Judging by Appearance: Children's Face-Based Trust Judgments

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Abstract

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Full Text

Judging a Book by Its Cover: Children's Trust Judgments Based on Facial Features

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Abstract: Children can make trust judgments based on facial features as quickly as adults. Such face-based trust judgments play a crucial role in children's knowledge acquisition, social adaptation, and self-protection. The facial features influencing children's trust judgments include gender, race, facial attractiveness, trustworthiness, competence, dominance, and emotional expressions. These facial features may affect trust judgments through four pathways:

perceptual foundation, emotional affect, general cognitive abilities, and social experience. Based on previous research, we propose a model of children's face-based trust judgments. Future research directions include: 1) improving research methodologies; 2) exploring developmental characteristics of children's trust judgments based on facial features; and 3) investigating the mechanisms through which facial features influence children's trust judgments to refine the theoretical model.

Keywords: trust judgments, facial features, facial attractiveness, facial trustworthiness, children

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We are taught from an early age not to judge people by their appearance, yet in social interactions, individuals form first impressions from faces within milliseconds [?, ?, ?, ?, ?], which subsequently influences trust judgments [?, ?, ?, ?, ?, ?, ?]. Trust judgment refers to an individual's assessment of whether another person and their statements are trustworthy based on various cues in a specific context [?, ?]. Children's face-based trust judgments continue to develop throughout childhood. The ability to make face-based trust judgments is essential for self-protection and social adaptation and has attracted considerable research attention. However, no comprehensive review has systematically examined the facial features affecting children's trust judgments, their development, and underlying mechanisms. Therefore, this paper aims to synthesize the processes, development, and mechanisms of children's face-based trust judgments to better understand how facial features influence children's trust decisions. This will not only deepen our understanding of children's trust judgments but also reveal when and how individuals use faces as important information for trust decisions.

Research on children's trust judgments primarily employs economic trust games, the "conflicting sources" paradigm, and its variants [?, ?, ?, ?, ?]. Economic trust games are classic paradigms for measuring trust, focusing on testing trust *in* a trustee and measuring social trust. In this game, Player A can invest money with Player B, who receives triple the amount and then decides how much to return. The investment and return amounts serve as behavioral indices of trust and trustworthiness, respectively. Scholars have applied this paradigm to study how faces influence trust decisions [?, ?, ?] by manipulating the trustworthiness of players' faces to observe differences in investment and return amounts. The "conflicting sources" paradigm is a classic selective trust paradigm that measures trust *in* a trustee's statements or testimony, focusing on epistemic trust [?, ?]. Developed by Koenig et al. (2004), this paradigm assesses factors influencing children's selective trust, such as gender [?, ?], emotional expression [?, ?], and attractiveness [?, ?]. The paradigm typically consists of two phases: a familiarization phase and a test phase. During familiarization, researchers manipulate informants' features, presenting them with contrasting characteristics (e.g., high vs. low attractiveness) [?, ?, ?]. The test phase then measures children's trust in different informants through various questions.

Although research shows that facial features affect children's trust judgments, several challenges remain. First, existing studies examine different facial features (e.g., gender, expression, facial attractiveness, trustworthiness) but lack a systematic framework, making it difficult to draw comprehensive conclusions. Second, current theories explaining how faces influence social judgments—from evolutionary, cognitive, and sociocultural perspectives—focus primarily on adults, limiting our understanding of the mechanisms underlying children's face-based trust judgments. Third, research findings are contradictory; some studies show that facial features significantly influence children's trust judgments [?, ?, ?], while others find weak effects [?, ?]. Finally, most evidence comes from Western cultural contexts, yet studies from other cultural backgrounds—such as India [?, ?], Egypt [?, ?], and Iran [?, ?]—suggest that sociocultural environments may influence face-based trust judgments, a factor that remains underexplored.

Given these limitations, this paper systematically reviews the facial features and mechanisms affecting children's (ages 3–12) trust judgments from two perspectives. First, we synthesize empirical research on facial features influencing children's trust judgments (Table 1), focusing on seven aspects: gender, race, facial attractiveness, trustworthiness, competence, dominance, and expressions. Second, we examine the development and potential mechanisms of children's face-based trust judgments and propose a model of how facial features influence children's trust judgments (Figure 1 [Figure 1: see original paper]). Finally, we suggest directions for future research.

