = 21.49, SD_{girls} = 1.96; M_{boys} = 21.68, SD_{boys} = 1.97), 25 to 30 months (23 girls, 15 boys; M_{girls} = 28.34, SD_{girls} = 1.73; M_{boys} = 28.13, SD_{boys} = 1.86), or 31 to 36 months (11 girls, 15 boys; M_{girls} = 34.28, SD_{girls} = 1.97; M_{boys} = 34.07, SD_{boys} = 1.48). I recruited participants using a database of names, which were compiled by research assistants who used birth announcements found in local newspapers to look up contact information for parents. Children were from the following racial backgrounds: White (80), Black or African American (5), Asian (4), some other race or multiple races (13), and race not reported (7). Children were from the following ethnicities: Spanish/Hispanic/Latino (9), Mexican/Mexican American/Chicano (9), Cuban (5), Puerto Rican (2), not Spanish/Hispanic/Latino (81), and ethnicity not reported (3). Data from 22 toddlers were not included in analyses for the following a priori reasons: the child was born preterm (more than 25 days prior to his/her due date and a birth weight less than 2.49 kg; 6), or the child did not complete the classic visual preference portion of the study due to fussiness (5), parental interaction (4), experimenter error (1), or the family did not return for that portion of the study (6). Toddlers were given a coloring book for participating.

A subset of participants' families completed a week-long facial experience survey. This sample consisted of 11 girls (six at 18 to 24 months, three at 25 to 30

months, and two at 31 to 36 months) and nine boys (four at 18 to 24 months, two at 25 to 30 months, and three at 31 to 36 months). Nineteen were White and one was of a racial background not reported. Three were Spanish/Hispanic/Latino, two were Mexican/Mexican American/Chicano, one was Puerto Rican, 13 were not Spanish/Hispanic/Latino, and one was of an ethnic background not reported. Survey data from four toddlers were not included in the analysis for the following reasons: the child was preterm (1), the child did not complete the classical visual preference portion of the study due to fussiness (1) or parental interaction (1), and the parent reported that during the week of the survey the family was on vacation for 3.5 days and she had only been "semi-accurate" when keeping track of her child's interactions (1).

Stimulus Faces

Face stimuli for the sex labeling and same-sex preference tasks consisted of 24 male and 24 female images of White/Caucasian adults aged 18 to 35 years. All images were digitized, color photos of faces from the neck up with neutral or slightly positive expressions (expression matched across stimulus pairs). Clothing cues were masked using a white sheet, and all images were adjusted using Adobe Photoshop software to match image size, brightness, and contrast. Faces were rated by independent groups of at least 40 undergraduates for sex-stereotypicality, masculinity/femininity, and attractiveness using a Likert-type scale ranging from 1 (*not very sex-stereotypical, masculine/feminine, or attractive*) to 5 (*very sex-stereotypical, masculine/feminine, or attractive*).

The 12 male and female faces for the sex labeling task were matched on sex-typicality ratings and all faces had sex-typicality ratings above the mean. The 12 male

and female faces for the preference tasks were chosen based on attractiveness and masculinity/femininity ratings. All face pairs were matched on attractiveness (with all being medium to high attractive). The high/low masculine male and the high/low feminine female groups significantly differed in masculinity/femininity ratings, whereas the high masculine male/high feminine female group did not differ in masculinity/femininity ratings. Interrater agreement ranged from .904 to .983 (M = .949) for the male stimuli and .961 to .986 (M = .976) for the female stimuli. See Table 1 for means, standard deviations, and ranges of the ratings for the stimulus faces and paired-samples *t*-tests comparing group ratings for the attributes of sex-typicality, attractiveness, and masculinity/femininity.

For the photo identification task, I used digitized, color photos of boys and girls aged 18 to 36 months. Photos were standardized in a manner similar to the adult stimuli. The target face was presented alongside six[1] distractor faces of the same sex. Whenever possible, I matched race/ethnicity and hair color across all faces.

Measures and Apparatus

Facial experience survey. During the initial visit to the lab, research assistants showed parents how to fill out modified versions of the Infant-Individual Interaction Scale (IIIS) and the Infant-Caregiver and Family Member Interaction Scale (ICFMIS; Rennels & Davis, 2008). These scales were used to assess toddlers' experience with faces in a typical week. The IIIS was developed as a measure of infants' interactions with unfamiliar individuals. It has places to note the interacting person's age, sex, and race/ethnicity. The IIIS also includes three items related to the interaction: the distance between the child and the individual, the amount of time of the interaction, and the

child's attention toward the person. Each item has four options with varying levels of intensity. For the purposes of this research, the distance between the toddler and the person with whom the child was interacting was not relevant because by 8 months of age a child's visual acuity is equivalent to an adult's visual acuity (Norcia & Tyler, 1985). The modified version for toddlers therefore did not include distance estimates.

The ICFMIS is a simplified version of the IIIS to be used with individuals with whom the child interacts on a daily basis. A separate scale is used for each person on each day, and the parent estimates the number of each type of interaction the individual has with the child (fleeting, brief, moderate, or high involvement). Interactions are described in terms of distance, time, and child's interest. Like the IIIS, the modified version of this form included only length of interaction and child's interest in the interacting person, but not distance. For children in daycare, parents filled out one form, the child daycare form (CDF), indicating the number of days and amount of time the child attended daycare that week, the number of instructors and classmates, and the demographic breakdown for the instructors and classmates. See Appendices A-C for examples of the adopted scales.

Choice preference. The child sat at a low table facing a 48.26 cm computer monitor connected to a laptop. Microsoft PowerPoint was used to display stimuli to the child. An experimenter guided the child through the experiment but sat beside the computer monitor to minimize inadvertently cuing the child. All sessions were video recorded so an experimenter could later code children's behaviors during the tasks.

Classic visual preference. The parent and child sat on one side of a partition approximately 127 cm away from two, 43.18 cm computer monitors. The monitors were

level with the child's eyes and 30.5 cm apart. Behind the parent and child was a VHS camera that recorded the two monitors on which the stimuli were displayed to ensure the proper stimuli were shown. The experimenter sat on the other side of the partition and controlled the study using a Macintosh computer with a three-monitor set-up and Habit X 1.0 software (Cohen, Atkinson, & Chaput, 2004). The experimenter monitored the child via a digital video camera connected to a TV. The digital video camera recorded the child's looking behavior so that research assistants could later code the duration and number of looks toward each monitor using Supercoder software (Hollich, 2005).

Mirror self recognition. The child sat at a low table while the experimenter showed the child a 27.31 cm by 34.93 cm mirror. To measure MSR behavior, the child's caregiver applied a spot of non-toxic, water soluble, blue face paint to the child's nose. Although a spot of red rouge has been used more frequently in the past, experimenters have used a variety of markers, including stickers and blue paint (Courage et al., 2004; Nielsen et al., 2006; Pipp et al., 1987), and anecdotal evidence suggests that older children have found red rouge to be somewhat distressing with some children responding to the spot by saying "boo boo, mommy" and "it hurts" (Lewis & Brooks-Gunn, 1979, p. 63).

Self development questionnaire. The questionnaire measures four factors of self development including: self descriptions and evaluations (12 items), self recognition (5 items), emotional response to wrongdoings and self-regulation (5 items), and autonomy (3 items; Stipek et al., 1990). For 20 of the items, the parent responded that his/her child (a) *definitely has not* manifested the behavior, (b) *has sort of* manifested the behavior, or (c) *definitely has* manifested the behavior. The *sort of* response was for behaviors the

child has begun to show but does not show consistently (Stipek et al., 1990). For the remaining five items, the parent responded with a *yes* or *no* to the questions. See Appendix D for a sample of the SDQ.

Photo identification and sex labeling of adults. For both the photo identification and sex labeling of adults tasks, the child sat at a low table and saw presentations of two adult stimuli or three child stimuli on the 48.26 cm computer monitor.