[Figure 1: see original paper]

2. Facial Features Influencing Children's Trust Judgments

Faces convey multiple types of information, such as attractiveness, intentions, or emotions [?, ?]. When encountering strangers, faces serve as important cues for trust judgments, and people appear willing to make trust decisions based on appearance [?, ?]. Hassin and Trope (2000) found that approximately 75% of people believe personality can be inferred from faces, a process that takes only tens of milliseconds [?, ?, ?, ?, ?, ?, ?]. The literature has used diverse classifications of facial features; based on previous research, we categorize features influencing children's trust judgments into static features (including biological and social features) and dynamic features (expressions).

2.1 Biological Features of Faces

Biological features include gender, age, and race, which also provide social category information [?, ?, ?]. Through social categorization from faces, children easily classify others as in-group or out-group members. According to developmental intergroup theory, when children can identify with a group and distinguish group membership, in-group preferences emerge, such as same-gender preference [?, ?, ?], the other-race effect [?, ?], and the own-age bias [?, ?, ?].

Few studies have examined how facial age influences children's trust judgments, and the limited existing literature finds no own-age bias in children's trustworthiness judgments [?, ?, ?]. Therefore, we focus our analysis on gender and race.

2.1.1 Gender Children demonstrate same-gender preference by choosing to trust informants of their own gender [?, ?], which influences trust judgments. For example, Ma and Woolley (2013) examined 4- and 6-year-olds' trust judgments about contradictory testimony from male and female informants regarding the functions of differently colored objects. They hypothesized that children would trust males about blue objects and females about pink objects. Contrary to expectations, both 4- and 6-year-olds showed strong same-gender preferences, trusting same-gender informants regardless of object color.

Using the conflicting sources paradigm, researchers have consistently found that 3- to 8-year-olds choose to trust same-gender informants and their testimony when no other valid judgment cues are available [?, ?, ?, ?, ?].

Although same-gender preference influences children's trust judgments of different-gender informants when other information is lacking [?, ?], this effect diminishes when epistemic cues (e.g., knowledge states) are available. Taylor (2013) found that 4- to 7-year-olds trusted opposite-gender informants who provided reliable information over same-gender informants who provided unreliable information. Similarly, Terrier et al. (2016) found that 3- to 4-year-olds preferred to trust opposite-gender informants who had seen objects over same-gender informants who had not. Children aged 3–5 prioritized expertise over gender when determining who knew more about specific occupations [?, ?], and 6- to 8-year-olds preferred opposite-gender experts over same-gender non-experts [?, ?]. Mirtaheri et al. (2023) found that after providing explicit epistemic cues (accuracy), children's trust judgments were unaffected by informant gender. Thus, while same-gender preference influences initial trust judgments, children can make more rational decisions based on task requirements when additional information is available.

These studies demonstrate that gender influences children's trust judgments, but few have examined how facial sexual dimorphism affects trust judgments. Facial dimorphism refers to masculine or feminine facial features developed after puberty [?, ?]. Children may prefer more feminine faces over same-gender preferences in trust judgments. For instance, Chen et al. (2018) used trust games to examine whether preschoolers' trust decisions about partners were influenced by facial dimorphism, finding that preschoolers showed more trusting behavior toward feminine faces and less toward masculine faces. Adult findings are more complex: women, but not men, trust more masculine-looking men more [?, ?]. Thus, gender and facial dimorphism may differentially influence children's trust judgments. Future research should explore the interactive effects of facial gender and dimorphism—for example, how highly feminine male faces or highly masculine female faces influence children's trust judgments. Additionally, dif-

ferent task contexts may affect trust judgments of different facial features. Luo et al. (2023) set up donation and investment scenarios, finding that adults donated to feminine faces but invested in masculine faces, suggesting that people weigh warmth and competence traits differently across contexts, affecting trust judgments of strangers. Future studies should examine how children trust dimorphic faces across different situations.

Furthermore, gender's influence on children's trust judgments may vary across sociocultural contexts. Children learn culturally defined gender concepts from birth. Gender schemas, as cognitive structures, are shaped by social environments [**?**, **?**], including parenting [**?**, **?**], schooling [**?**, **?**], and media [**?**, **?**]. In empirical research, gender schemas are conceptualized as sex-typing [**?**, **?**], encompassing various gender-related cognitive structures [**?**, **?**] such as gender role attitudes, stereotypes, and preferences. Bigler (1997) used sex-typing to represent children's gender categorization of themselves and others, which influences their social information processing [**?**, **?**] and consequently their trust judgments of different-gender informants. Taylor (2013) examined how sex-typing influenced 4- to 7-year-olds' trust judgments, finding that American girls with higher self-sex-typing scores (i.e., more feminine preferences) were more likely to trust female informants, regardless of reliability. Mirtaheri et al. (2023) replicated this study in Iran, finding that Iranian girls with higher sex-typing scores (i.e., more feminine) trusted male informants more. Additionally, Shenouda and Danovitch (2014) found that Egyptian children had greater difficulty attributing occupation-related knowledge to counter-stereotypical gender experts, suggesting they were more influenced by gender than American children in trust judgments. Thus, different cultural gender beliefs shape children's trust judgments of different-gender informants.

2.1.2 Race The other-race effect leads to in-group favorism [**?**, **?**], making individuals more likely to trust own-race faces. Research shows that infants display preferences for own-race faces at 3 months [**?**, **?**]. McDonald and Ma (2016) examined preschoolers' credulity toward false testimony, finding that 4-year-olds trusted false testimony from own-race informants while doubting it from other-race informants. Li et al. (2016) investigated trust in Chinese and White women among children with autism, finding that both autistic and typically developing children preferred own-race faces. Although race significantly influences children's trust judgments, research specifically examining racial facial features is limited, with most studies focusing on non-facial variables related to race and their interactions.

Individuals typically infer race from faces, language (including dialects and accents). Research on race-based trust judgments also includes language effects. Speakers' language provides information about nationality, social identity, and race [**?**, **?**, **?**, **?**]. Current research focuses on how different accents (e.g., Spanish vs. native accents) among speakers of the same language (English) influence children's trust judgments, finding that preschoolers trust native-accented speakers

more than foreign-accented speakers when learning new information [?, ?, ?]. When face and accent conflict, accent may outweigh face in influencing children's trust judgments. Kinzler et al. analyzed accent preferences in social judgments from a cognitive-evolutionary perspective, experimentally manipulating informants' faces and accents. They found that 4- to 5-year-olds trusted other-race faces with native accents over own-race faces with foreign accents [?, ?, ?], suggesting accent may have greater influence than face.

These race-related studies come exclusively from Western populations, and their applicability to Western cultural contexts requires further investigation. Understanding how racial facial features influence Chinese children's trust judgments within Chinese cultural contexts demands deeper exploration.

2.2 Social Features of Faces

Inferences about faces' social features are rapid, necessary, and universal [?, ?]. Todorov and colleagues have extensively examined facial social features, proposing two-dimensional and three-dimensional models and recently identifying seven facial features through computational modeling: attractiveness, competence, dominance, extraversion, likability, threat, and trustworthiness [?, ?, ?, ?]. Empirical research on facial social features influencing children's trust judgments primarily focuses on facial attractiveness, trustworthiness, competence, and dominance (see Table 1).

2.2.1 Facial Attractiveness Facial attractiveness refers to perceptions of facial beauty [?, ?] and influences trust judgments [?, ?]. Like adults, children use facial attractiveness as a heuristic cue for trust judgments about strangers.

Children may choose to trust more attractive informants, showing preferences for seeking information from and trusting their testimony. Using the conflicting sources paradigm, researchers have found that preschoolers endorse labels for novel objects from more attractive informants [?, ?, ?]. Bascandziev and Harris (2016) examined how facial attractiveness influenced 4- to 5-year-olds' trust judgments across three conditions (same attractiveness/different accuracy, same accuracy/different attractiveness, different attractiveness/different accuracy). They found that when accuracy was equal, children trusted more attractive informants. However, Tang et al. (2019) found that when both informants had 50% accuracy, preschoolers did not show selective trust in more attractive informants.