Procedure

The parent and child made two visits to the lab (four families did not return for the second visit) approximately one to two weeks apart (M = 11 days, SD = 7.30 days). During the first visit, an experimenter explained the study to the parent and obtained informed consent and voluntary demographic information. For approximately 20% of participants, the experimenter also showed the parent how to complete the ICFMIS and IIIS, which they took home and completed everyday for one week. The experimenter took a photo of the child (or requested that the parent bring a recent digital photo of the child) to be used during the photo identification task. Pictures were taken from the neck up, and the experimenter attempted to have a consistent smile across images. The experimenter played a quiet game (such as coloring or putting together a puzzle) with the child for 3-5 minutes to establish rapport while the parent filled out the SDQ. Then experimenter, parent, and child entered the study room. The experimenter asked the parent to sit quietly to one side and not to encourage or praise the child for any particular response, but the parent was allowed to respond if the child approached and could encourage/reassure the child to “play the game” with the experimenter.

First, the child participated in either the choice preference task or the classic visual preference task (order was counter-balanced across participants). The preference tasks always occurred at the beginning of each visit in order to avoid other tasks related to gender knowledge from influencing the child's spontaneous preferences. The order of the remaining four tasks was randomized across participants and equally divided between visits two and three (except for the photo identification task, which almost always occurred during the second visit). Each child participated in the following tasks: mirror self recognition, photo identification, sex labeling of adults, and sex labeling of self. When appropriate, tasks were preceded by a "warm up" task that served as a training session to determine if the child was developmentally capable of performing the task. For example, during the sex labeling of adults task, children first completed four trials in which they were asked to point to cartoon drawings of objects familiar to children of this age (Leinbach & Fagot, 1986). All sessions were videotaped so that the experimenter could later code for behavior during the various tasks.

Choice preference. In the study room, the child sat at a low table in front of a computer monitor while the experimenter sat beside the monitor and presented the stimuli using the laptop. The experimenter explained that they were about to play a game in which the child could touch or point to one picture after being asked a question about two pictures. The preference task began with four "warm up" trials in which two items were displayed on the screen at a time, and the experimenter prompted the child to "Touch the one you like best." Pairs of warm-up items included cartoon drawings of a television set-tricycle, camera-eyeglasses, crayons-book, and ice cream cone-telephone, which adults and 4-, 5-, and 7-year-olds deemed gender neutral toys and items (Leinbach, Hort, &

Fagot, 1997). If the child did not make a choice, the experimenter made the first choice to show the child that touching an item would advance the trial. For all trials, once an item was touched, the child was "rewarded" by seeing only the chosen item for 5 s. If a choice was not made within 5 s, the experimenter asked the child "Can you pick the one you like best?" These two phrases were repeated every 5 s for ~20 s or until a choice was made. If no choice was made, the experimenter encouraged the child by saying "Can you play the game?" or "Let's play this fun game," and if still no choice was made, the experimenter advanced to the next trial and no score was recorded for that trial. After the warm-up trials, the child completed 12 test trials, which consisted of three blocks of four trials each. Block order was randomized across participants, and each block consisted of (a) high masculine male faces paired with high feminine female faces, (b) high/low feminine female face pairs, and (c) high/low masculine male face pairs. The left/right position of the face pairs was presented randomly with the constraint that each face-type appeared on both sides an equal number of times[2].

Classic visual preference. During the visual preference paradigm, the child saw twelve, 10 s trials of face pairs presented on two computer monitors. The faces were the same as those shown during the choice preference task. For each child, the faces were presented in the same block order for the choice and classical visual preference tasks, but the order of the actual face pairs was randomized between tasks. The child sat in a high-chair or on his parent's lap in a darkened room with the parent seated directly behind him. The experimenter requested the parent not interact with the child. If the child was sitting on the parent's lap, the parent wore a pair of opaque sunglasses to ensure that the parent's interest in the faces did not influence the child's preferences. To start the study

and in between each trial, a brief attention getter (a pendulum with a chirp sound) was played to help direct the child's attention toward the monitors. After the experiment, two to three research assistants coded each child's video for duration and direction of looks. Interrater agreement ranged from .836 to .998 (M = .956).

Mirror self recognition. The child sat at a low table in front of the mirror and was allowed to examine her image for 60 s, which served as a baseline for mirror behavior (Courage et al., 2004; Fasig, 2000; Lewis & Brooks-Gunn, 1979; Nielsen et al., 2003). Although prior mirror exposure is not necessary for children to engage in self-directed behavior during the MSR task (Amsterdam, 1972; Lewis & Brooks-Gunn, 1979; Lewis & Ramsay, 2004), prior exposure allowed children who did not have as much experience with mirrors at home time to become familiar with the potentially novel situation. The experimenter took the mirror away and engaged the child with a coloring task. While the child was distracted, the child's caregiver applied a spot of blue face paint to the child's nose under the guise of a nose wipe. Then the experimenter and child continued to color for ~60 s to ensure the child had not noticed the paint prior to seeing her reflection. The experimenter placed the mirror in front of the child again and observed the child's behavior for ~90 s. If the child did not look into the mirror, the experimenter encouraged her to do so by saying "Look here!" and tapping the mirror. This process was repeated until four consecutive looks occurred for at least 5 s each or until the child touched her nose (Lewis & Ramsay, 2004). At no time was the parent or experimenter visible to the child in the mirror's reflection.

Photo identification. To assess the child's ability to identify his own photo, the child saw three photos (one being the child, the others being same-age/same-sex children)

presented on the computer monitor. The experimenter displayed the images and then waited for ~30 s for the child to spontaneously identify himself (including looking longer at, pointing to, or correctly naming the self). If spontaneous identification did not occur, the experimenter prompted the child for an additional 60 s using the phrases "Where is (child's name)?" and "Who is that?" For each of the three trials the child's photo was randomly positioned to the left, right, or center (Courage et al., 2004). Different distractor photos were used for each trial so that the child's picture was presented alongside approximately six different children (see Endnote 1).

Sex labeling of adults. The labeling task was preceded by four "warm up" trials to determine if the child was capable of completing this task. The child sat at a low table and saw four pairs of cartoon objects presented in consecutive trials on the computer monitor (ball-car, cat-dog, doll-book, shoes-boat), and the experimenter asked the child to point to one of the items. Then the child saw 12 pairs of male and female adults presented during sequential trials. No images were used in previous or subsequent portions of the study. The experimenter asked the child to point to the "mommy" or "daddy." If a child did not respond to those labels, "man" and "woman" or "boy" and "girl" were substituted (Leinbach & Fagot, 1986). The child was given the same time limitations as the choice preference task. The order in which the face pairs were presented was randomized with the following criteria: (a) each male (and subsequently each female) was designated as the target on half of the trials, (b) the target occurred equally often on the left side of the screen as on the right, (c) no target occurred more than two times in a row on the same side of the screen, and (d) the same-sex target was not made more than two times in a row.

Sex labeling of self. To determine if a child was aware of her own sex, the experimenter asked each child the following three questions: Are you a boy? Are you a girl? Are you a girl or a boy? For the last question, I randomly selected if the correct choice was offered first or second. The experimenter asked the questions in random order counterbalanced across participants during different portions of the study: after the first preference test, between the third and fourth tasks (or at the end of the first session), and at the end of the study. Because it was unclear if children would exhibit accurate and reliable responses using this method, I also included item #10 from the SDQ as part of the final tally for data analysis. This item is related to the child's use of gendered nouns (i.e., boy/girl) in reference to the self.

Perceived masculinity/femininity of child participants. Forty adult participants (20 males and 20 females) rated the facial masculinity (for boys) and facial femininity (for girls) of the child participants in this study. Raters used a Likert-type scale ranging from 1 (*not very masculine/feminine*) to 5 (*very masculine/feminine*). Raters' judgments were assessed for reliability, and interrater agreement was .961 for the boys' images and .963 for the girls' images. I calculated an average masculinity or femininity score for each child to be used in further analyses.

Data Coding

Facial experience survey. I coded data in a manner similar to Rennels and Davis (2008) and calculated three variables to be used in later analyses: percentage of interactions with females (which included data from the IIIS and ICFMIS forms), time spent interacting with less familiar males and females (which included only data from the

IIIS form), and attention/interest toward less familiar males and females (which included only data from the IIIS form).

Choice and visual preference tasks. For the choice preference task, I calculated the percentage of choices made to particular stimuli for each block. For the classic visual preference task, I calculated the percentage of total looking time (PTLT) the child spent looking toward particular stimuli and calculated the average PTLT for each block of visual preference trials. Percentages were always calculated for the "female-like" stimuli (i.e., high feminine females in the male/female block, high feminine females in the high/low feminine block, and low masculine males in the high/low masculine block).

Mirror self recognition. The child was labeled a "recognizer" (score of 2) if he looked at the mirror and touched his own nose or indicated orally that something about his appearance had changed; "ambiguous" (score of 1) if he stared at the mirror image without gross body movement for at least 10 s or looked shy or embarrassed but did not touch the nose mark; "non-recognizer" (score of 0) if he did not display any of the above behaviors (Courage et al., 2004). If the child noticed the paint prior to seeing the mirror or if the parent interacted with the child, I coded the data as missing for the MSR task.

Self development questionnaire. For the 20 items in which parents responded with *has definitely not, has sort of,* and *has definitely* manifested various behaviors, scores were 0, 1, and 2, respectively. For the five items in which the parent's responses consisted of either *no* or *yes*, scores were 0 and 1, respectively. Final SDQ scores ranged from 0 to 45.

Photo identification. For each instance in which the child correctly identified her photo from the array of three photos, she received a score of 1. Photo identification

scores ranged from 0 to 3. Data were considered missing if the child did not participate in this task or if the parent interacted during the trials.

Sex labeling of adults. Each correct response a child made was tabulated and children received a score ranging from 0 to 12. Data were considered missing if the child did not participate in this task or if the parent interacted during the trials.

Sex labeling of self. Each correct response to the sex identity questions received a score of 1, for a total of 3 possible points. I also added item #10 from the SDQ which asked parents to indicate if their child *has definitely not* (score of 0), *has sort of* (score of 1), or *has definitely* (score of 2) used gender nouns in reference to the self. Scores ranged from 0 to 5 for this task. Because all children had the opportunity to answer the three questions (not all children responded to the questions) and all parents completed the survey, no data were coded as missing for this task.

Data Analyses

Dependent variables

Choice preference. Toddlers did not respond to the choice preference task as expected. Only 46 of the 109 children sampled appeared to respond consistently across some or all of the trials (two children made choices on only one block of trials, seven made choices on two blocks of trials, and 37 made choices on all three blocks of trials). Data from 25 children were not included because they appeared to be perseverating, meaning they chose either the right or left stimulus face eight or more times in a row during the 12 trial testing phase. Data were also deleted for the following reasons: children did not make any choices or made choices on only one or two trials per block (30), parental interaction (3), families did not return for the choice preference portion of

the study (4), and experimenter error (1). Data from the children included in analysis fell within acceptable bounds of skewness |.35| and kurtosis |.51|.

Classic visual preference. The classic visual preference task yielded better performance from toddlers with only five children not completing the task due to fussiness. Because this measure became the primary dependent variable, children's data were not included in the analysis if they did not complete this task. After dividing the sample by age and gender, skewness ranged from |.09| to |.88| and kurtosis from |.01| to |2.37|.

Categorical independent variables

Sex and age. To test if visual preferences varied as a function of age or sex of participants, I divided my sample by sex (boys and girls) and by three age groups (18-24 months, 25-30 months, 31-36 months). I performed a profile analysis (multivariate approach to repeated measures) on the three components of "female-like" visual preference (i.e., preference for females over males, high feminine females over low feminine females, and low masculine males over high masculine males). If interactions were signification, I followed up with tests of simple effects and simple contrasts when appropriate. For significant main effects, follow-up post hoc comparisons were performed using Tukey adjustment.

I examined the data for multivariate outliers (Mahalanobis distance) and univariate outliers. No Mahalanobis distances exceeded the chi-squared critical value ($\chi^2(5) = 20.52$, $p = .001$). Some univariate outliers were detected, but an examination of the data revealed no errors due to calculation, and no outliers fell within the range associated with a side preference (less than 10% looking to one set of stimuli). No

outliers were removed for these conceptual reasons. Cell sizes were not balanced across groups; however, Box's M test of equality of covariance matrices indicated that the assumptions of homogeneity of variance-covariance matrices was met, $F(30,13581) = 1.78$, $p > .001$. Univariate tests of homogeneity of variance confirmed equality of variance for the dependent variables except for PTLT toward high feminine females over low feminine females, $p < .05$. Significant results from the profile analysis were followed up with a comparison of PTLT scores to chance (50%) looking.

Perceived masculinity /femininity of child participants. I used the mean masculinity/femininity rating for each child participant and reverse coded boys' masculinity ratings to create one variable ranging from low femininity/high masculinity to high femininity/low masculinity. I divided my sample into thirds to create low, medium, and high groups. A one-way ANOVA revealed that ratings for the low, medium, and high groups significantly differed, $F(2,105) = 175.23$, $p < .001$, $\eta^2 = 0.77$. A rating for one girl was missing because the family did not return for the second visit and no picture was acquired on the first visit. See Table 2 for means, standard errors, and pairwise comparisons for the three groups.

To determine if the perceived masculinity/femininity of child participants was indicative of their visual preferences for adult faces, I performed a profile analysis on the three components of "female-like" preference (i.e., preference for females over males, high feminine females over low feminine females, and low masculine males over high masculine males) with age (18 to 24 months, 25 to 30 months, 31 to 36 months) and masculinity/femininity group (low, medium, and high) as between-subjects factors. If interactions were signification, I followed up with tests of simple effects and simple

contrasts when appropriate. For significant main effects, follow-up post hoc comparisons were performed using Tukey method.

After dividing the data by age and masculinity/femininity group, skewness (range |.06| to |.97|) and kurtosis (range |.05| to |2.80|) were found to be within acceptable bounds. I examined the data for multivariate outliers (Mahalanobis distance) and univariate outliers. No Mahalanobis distances exceeded the chi-squared critical value ($\chi^2(6) = 22.46$, $p = .001$). Some univariate outliers were detected, but an examination of the data revealed no errors due to calculation. Again, no outliers were removed for conceptual reasons. Cell sizes were not balanced across groups; however, Box's M test of equality of covariance matrices indicated that the assumptions of homogeneity of variance-covariance matrices was met, $F(48,7020) = 1.49$, $p > .01$. Univariate tests of homogeneity of variance confirmed equality of variance for the three dependent variables. Significant results from the profile analysis were followed up with a comparison of PTLT scores to chance (50%) looking.

Predictor variables

Mirror self recognition. Previous research indicated that children should not be aware of the application of the spot of paint (Courage et al., 2004; Lewis & Brooks-Gunn, 1979). For this reason, instances when the child noticed the paint prior to seeing the mirror or when a parent said something about the paint prior to the child exhibiting mirror self recognition, the child's response was coded as missing. Data were deleted for the following reasons: the child noticed the paint prior to mirror (15), parental interaction (3), and experimenter error (1). Of the 90 remaining children, eight were labeled as non-recognizers, 15 as ambiguous, and 67 as recognizers. Because 17.4% of participants had

missing data for this task, and because 74.4% of the remaining children performed at ceiling, I decided not to include this task in the regression analysis.

Self development questionnaire. All but one parent completed the SDQ, and data for the child were not included in analysis because he did not complete the visual preference task. Scores ranged from 8 to 45 (M_{boys} = 31.04, SD_{boys} = 9.87; M_{girls} = 34.57, SD_{girls} = 8.38), and skewness and kurtosis were in acceptable ranges (|.33| and |.63|, respectively for boys; |.31| and |1.19|, respectively for girls).