Epistemic cues about informants may influence children's attractiveness-based trust judgments, but findings are inconsistent. Tang et al. (2019) asked children to make trust judgments about names for synthetic objects from informants differing in accuracy (50% vs. 50%, 25% vs. 75%) and attractiveness (high vs. low). When the high-attractiveness informant had 25% accuracy, children trusted the low-attractiveness informant with 75% accuracy. When children had relevant knowledge, attractiveness effects weakened. However, Bascandziev and Harris

(2016) found that 4- to 5-year-olds showed no clear preference between low-attractiveness/high-accuracy and high-attractiveness/low-accuracy informants, with selective trust more influenced by attractiveness than accuracy. This suggests attractiveness and accuracy may be equally important in children's information judgments. Differences between these studies in participant groups, materials, and procedures may explain inconsistent results, warranting future research on the dynamic influence of attractiveness on children's trust judgments.

2.2.2 Facial Trustworthiness Facial trustworthiness refers to perceptions of how trustworthy a face appears [**?**, **?**] and is an important indicator of trust judgments [**?**, **?**]. Todorov et al. (2009) found that individuals can judge facial trustworthiness within 100ms, suggesting an automatic, non-rational process. Some studies conceptually fail to distinguish between trustworthiness judgments and trust judgments based on trustworthiness, using "trust judgment" conceptually while operationally asking participants to rate trustworthiness. Trustworthiness judgment is a face-to-trait process (implicit impression), a social feature of faces; trust judgment based on trustworthiness is a face-to-trait-to-trust process (explicit behavior), with facial trustworthiness being one feature influencing trust. This paper focuses on explicit behaviors reflecting children's face-to-trait-to-trust judgments.

Individuals prefer trustworthy over untrustworthy faces [**?**, **?**]. In trust games, people invest more in trustworthy-looking partners. Ewing et al. (2015) used economic trust games to examine whether 5- and 10-year-olds, like adults, more easily trust trustworthy-looking partners. They found that children, like adults, trusted trustworthy-looking partners more, investing tokens in high- rather than low-trustworthiness faces. Siddique et al. (2022) used multi-round trust games and found that 8- to 10-year-olds also invested more in trustworthy-looking partners. In social interactions, children prefer trustworthy-looking strangers, believing they are more likely to keep promises [**?**, **?**], help others, or share toys [**?**, **?**, **?**]. Mondloch et al. (2019) used storybook methods to study children's use of facial features in cooperative tasks, finding that 4- to 11-year-olds chose trustworthy-looking partners for challenges, believing they would keep treasure secrets and not steal cloaks. Additionally, children may generalize from facial trustworthiness to knowledge states: Palmquist et al. (2020) found that 4- to 5-year-olds believed trustworthy-looking people were more familiar with object functions. However, Li et al. (2016) found no significant correlation between selective trust and facial trustworthiness in 4- to 8-year-olds with autism and 5- to 7-year-olds with typical development.

Children's trustworthiness-based trust judgments change dynamically through social interaction. Siddique et al. (2022) adapted the classic trust game using multi-round economic trust games to examine how 8- to 10-year-olds' trust judgments based on facial trustworthiness and behavior (partner fairness) changed across rounds and whether they could overcome trustworthiness impressions. Results showed that children's initial trust judgments were influenced by part-

ners' facial trustworthiness, preferring to invest in trustworthy-looking partners. However, after further interaction and experiencing fair or unfair returns, children could overcome facial trustworthiness effects, making new trust judgments based on partners' behavioral fairness. These findings indicate that children's trustworthiness-based trust judgments are complex processes influenced by multiple factors, and that children may gradually overcome facial trustworthiness effects through social interaction, making more rational trust judgments based on behavioral characteristics.