Photo identification. Four children did not complete this task because they did not return for this portion of the study. Data for two children were considered missing because of parental interaction. Scores ranged from 0 to 3 (M_{boys} = 2.13, SD_{boys} = 1.04; M_{girls} = 2.34, SD_{girls} = 1.10), and skewness and kurtosis were in acceptable ranges (|.76| and |.78|, respectively for boys; |1.32| and |.10|, respectively for girls).

Sex labeling of adults. Only one child's data were deleted for the sex labeling of adults task because the child appeared to perseverate and chose the left stimulus face on eight consecutive trials. I kept partial data for this task; therefore, scores do not necessarily reflect inaccurate performance but may indicate that the child stopped responding before all 12 sets of stimuli were presented. This variable was used as a continuous variable for the regression analysis; however, based on Leinbach and Fagot's (1986) criterion, 75 (69.44%) toddlers performed above chance (10 out of 12 stimuli correctly labeled). Scores ranged from 0 to 12 (M_{boys} = 8.76, SD_{boys} = 4.00; M_{girls} = 9.83, SD_{girls} = 3.43), and skewness and kurtosis were in acceptable ranges (|1.19| and |.05|, respectively for boys; |1.83| and |2.45|, respectively for girls).

Sex labeling of self. All children were asked all questions, so no data were considered missing. Four families did not return for the second visit, so those children were only asked two out of the three questions, but all children included in analysis had data for item # 10 of the SDQ that asked about children's gendered pronoun use in reference to the self. Scores ranged from 0 to 5 (M_{boys} = 2.06, SD_{boys} = 1.73; M_{girls} = 2.57, SD_{girls} = 1.83), and skewness and kurtosis were in acceptable ranges (|.51| and |1.09|, respectively for boys; |.06| and |1.36|, respectively for girls).

Facial experience survey. Fifty-three families agreed to participate in the survey, 24 returned the completed survey on the second visit, and data for four families were not included in the final analysis. For two toddlers, data for the percentage of time they spent with females was coded as missing because parents indicated that the ICFMIS forms had not been completed accurately. See Table 3 for descriptive statistics related to the variables of interest from the survey data.

Section 3: Results

The purpose of this investigation was to determine (a) if the results from the proposed choice preference task were similar to results from a classic visual preference paradigm, (b) if children's visual preferences for adults varied by age, sex, or facial masculinity/femininity of the child or by the type of face pairs viewed (i.e., high feminine females/high masculine males, high/low feminine females, or high/low masculine males), and (c) if visual preferences do exist in children under 3 years, what factors related to self knowledge (MSR, photo identification, SDQ), knowledge of sex categorization (sex labeling of adults, sex labeling of self), and environmental influences (facial experience survey) contribute to these preferences.

Comparison of Preference Tasks

For the choice preference task, I computed a percentage of choice preference for "female-like" stimuli (i.e., females, high feminine females, and low masculine males) separately for the three types of facial parings. For the classic visual preference task, I calculated the average PTLT toward "female-like" stimuli for each type of facial pairing. I then correlated percentages from the choice preference task with the percentages from the classical visual preference task for each type of facial pairing. I found no significant relationships between children's choice preferences and their classic visual preferences, *p*s > .05. Because it is unclear if the new preference task measured preferences in a similar manner as the classical visual preference task, and because children did not consistently make choices during the new task, I used PTLT from the classical visual preference task in all subsequent analyses.

Examination of Visual Preferences

A profile analysis was conducted to examine the percentage of total looking time (PTLT) toward "female-like" stimuli (i.e., PTLT toward females, PTLT toward high feminine females, and PTLT toward low masculine males) for the between-subjects factors of sex of the child (boys and girls) and age group (18 to 24 months, 25 to 30 months, and 31 to 36 months). No interactions were significant. The within-subjects main effect for "female-like" preference was significant, $F(2,206) = 4.13$, $p = .012$, $\eta^2 = .039$. Pairwise comparisons revealed that the visual preference for low masculine males was significantly greater than the visual preference for high feminine females, $p = .01$, but did not differ from the visual preference for females, $p > .05$. Also, the visual preference for low masculine males significantly differed from chance (50%) looking,

$t(108) = 3.08$, $p = .003$, $d = .41$. See Figure 1 for means, standard errors, and chance comparisons for the three dependent variables.

To analyze the contribution children's own facial masculinity/femininity might make to their visual preferences for adults, I used a profile analysis to examine preference for "female-like" stimuli (PTLT toward females, PTLT toward high feminine females, and PTLT toward low masculine males) by age (18 to 24 months, 25 to 30 months, and 31 to 36 months) and masculinity/femininity group (low, medium, and high). No interactions were significant. Again, the main effect for "female-like" preference was significant, $F(2,198) = 3.39$, $p = .04$, $\eta^2 = .033$.

Predictors of Same-Sex Visual Preferences

I conducted multiple regression analyses to determine if any of the tasks related to self and gender knowledge predicted visual preferences for adults. The three dependent variables (PTLT toward females, PTLT toward high feminine females, and PTLT toward low masculine males) were examined separately. Predictors included: SDQ, photo identification, sex labeling of adults, and sex labeling of self. Data were analyzed separately for boys and girls. For both boys and girls, simultaneous solution revealed the four predictors did not account for a significant amount of variance in any of the dependent variables. See Table 4 for the results of the regression analyses.

The Role of Experience

Amount of time and attention to males and females related to preferences. I examined the facial experience survey data to determine if boys and girls had different experiences with faces or showed differential attention toward males or females. First I compared the percentage of time boys and girls spent with females and found no

differences between the sexes, $t(16) = .002$, $p > .05$. Independent samples *t*-tests also revealed that boys and girls did not attend to males or females differently, $t(18) = 1.89$, $p > .05$ and $t(18) = 1.11$, $p > .10$; respectively, nor did boys or girls spend more time around males or females, $t(18) = 1.69$, $p > .10$ and $t(11.79) = 1.84$, $p > .05$; respectively. Paired samples *t*-tests, however, revealed that all toddlers (boys and girls combined) spent more time (in seconds) around females than males, $M_{female} = 948.03$, $SE_{female} = 223.75$, $M_{male} = 456.28$, $SE_{male} = 110.04$, $t(19) = 2.59$, $p = .02$, and attended (as measured in percentage of eye contact during interactions) more toward females than males in real-world settings, $M_{female} = .48$, $SE_{female} = ..04$, $M_{male} = .39$, $SE_{male} = .04$, $t(19) = 2.27$, $p < .05$.

Because attention toward males and females in the real-world may be related to attention toward males and females in the lab, I divided the sample into toddlers who engaged in high (greater than the mean percentage of eye contact during interactions) and low (less than the mean percentage of eye contact during interactions) amounts of attention with less familiar males and females. I conducted two separate 2 x 3 within-subjects ANOVAs (attention [low, high] x ("female-like" visual preference [PTLT toward females, PTLT toward high feminine females, PTLT toward low masculine males]): one for real-world attention toward males and one for real-world attention toward females). Visual preferences toward females, high feminine females, or low masculine males did not vary as a function of real-world attention toward males or females, *p*s > .10. When comparing PTLT to chance, children who had high amounts of attention to females in the real-world showed visual preferences for the low masculine males in the lab that differed from chance, $t(10) = 2.48$, $p < .05$ No other PTLT scores differed from chance. See Figure 2 for mean PTLT and standard errors.

Section 4: Discussion

This investigation sought to determine if 18- to 36-month-old boys and girls exhibit same-sex and within-sex preferences for adults. I predicted that children's preference for males and females would vary as a function of age, sex of the child, and/or perceived masculinity/femininity of the child. Specifically, boys may switch from a female, familiarity preference to a same-sex preference while girls may maintain their preference for females and "female-like" faces. The data supported these predictions for the low/high masculine male faces. In general, all children showed visual preferences for low masculine males over high masculine males that exceeded chance looking. No specific visual preferences based on age or sex emerged, however. Also, for the subgroup of toddlers for whom experience survey data existed, children who attended more toward females in their real-world settings showed visual preferences for low masculine males over high masculine males that exceeded chance looking. These results may indicate that 18- to 36-month-old children have not yet begun to associate with same-sex others and are still exhibiting visual preferences based on familiarity with females.