2.2.3 Other Social Features of Faces Competence and dominance are important facial features that significantly influence various adult social decisions (e.g., elections, employment) and are more specific than attractiveness and trustworthiness. These features have received limited attention in children [**?**, **?**], yielding unclear conclusions. Some research indicates that children can recognize competence and dominance from faces by age 3 but cannot use these features to make behavior-consistent judgments until age 5 [**?**, **?**]. Charlesworth et al. used forced-choice paradigms to examine whether children judged others' behaviors based on different facial features, finding that 5-year-olds could select faces with different features according to task contexts. Specifically, they believed dominant-looking faces were more likely to perform dominant behaviors (e.g., lifting heavy objects, leading games), while competent-looking faces were more likely to perform competent behaviors (e.g., drawing the best picture). However, children preferred to give gifts to submissive-looking (low-dominance) individuals. Mondloch et al. (2019) used storybook methods to examine children's use of facial features in cooperative tasks, finding that 4- to 11-year-olds chose high-dominance partners for challenges, believing they would fight dragons and move boulders. However, contradictory evidence exists: Palmquist et al. (2020) found that children under 5 were not sensitive to competence-related facial features and could not use facial competence to infer others' knowledge states, instead relying on facial trustworthiness.

2.3 Emotional Expressions

Expressions play a key role in social interaction, are directly perceivable, and largely determine individuals' trust impressions of others [**?**, **?**, **?**], influencing trust judgments. Research shows that smiles represent sincerity and friendliness, earning more trust. Adults tend to trust individuals with positive expressions, with smiling trustees receiving more coins in trust games [**?**, **?**]. Angry faces, conversely, are perceived as unfriendly and receive lower acceptance rates in ultimatum games [**?**, **?**].

Children's trust judgments are similarly influenced by facial expressions, preferring positive expressions in interpersonal interactions. They give more tokens to positive-expression partners. Ewing et al. (2019) used economic trust games to examine how facial expressions influenced 5- to 12-year-olds' trust judgments, finding that children from age 5 showed adult-like preferences, trusting happy

over angry faces. In more complex social interaction games, expression effects become more complex. Mondloch et al. (2019) used storybook methods to examine partner selection in cooperative tasks, finding that 4- to 11-year-olds trusted happy over angry or fearful partners, while Van Der Zant et al. (2021) found that 5- to 8-year-olds did not prefer positive-expression partners like adults did, considering happy and neutral expressions equally trustworthy. Additionally, children believed positive-expression faces were more likely to keep secrets [**?**, **?**] and keep promises [**?**, **?**].

Expressions also influence children's knowledge learning. Clément et al. (2013) used computer-generated faces expressing happiness, anger, or neutrality in a selective trust paradigm, providing different verbal labels for an unknown object. They found that 3- to 5-year-olds preferred labels from happy over angry faces. In another study, 4- to 5-year-olds trusted positive-expression individuals and their testimony over negative-expression individuals [**?**, **?**]. These findings indicate that children prefer to obtain information from positive-expression individuals, as happiness and anger convey cooperative intentions that likely play important roles in information gathering [**?**, **?**].

Notably, facial expressions not only directly influence children's trust judgments but also moderate their judgments of other social features. Research shows that children's trustworthiness judgments are modulated by expressions: angry expressions decrease perceived trustworthiness, while happy expressions increase it [**?**, **?**, **?**, **?**]. This effect strengthens with age, with angry expressions having stronger effects than happy ones. Similar patterns appear in children with autism, who consider angry faces untrustworthy and happy faces trustworthy [**?**, **?**]. The same emotion can differentially modulate facial features: anger decreases trustworthiness but increases dominance [**?**, **?**, **?**].

3. Development of Children's Face-Based Trust Judgments

Based on the face-based trust judgment model (Figure 1), we decompose children's face-to-trust judgment process into face-to-trait-to-trust judgment. Thus, developmental trends can be analyzed from two perspectives: 1) age differences in face-to-trait judgments (first impressions); and 2) age differences in trait-to-trust judgments combined with task demands.

First, children's recognition of biological features and expressions generally precedes recognition of social features. Research shows that infants from a few months old differentially respond to gender [**?**, **?**], race [**?**, **?**], age [**?**, **?**], and expressions [**?**, **?**] in human faces, while social feature judgments emerge after age 3 [**?**, **?**, **?**]. Children's social feature judgments follow a pattern from global valence judgments to specific feature judgments. Younger children tend to judge based on global face valence (e.g., good vs. bad) and cannot identify specific features [**?**, **?**, **?**]. With age, children can distinguish different facial features. Additionally, developmental timing differs across features: social feature judgments precede epistemic feature judgments. Jessen and Grossmann found

that infants are sensitive to attractiveness and trustworthiness [?, ?, ?], while competence and dominance impressions emerge around age 3 [?, ?]. Cogsdill et al. (2014) also found that competence judgments develop later than trustworthiness and dominance judgments. These abilities develop throughout childhood, reaching adult-like levels between ages 10 and 13 [?, ?, ?, ?].