Interestingly, the only group differences to emerge for toddlers' same- and within-sex visual preferences occurred in instances when face pairs did not contain female faces. In general, boys and girls exhibited visual preferences for low masculine males relative to high masculine males. Children of this age are not spending much time with males, particularly male strangers. The survey data from this investigation suggest that only 0.86% of 18- to 36-month-olds' social interactions are with unfamiliar males. Perhaps something about the novelty of seeing four sets of male faces in the lab contributed to

group visual preferences emerging. Because few children in this investigation likely had experience with many male strangers, when they were placed in a situation in which only male faces were available, they collectively preferred the more "familiar" (i.e., feminine/low masculine) of the choices.

Additionally, the interplay between categorical (i.e., male/female) and perceptual (i.e., high/low masculine/feminine) information may have contributed to toddlers' visual preferences, particularly in instances when differential real-world experience exists between the categories. Sixty-nine percent of the children in this investigation were able to accurately label adults by sex, and 19% of children accurately applied labels to adults on at least 3 trials; therefore most children in this investigation were at least somewhat aware of sex categories. This conceptual knowledge may have been competing in some way with the perceptual information they were receiving when exposed to high/low masculine males and high/low feminine females. Because toddlers acquire categorical knowledge about the sexes during the time-frame under investigation, categorical information may have been more salient to the children in this study and possibly overshadowed perceptual information in some instances. Perhaps children did not show visual preferences for high feminine females relative to low feminine females, as predicted, because perceptual distinctions were not important for the category of females. Because children encounter more females in the real-world and presumably gain categorical knowledge from these interactions, maybe simply knowing that the person is female is relevant and the "female-ness" (i.e., prototypicality or femininity) of the person is not as meaningful.

For categories with which children have less experience (i.e., males), perhaps structural/perceptual information is more relevant. In these instances children may still be relying on familiarity preferences observed in infancy (Quinn et al., 2002). The familiarity toddlers have with females may be extended into the less familiar category of males in such a way that children visually preferred the more perceptually similar (i.e., more feminine/less masculine) examples of males. But in instances when perceptual information is combined with categorical information (i.e., males paired with females), visual preferences may be more individualized and based on the child's experiences, level of interest, or other factors. Or possibly, because all children are acquiring sex category knowledge during this time, they may be using the lab setting as an opportunity to examine perceptual similarities and differences between the sexes. Because the experience they are receiving in the lab is rather passive and benign (as opposed to a real-world setting in which males and females are not often standing side-by-side without motion), the opportunity to make comparisons between the sexes may be ideal, and thus children were not showing visual preferences because of this comparative process. Teasing apart group preferences during periods of transition may be difficult, because children are being exposed to and attending to a variety of different types of information, all of which could potentially impact preferences (Thelen, 2005).

Potential Limitations Related to Design and Analyses

Stimuli may not have provided the proper affordance. Perhaps visual preferences for same-sex adults do not emerge until later in development (if at all) because children must learn a new social role for adults. They must transition from seeing adults as caregivers to viewing them as appropriate representatives for in-group

behavior. Toddlers exhibit same-sex preferences for toys and peers (e.g., Campbell et al., 2000; Fein et al., 1975; O'Brien & Huston, 1985). No investigation has shown preferences for same-sex adults among 18- to 36-month-old children. A lack of clear preferences for adults among children of this age may be due to the relative interests and goals of children. The ecological theory of social perception (ETSP) predicts that the information children seek may shift as their goals and interests change (McArthur & Baron, 1983). Children gain autonomy and engage in more peer-play during the toddler years (Roopnarine & Field, 1983); therefore having same-sex preferences for toys and peers may be more relevant to their current goal-state than having preferences for same-sex adults.

Static versus dynamic stimuli. ETSP would suggest that dynamic stimuli provide valuable information about structure and allow the perceiver more opportunity to explore the event (McArthur & Baron, 1983); therefore, children may not have perceived the static, two-dimensional images used in this investigation as relevant tools for acquiring gender knowledge. If children are seeking out like-minded others as models for their own behavior (Baldwin & Moses, 1996; Martin et al., 2002), toddlers may not exhibit preferences for passive faces because faces without action may be too divergent from their current interests and real-world experiences. In instances when preschool children (2.5 to 5.5 years) have shown same-sex preferences for adults, they viewed models engaged in specific behaviors (Bussey & Bandura, 1984; Grace, David, & Ryan, 2008).

Future research should examine children's visual preferences in a similar scenario to this investigation but use dynamic faces or images in which actors are performing

socially relevant actions. Even without requiring children to imitate the actions of others, which may be too difficult a task for younger children, providing children with multiple instances of male/female, high/low feminine female, and high/low masculine male actors engaged in socially relevant tasks may help illuminate the affordance these images could provide and may facilitate children to show same-sex visual preferences.

Relevance of time. If children do switch from visual preferences based on familiarity found in infancy to visual preferences based on socially relevant information such as gender, they are likely experiencing periods of fluctuation and change during this transition (Thelen, 2005). The potentially chaotic nature of their behavior may lead to their visual preferences being fleeting and unstable, but it is unlikely that visual preferences did not exist at any point during the developmental period under investigation. Examining the data without respect to the time-course of the study may lead to some loss of information (Granic & Hollenstein, 2003; Lewis, Lamey, & Douglas, 1999). Children may have responded differently based on the block order in which they saw the male/female, high/low feminine female, and high/low masculine male face pairs; or they may have responded to the faces differently during the first trial or two as compared to the last trial or two; or they may have even responded differently within a single trial (e.g., showing chaotic looking at the beginning of the trial that eventually stabilized onto one stimulus). Taking a dynamic systems perspective and incorporating time into the analysis may illuminate some more nuances of children's visual preferences.

In fact, order effects may be at play. When looking at children who saw the male/female face pairs first, I found that girls (M = .54, SE = .02) and boys (M = .53, SE

= .04) showed a female visual preference that differed (or trended toward differing) from chance, $t(16) = 1.97$, $p = .07$ and $t(20) = 3.09$, $p = .006$, respectively, whereas those who saw either the high/low masculine males or high/low feminine females first did not have visual preferences during the male/female block that differed from chance, ps > .10. This potential order effect did not carry-over to the other stimulus sets. Children who saw high/low feminine females first did not show visual preferences that differed from chance toward high/low feminine females, and only girls who saw high/low masculine males first exhibited an almost significant visual preference for low masculine males (but children in general showed a visual preference for low masculine males).

Real-world experience. In order to better understand how toddlers' real-world experiences might impact their preferences in the lab, I asked a subset of parents to complete a facial experience survey (adopted from Rennels and Davis, 2008) everyday for the week between testing sessions. Children's overall percentage of facial experience with males and females did not change dramatically from infancy. Approximately 71% of infants' social interactions were with females (Rennels & Davis, 2008), and in this study, approximately 66% of 18- to 36-month-olds' social interactions were with females. Eighteen- to 36-month-olds engaged in eye contact with less familiar females and males about 48% and 38% of the time, respectively. Attention, however, was not indicative of same-sex preferences, although children who attended more toward less familiar female faces in the real-world tended to show visual preferences for low masculine males relative to high masculine males in the lab. Perhaps those who attend more toward others in social settings are more aware of perceptual distinctions in the lab.

External experiences may be contributing to the variability seen in the data from this investigation. Children may be more vulnerable to outside experiences during periods of transition (i.e., the transition from female, familiarity visual preferences to same-sex visual preferences), because their visual preferences are unstable and easily disrupted by external influences (Thelen, 2005). To help alleviate these concerns, future investigations should attempt to collect data from a sample with more homogeneous experiences or attempt to collect experience data from all participants and incorporate individual experience into data analysis.