Second, children's face-based trust judgments evolve from initial valence-based inferences to the ability to use specific facial features according to task demands [?, ?]. Charlesworth et al. (2019) found that 3- to 4-year-olds tend to predict others' behaviors based on facial valence, while 5-year-olds can predict specific behaviors based on different facial features. However, the relationship between facial features and valence is complex and changes throughout childhood [?, ?]. Children's recognition of social features develops earlier than epistemic features. Younger children more easily make social or epistemic trust judgments based on social features like attractiveness or trustworthiness [?, ?, ?]. With age, children become more sensitive to different features and can flexibly switch between attending to epistemic features (e.g., competence) and social features based on task goals (epistemic vs. social). During early childhood, children believe that trustworthy or attractive faces indicate greater knowledge [?, ?] and tend to trust information from trustworthy or attractive strangers [?, ?]. Differences also emerge across tasks: in social trust judgments (e.g., who they prefer to interact with), children from early ages trust valence-positive faces (e.g., high trustworthiness or attractiveness), with little age-related change; in epistemic trust tasks (e.g., whose information to trust), young children infer others' epistemic states from social features [?, ?, ?], but with age become more sensitive to different features and can select matching features according to task demands.

Moreover, a developmental lag exists between face-to-trait and trait-to-trust judgments [?, ?]. Face-to-trait judgments are more direct and develop earlier, while trait-to-trust judgments require understanding the relationship between tasks and features, developing later. Research suggests children may only use facial feature information in trust judgments after age 5 [?, ?].

4. Mechanisms of Facial Features Influencing Children's Trust Judgments

Trust socialization begins in the first years of life. Analyzing mechanisms of children's face-based trust judgments helps reveal how faces influence human trust decisions. Although no studies have systematically examined the mechanisms underlying children's face-based trust judgments, research on mechanisms influencing adults' social judgments typically adopts evolutionary [?, ?, ?, ?, ?], cognitive [?, ?, ?, ?], and sociocultural perspectives [?, ?]. Many empirical studies show that children's face-based trust judgments exhibit adult-like trends from early childhood, reaching adult levels by late childhood. This similarity suggests common mechanisms across development (e.g., evolutionary perspectives), while continued development throughout childhood indicates unique de-

velopmental mechanisms, such as the development of face perception, general cognitive abilities, and accumulated social experience. Based on this, we synthesize four mechanisms: perceptual foundation, emotion and affect, general cognitive abilities, and social experience.

4.1 Perceptual Foundation

The two most widely used theories to explain how faces influence social judgments are evolutionary and cognitive perspectives. Although they differ in explanation, both discuss how and why facial structures influence social judgments. Facial structures such as averageness, symmetry, sexual dimorphism cues, and skin tone influence perceptions of attractiveness and trustworthiness [?, ?, ?, ?]. People prefer faces with high averageness [?, ?], strong symmetry [?, ?], high femininity [?, ?, ?], reddish skin [?, ?], and smoothness [?, ?], and trust groups with these features more. These structural features directly affect face perception, influencing trust judgments.

The evolutionary perspective explains preferences for these facial structures from a reproductive standpoint. Facial impression systems may have been constructed through long evolutionary adaptation [?, ?, ?, ?]. Over millennia, face-based trust judgments helped individuals quickly identify potential threats or benefits [?, ?], increasing survival and reproduction opportunities. Individuals tend to trust faces representing good genes and health [?, ?], with perceptual preferences for these features being products of evolution, emerging early in development. The cognitive perspective explains these preferences from a cognitive resource-saving angle [?, ?]. Using heuristic judgments based on facial features saves cognitive resources [?, ?]. When lacking reputation or behavioral information, forming impressions of intentions from faces reduces cognitive load and facilitates social interaction and self-protection [?, ?, ?, ?, ?]. Both perspectives essentially address how perceptual foundations of facial structures influence trust judgments, suggesting that perceptual foundations may be the primary mechanism affecting children's trust judgments.