Examination of Choice Preference Task

The choice preference task did not yield reliable performance from the toddler participants as anticipated. Often, children did not make choices or perseverated and chose either the right or left stimulus face continuously. Perseveration is a common developmental behavior among children, and appears to be a frequent event during periods of transition (Clearfield, Diedrich, Smith, & Thelen, 2006). From a dynamic systems perspective this type of error is viewed as an experience-dependent effect (i.e., an inability to deviate from previous actions because the activation and memory stores that occurred during those actions are competing with the individual's current state; Schutte, Spencer, & Schoner, 2003).

When tasks become more difficult due to physical proximity of stimuli or complexity of stimuli, perseveration is more likely to occur (Berger, 2004; Schutte et al., 2003). In this investigation, task complexity may have also contributed to the likelihood of a child perseverating. Of the 25 children who perseverated, only 5 did so in instances when the male/female stimulus set appeared as the first block of trials even though

children were equally likely to see each set of stimuli first (38 children saw the male/female set first, 35 children saw the high/low masculine set first, and 36 children saw the high/low feminine set first). Because face pairs in the male/female set of stimuli were potentially the easiest to discriminate (i.e., they differed categorically and perceptually), children may have found choices easier to make on these trials and, therefore, did not succumb to preservation as quickly (Berger, 2004).

Future investigation may be able to improve upon this task by creating a more controlled environment in which to test choice preferences (i.e., having the child in a more fixed position such as a highchair and then physically moving the stimulus set forward and back, up and down, or right and left so that on each trial, the child must reorient to the position of the stimuli and will, therefore, be less likely to perseverate based solely on physical action; Lew, Hopkins, Owen, & Green, 2007).

Why Self and Gender Knowledge Might Not Matter

I predicted that children's visual preferences for same-sex and masculine/feminine faces would be related to their self and gender knowledge. Children's self awareness and knowledge about their own and others' gender category did not appear to be predictive of preferences for adult faces. Perhaps emerging knowledge of self and others is not relevant for 18- to 36-month-olds' gender preferences for adult faces because familiarity with females (or primary caregivers in general) is more important.

Conclusion

Toddlers' visual preferences for adult faces may be based more on real-world experiences with males and females than on same-sex preferences. Eighteen- to 36-

month-olds appear to be showing visual preferences based on familiarity/experience, particularly for less familiar faces (i.e., males). Future research should incorporate measures of real-world facial experience when examining infants' and children's visual preferences for faces. Examining older children's visual preferences for males and females could serve as an initial step to determining if children eventual exhibit visual preferences based on their own sex category membership or if they continue to show visual preferences based on their disproportionate experiences with males and females.

Visual preferences guide early cognitive and social development. Children attend more toward items that are relevant to their current needs (McArthur & Baron, 1983), and therefore, visually prefer some items over others. As children grow and change, so do their needs, and subsequently their preferences must adopt and change too. Investigating children's preferences during periods of transition (i.e., from infancy to childhood) can serve as a valuable tool for determining when and how their social and cognitive worlds might be changing.

Section 5: Endnotes

[1] For the photo identification task, three children only saw four distractor faces (instead of six), because I did not have a large enough sample of potential stimuli to match race/ethnicity at the time they participated. In these instances two faces repeated on the last trial, one from trial 1 and one from trial 2.

[2] For the preference tasks, two exceptions to the stated face-position order occurred. In one instance the female face appeared on the left three times in the high feminine female/high masculine male block, and in another instance the high feminine face appeared on the right three times during the high/low feminine female block. In both instances the order was only used for one child.

Section 6: Appendices

Appendix A

Tables and Figures

Table 1

Means, Standard Deviations, and Ranges of Ratings for Stimulus Faces and Paired-Samples t-tests Comparing Stimuli Sets for the Sex Labeling and Preference Tasks

Task/Rated Attribute	Face Pair	M (*SD*)	Range	Paired-Samples *t*-test
Sex Labeling Task				
Sex-Typicality	Males	3.84 (*.30*)	3.47-4.58	*t*(11) = .010
	Females	3.83 (*.31*)	3.53-4.64	
Preference Task				
Attractiveness	High Masculine Males	2.75 (*.51*)	2.10-3.33	*t*(3) = -.360
	High Feminine Females	2.76 (*.44*)	2.18-3.25	
Attractiveness	High Feminine Females	2.77 (*.52*)	2.38-3.52	*t*(3) = -.080
	Low Feminine Females	2.77 (*.62*)	2.35-3.66	
Attractiveness	High Masculine	2.75	2.33-	*t*(3) = .003

	Males	(*.56*)	3.55	
	Low Masculine Males	2.75	2.32-	
		(*.50*)	3.48	
	High Masculine	3.49	3.38-	
Masculinity	Males	(*.14*)	3.69	*t*(3) = .256
Femininity	High Feminine	3.46	3.00-	
	Females	(*.33*)	3.76	
	High Feminine	3.81	3.67-	
	Females	(*.22*)	4.13	
Femininity				*t*(3) = 11.067**
	Low Feminine	3.06	2.85-	
	Females	(*.17*)	3.23	
	High Masculine	3.91	3.31-	
	Males	(*.47*)	4.36	
Masculinity				*t*(3) = 10.879**
	Low Masculine Males	2.55	2.22-	
		(*.37*)	2.84	

** $p = .002$.

Table 2

Means and Standard Deviations for Perceived Femininity/Masculinity Ratings for Child Participants and Post Hoc Comparisons

	Femininity/Masculinity Ratings				
Group	N	M (*SD*)	Range	Tukey HSD	Cohen's *d*
Low	37	1.92 (*.34*)	1.23-2.33		
				$p < .001$	2.83
Medium	35	2.71 (*.20*)	2.38-3.00		
				$p < .001$	2.20
High	36	3.59 (*.53*)	3.03-4.88		

Table 3

Descriptive Statistics for Variables from the Experience Survey Participants

Experience survey variables	Boys					Girls				
	N	M (*SD*)	Range	Skewness	Kurtosis	N	M (*SD*)	Range	Skewness	Kurtosis
% of time with females	9	.666 (*.147*)	.489-.998	1.44	.72	9	.666 (*.124*)	.526-.917	1.23	1.06
Amount of attention toward female strangers[a]	9	.436 (*.134*)	.214-.688	.30	.33	11	.518 (*.181*)	.292-.875	.56	.12
Amount of attention toward male strangers[a]	9	.301 (*.176*)	.000-.625	.27	1.01	11	.457 (*.189*)	.125-.708	-.48	-.96
Amount of time with female strangers[b]	9	551.53 (*341.22*)	67.50-1108.13	.36	-.53	11	1272.44 (*1245.78*)	26.86-4058.75	1.23	1.14
Amount of time with male strangers[b]	9	259.65 (*274.15*)	0.00-742.50	.99	-.69	11	617.16 (*580.26*)	13.13-1736.88	.63	-.46

[a] *amount of attention was measured as an average of the percent of eye contact children had during interactions with strangers*
[b] *amount of time was measured as the average number of seconds of interactions with strangers*

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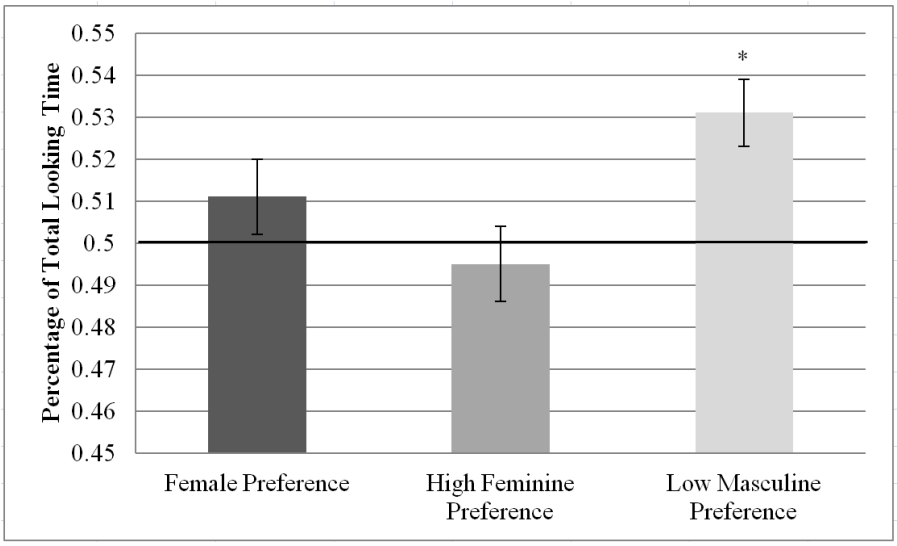

Figure 1. Percentage of total looking time (PTLT) compared to chance (50%) for the variables of "female-like" preference. PTLT scores reflect mean values with standard error bars. PTLTs above .50 reflect a preference for females over males, high feminine females over low feminine females, and low masculine males over high masculine males. PTLTs below .50 reflect preferences for males over females, low feminine females over high feminine females and high masculine males over low masculine males.

* $p < .05$.

Table 4

Results of Simultaneous Solution for the Regression of SDQ, Photo Identification, Sex Labeling of Adults, and Sex Labeling of Self on PTLT toward Females, High Feminine Females, and Low Masculine Males

				Predictors							
	Regression statistics			SDQ		Photo ID		Sex labeling of adults		Sex labeling of self	
Dependent variables	R^2	F	p	b	β	b	β	b	β	b	β
Boys											
PTLT to females	.073	.807	>.05	-.002	-.268	.002	.028	-.004	-.187	.012	.295
PTLT to high feminine females	.028	.293	>.05	-.002	-.204	-.007	-.074	.002	.061	.003	.055
PTLT to low masculine males	.098	1.11	>.05	-.002	-.286	.007	.087	-.005	-.230	.010	.226
Girls											
PTLT to females	.072	.995	>.05	-.002	-.200	.013	.136	.006	.211	-.002	-.030
PTLT to high feminine females	.077	1.06	>.05	-.003	-.328	-.008	-.110	-.001	-.038	.011	.274
PTLT to low masculine males	.051	.688	>.05	-.003	-.272	-.012	-.141	.003	.094	.011	.211

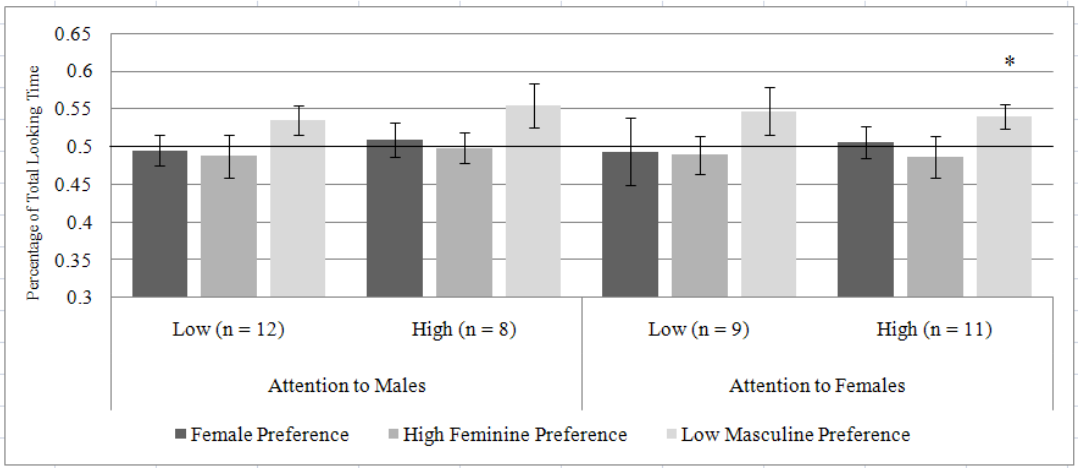

Figure 2. Percentage of total looking time (PTLT) compared to chance (50%) for children who had low (< the mean percentage) and high (> the mean percentage) amounts of attention toward males and females in the real-world. Attention was measured as the average percentage of eye contact children had with male and female strangers. PTLT scores reflect means values with standard error bars. PTLTs above .50 reflect a preference for females over males, high feminine females over low feminine females, and low masculine males over high masculine males. PTLTs below .50 reflect preferences for males over females, low feminine females over high feminine females and high masculine males over low masculine males.

* $p < .05$.

Appendix B

Infant-Individual Interaction Scale (IIIS) – modified toddler version

Participant Number _____

Individual (check one):

_____ Friend/Family name: _____

_____ Stranger (continue with age/gender/race information below)

Approximate age (check one):

_____ Birth-2 years _____ 2-6 years _____ 6-11 years _____ 11-20 years _____ 21-39 years _____ 40-59 years _____ 60 + years

Gender (check one):

_____ Female _____ Male

Race (check all that apply):

_____ Asian

_____ Black/African-American

_____ Middle Eastern

_____ Pacific Islander

_____ Spanish/Hispanic/Latino

_____ White

_____ Other _____

1. The amount of time the individual interacts with the child

_____ Interacts with the child for 10 seconds or less

_____ Interacts with the child for 10 seconds to one minute

_____ Interacts with the child for 1 to 5 minutes

_____ Interacts with the child for more than 5 minutes

2. The child's attention or interest toward the individual:

_____ Child made eye contact for less than 25% of the time

_____ Child made occasional eye contact for 25% to 50% of the time

_____ Child made eye contact for 50% to 75% of the time

_____ Child made eye contact for 75% or more of the time

Appendix C

Infant-Caregiver and Family Member Interaction Scale (ICFMIS) – modified toddler version

Name of individual interacting with child: _____

If caregiver, what is the child to caregiver ratio? _____

Date: _____ Participant Number: _____

Interaction Scenario	Approximate number of times the child and person engaged in this type of interaction today
1. Fleeting Involvement	
a. The person interacts with the child for less than 10 seconds	_____
b. The child engages in eye contact for less than 25% of the time	
2. Brief Involvement	
a. The person interacts with the child for 10 seconds to one minute	_____
b. The child made occasional eye contact for 25% to 50% of the time	
3. Moderate Involvement	
a. Person interacts with the child for 1 to 5 minutes	_____

b. The child engages in eye contact for 50% to 75% of the time

4. High Involvement
    a. The person interacts with the child for over 5 minutes
    b. The child engages in eye contact for over 75% of the time

Appendix D

Child Daycare Form (CDF) – for toddlers who attend day care on a regular basis

Participant Number: _____

Number of days the child attended day care this week: _____

Approximate amount of time (hours) the child was in daycare for each day:

_____

Instructors/Caregivers:

Total Number of Instructors/Caregivers: _____

Number of Males: _____ Number of Females:

_____

Approximate Age of Instructors/Caregivers (indicate number of individuals for each age range):

_____ 11-20 years _____ 21-39 years

_____ 40-59 years _____ 60 + years

Race/Ethnicity of Instructors/Caregivers (indicate number of individuals for each category):

_____ Asian

_____ Black/African-American

_____ Middle Eastern

_____ Pacific Islander

_____ Spanish/Hispanic/Latino

_____ White

_____ Other _____

Classmates/Other Children In Daycare (with whom the child interacts frequently):

Total Number of Children: _____

Number of Males: _____ Number of Females: _____

Approximate Age of Children (indicate number of individuals for each age range):

_____ Birth-2 years _____ 2-6 years _____ 6-11 years

Race/Ethnicity of Children (indicate number of individuals for each category):