4.2 Emotion and Affect

Facial features convey emotion, and attractive faces activate the brain's reward system [?, ?]. Facial evaluation represents an overgeneralization of emotional expression capabilities [?, ?]. According to the emotion overgeneralization hypothesis [?, ?], even neutral faces can trigger emotional responses in perceivers. Baccolo et al. (2020) found that facial trustworthiness judgments correlate with emotion understanding. Neuroscience evidence shows that trustworthiness judgments of both emotional and neutral faces involve the amygdala [?, ?, ?], an emotion center, suggesting that face evaluation is supported by underlying emotion perception mechanisms [?, ?].

Emotion influences trust judgments [?, ?] through complex mechanisms. Affect-as-information theory posits that emotion interacts with cognitive reasoning and

memory processes [**?**, **?**], affecting trust judgments. Different emotional states trigger specific cognitive strategies [**?**, **?**]. Positive emotions may lead to heuristic judgments based on impressions activated by facial features (global processing), while negative emotions may increase systematic information processing (detail-oriented processing). Empirical research supports this theory but with some inconsistencies. Zhao et al. (2017) found that individuals in positive moods relied more on partners' facial features, trusting attractive over unattractive faces, while those in negative moods showed no attractiveness effects. However, Dong et al. (2014) manipulated trustors' emotional states and found no effect on trust judgments of different facial expressions, challenging affect-as-information theory. They argued that happy faces are trusted more than sad or neutral faces regardless of perceiver mood.

Comparing these studies, Zhao et al. (2017) induced emotion by having participants recall and write about happy or sad events, while Dong et al. (2014) used happy or sad music/film clips. Different induction methods may affect controlled appraisals of emotion, producing differences. The appraisal-tendency framework [**?**, **?**] suggests that beyond emotional valence and cognitive appraisal [**?**, **?**], controlled appraisals of emotion moderate its effect on trust. Specifically, emotions appraised as other-controlled (e.g., gratitude) increase trust, while negative-valence emotions (e.g., anger) decrease trust; self-controlled emotions (e.g., pride, guilt) and environmentally-controlled emotions (e.g., sadness) have weaker effects on trust.

In summary, trustees' facial features activate trustors' emotional responses, influencing trust judgments. Trustors' own emotional states and appraisals are important moderators. When trustors appraise their emotions as other-controlled, valence activated by facial features affects trust judgments: positive-valence features increase trust, negative-valence features decrease trust. When emotions are appraised as self- or environmentally-controlled, facial feature-activated valence has weaker effects on trust judgments.

4.3 General Cognitive Abilities

Analyzing the process of children's face-based trust judgments (Figure 1), perceptual foundation and emotion primarily operate in the face-to-trait process, while general cognitive abilities mainly function in the trait-to-trust judgment process. To successfully make trust judgments about different faces, children must remember information provided by different strangers and understand others' mental states. When task demands vary, children must flexibly switch and match between task requirements and facial features. These processes require general cognitive abilities (e.g., memory, language, executive function), which develop rapidly between ages 3–5, a period when children's face-based trust judgments also change significantly. Therefore, researchers have proposed theoretical hypotheses linking selective trust with general cognitive abilities [**?**, **?**]. General cognitive development theory suggests that face perception matures early in childhood, with subsequent task performance improvements reflecting

enhancements in attention, explicit memory, and task strategy abilities [?, ?]. Theory of mind and executive function may also be important developmental mechanisms influencing how facial features affect children's trust judgments [?, ?].

Researchers have preliminarily explored relationships between selective trust, theory of mind, and executive function, but findings are inconsistent. Lucas et al. (2013) compared social-cognitive processes in selective trust among preschoolers from Turkey, China, and the UK, measuring selective trust, false belief, and executive function. They found selective trust correlated with false belief in Turkish but not Chinese children, and found no association between selective trust and executive function. Chinese samples provide inconsistent evidence. Ding et al. (2017) conducted a seven-month longitudinal study of selective trust, theory of mind, and executive function in 3- to 5-year-old Chinese preschoolers. Cross-lagged regression analyses showed no concurrent or longitudinal association between selective trust and theory of mind, suggesting children's judgments of different informants are not statistically related to understanding others' mental states. Results also showed selective trust positively predicted executive function one year later, but earlier executive function did not predict later selective trust. This suggests that selective trust development influences executive function development, not vice versa. This provides a plausible alternative to general cognitive development theory: as children's selective trust improves, they better attend to and remember informants' features, extract memories more effectively when facing unknown domains, and better monitor and control themselves to choose reliable informants, promoting attention, working memory, inhibitory control, and cognitive flexibility. These empirical findings challenge existing theoretical assumptions, warranting more research on the relationship between children's trust judgments and general cognitive abilities, particularly face-based trust judgments.