_____ Asian

_____ Black/African-American

_____ Middle Eastern

_____ Pacific Islander

_____ Spanish/Hispanic/Latino

_____ White

_____ Other _____

Appendix E

Self Development Questionnaire

Participant Number: _____

Does your child… (check one for each item):

	Definitely has not	Has sort of	Definitely has
1. …ever use general evaluative terms about himself/herself (e.g. “I’m a good girl,” “Susie’s pretty”)?	_____	_____	_____
2. …ever resist your help by saying “do it myself,” “Cindy do it,” or the equivalent?	_____	_____	_____
3. …ever use general evaluative terms when talking about someone else (e.g. “bad dog,” “Johnny’s bad or mean”)?	_____	_____	_____
4. …ever says “I can’t”?	_____	_____	_____
5. …ever uses descriptive terms that contain some evaluation (e.g. “sticky hands,” point to toys and say “dirty” or “broken”)?	_____	_____	_____
6. …ever use his/her own name (e.g. “Give it to Andrew,” “Andrew’s truck”)?	_____	_____	_____
7. …ever insist on wearing certain clothing?	_____	_____	_____
8. …use the world “me”?	_____	_____	_____

9. …use the world “mine”?	_____	_____	_____
10. …know whether he/she is a boy or girl?	_____	_____	_____
11. …use the world “I”?	_____	_____	_____
12. …describe himself/herself by physical characteristics (e.g. curly hair)?	_____	_____	_____
13. …recognize himself/herself in the mirror (identify himself/herself by name; point to mirror when you say “where is _____?”)?	_____	_____	_____
14. …ever call attention to something about himself/herself like hair or clothing?	_____	_____	_____
15. …communicate likes and dislikes verbally?	_____	_____	_____
16. …recognize himself/herself in pictures?	_____	_____	_____
17. …ever call attention to something he/she did (e.g. “Look what I did”) or by gesture—showing you something she/he did?	_____	_____	_____
18. …ever assert his/her own will contrary to yours, just for the sake of being contrary?	_____	_____	_____
19. …ever resist physical intervention (e.g. diapering, dressing, kissing, picking up)?	_____	_____	_____
20. …ever resist your help by pushing your hands away or saying “no”?	_____	_____	_____
21. Does your child ever seem upset when calling your attention to something he/she has done wrong?		YES	NO

22. Does your child ever seem upset (ashamed, remorseful) when you find him/her doing something he/she shouldn't do and you show your disapproval?	YES	NO
23. Has he/she ever tried to hide the evidence of something he/she did that he/she wasn't supposed to do?	YES	NO
24. Has he/she ever called your attention to something he/she did that he/she wasn't supposed to do (e.g. pulled the TV knob off)?	YES	NO
25. Has your child ever inhibited himself/herself from doing something he/she obviously wanted to do because you were watching?	YES	NO

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Section 8: Curriculum Vitae

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EDUCATION:

M.A. (2012)	University of Nevada, Las Vegas Area: Experimental Psychology Thesis: Do toddlers exhibit same-sex preferences for adult facial stimuli? Advisor: Jennifer L. Rennels, Ph.D
B.A. (2005; highest distinction)	University of Nebraska-Lincoln Major: Psychology Minors: Mathematics, English, Political Science Honors Thesis: Auditory representation of visual data for blind and visually impaired students Advisor: John H. Flowers, Ph.D

CONFERENCE PRESENTATIONS / TALKS:

Noles, E. C., Rennels, J. L., & Kayl, A. J. (2012, June). Dynamic presentation does not augment infants' intermodal knowledge of males. Poster presented at the XVIII Biennial International Conference on Infant Studies, Minneapolis, MN.

Rennels, J. L., Kayl, A. J., & Davis, R. (2012, June). Age differences in infant categorization of male faces: Cumulative experience with female faces shapes male categories. Talk presented at the XVIII Biennial International Conference on Infant Studies, Minneapolis, MN.

Kayl, A. J. & Rennels, J. L. (2012, April). Toddlers' visual preferences for adults: The impact of gender knowledge and real-world experience. Poster presented at the Fifth Gender Development Research Conference, San Francisco, CA.

Kayl, A. J. & Rennels, J. L. (2011, July). Toddlers' preferences for same-sex adult facial stimuli. Poster presented at the 17th biennial Australasian Human Development Association conference, Dunedin, New Zealand.

Rennels, J. L., Juvrud, J., & Kayl, A. J. (2011, July). How facial appearance, health, and sex-typed attributes are related. Poster presented at the 17th biennial Australasian Human Development Association conference, Dunedin, New Zealand.

Rennels, J. L. & Kayl, A. J. (2010, May). Beauty is positive: The relationship between attractiveness and perceived emotional expression. Poster presented at the 22nd annual convention for the Association for Psychological Science, Boston, MA.

Glover, V., Rennels, J. L., Kayl, A., & Cummings, A. J. (2010, March). Improving infant recognition of male faces. Poster presented at the XVII Biennial International Conference on Infant Studies, Baltimore, MD.

Rennels, J. L., Kayl, A., Cummings, A. J., & Glover, V. (2010, March). Infants categorize prototypical faces by sex but rely on femininity cues to categorize less prototypical faces. Poster presented at the XVII Biennial International Conference on Infant Studies, Baltimore, MD.

Rennels, J. L., Glover, V., Cummings, A. J., & Kayl, A. (2010, March). How infants represent faces. Poster presented at the XVII Biennial International Conference on Infant Studies, Baltimore, MD.

Rennels, J. L., Cummings, A. J., Glover, V. A., & Kayl, A. J. (November, 2008). Infant categorization of males and females. For experimental proseminar, Department of Psychology, University of Nevada, Las Vegas, NV.

Ramsey-Rennels, J. L., & Kayl, A. J. (March, 2008). Faces are rated similarly regardless of static or dynamic presentation. Poster presented at Graduate & Professional Student Research Forum, University of Nevada, Las Vegas, NV.

Ramsey-Rennels, J. L., & Kayl, A. J. (May, 2007). Faces are rated similarly regardless of static or dynamic presentation. Poster presented at the Association for Psychological Science 19th annual Convention, Washington, D.C.

Glover, V. A. & Kayl, A. J. (February, 2007; September, 2007; March, 2008; March 2010; February, 2011). Baby and child rebel lab: Methodological considerations when studying infants. For research methods in social sciences course, College of Southern Nevada, Las Vegas, NV.

AWARDS / GRANTS:

Graduate & Professional Student Association Travel Grant – University of Nevada, Las Vegas, April, 2012.

Graduate & Professional Student Association Travel Grant – University of Nevada, Las Vegas, June, 2012.

Graduate & Professional Student Association Travel Grant – University of Nevada, Las Vegas, July, 2011.

Graduate & Professional Student Association Travel Grant – University of Nevada, Las Vegas, May 2010.

Graduate & Professional Student Association Travel Grant – University of Nevada, Las Vegas, March 2010.

Graduate & Professional Student Association Travel Grant – University of Nevada, Las Vegas, June 2009.

Graduate & Professional Student Association Travel Grant – University of Nevada, Las Vegas, May 2007.

TEACHING EXPERIENCE:

PSY 101: Introduction to Psychology (2 sections), Fall 2008

PROFESSIONAL AFFILIATIONS:

Association for Psychological Science (2007-present)

International Society of Infant Studies (2010-present)

ACTIVITIES AND HONORS:

Graduate & Professional Student Association Department Representative (2009-2010)
Experimental Student Committee (Vice President 2007-2008, Secretary 2008-2009)
Developmental Emphasis Committee – Student Representative (2008-present)
Phi Beta Kappa member (2005-present)
Psi Chi : National Honor Society in Psychology (2003-present)
University of Nebraska-Lincoln Honors Program (2000-2005)
University of Nebraska-Lincoln Dean's List (2000-2005)
Regents Scholarship (2000-2004)
Peter Kiewit Foundation Distinguished Scholar Program (2000-2004)
Wolfe Award Outstanding Undergraduate Psychology Major Honorable Mention (2004)