4.4 Social Experience

One mechanism underlying developmental changes in face-based trust judgments may be changes in individuals' experience with associations between facial features and target behaviors [?, ?]. The process from encountering faces to making trust judgments involves facial experience and understanding of features and trust, which require extensive and complex social interaction and experience [?, ?, ?]. Children accumulate knowledge about different facial features and learn associations between features and social behaviors through social interaction, a learning process critical for first impression formation [?, ?]. Face-space theory assumes that face perception is experience-dependent and continuously adjusted throughout life [?, ?]. Studies show that children from different sociocultural backgrounds make different trust judgments about gender and race [?, ?, ?, ?, ?], indicating that social experience influences judgments of unfamiliar faces [?, ?, ?].

Individuals' visual experience with faces influences mental representations [?, ?].

Facial experience forms through interaction with others, and children's trust and facial experience both originate from close caregivers [**?**, **?**]. Since children obtain limited facial experience from significant others, and experience shapes facial preferences \cite{Heron-Delaney et al., 2018}, children's face perception differs from adults', with evaluations of the same face varying [**?**, **?**]. Cooper et al. (2006) found that daily exposure to facial proportions influences attractiveness perception, with people of all ages finding most familiar proportions most attractive. Children aged 4–9 found low-positioned features most attractive, while 12-year-olds and adults preferred average-positioned features. Differences in facial experience between children and adults may be a primary source of differences in face-based trust judgments.

Facial experience may influence trust judgments through two pathways. First, trustees' faces activate trustors' facial memories: positive memories increase trust, negative memories decrease trust. Second, perceived familiarity from faces also influences trust judgments. Research on children's advertising provides evidence: familiar characters induce positive emotions, provide memory cues for products, and elicit good recall and recognition of advertised figures [**?**, **?**]. Studies show that 3- to 5-year-olds trust information from more familiar over less familiar people [**?**, **?**, **?**].

5.1 Summary

Trust judgment is a necessary cognitive ability for social life, and facial features have received widespread attention as important factors influencing trust judgments. This paper reviewed how seven facial features—gender, race, attractiveness, trustworthiness, competence, dominance, and expression—affect children's trust judgments. Overall, when facing strangers, children show selectivity for different facial features, tending to trust strangers who are similar to them (same gender or race) and those with positive features (positive expression, high attractiveness, high trustworthiness).

Beyond reviewing facial features and mechanisms, this paper addresses a major issue in previous literature: the unclear process of face-based trust judgments. Many studies conflate trust judgments with trustworthiness judgments, leading to conceptual confusion between feature judgments and trust judgments. Our proposed model (Figure 1) distinguishes this process into two stages: face-to-trait-to-trust judgment. The face-to-trait process constitutes first impression formation, determining the trait-to-trust judgment process. This distinction helps clarify mechanisms and developmental processes. The face-to-trait process is rapid and non-rational, involving perceptual foundations of facial structures and emotional experiences evoked by faces. The trait-to-trust judgment process involves understanding tasks, relationships between features and behaviors, and trust itself, requiring certain cognitive levels and reflecting the ongoing development of children's face-based trust judgments. Additionally, social experience is an important mechanism for developmental change, originating from daily social interaction and directly influencing children's understanding of facial features

and their relationships with target behaviors.

5.2 Future Research Directions

Reviewing literature on facial features' influence on children's trust judgments reveals that facial features affect children's trust judgments with age differences, involving complex internal mechanisms requiring further investigation. Although research quantity is limited, all results point to a common conclusion: children, like adults, are influenced by faces when making trust judgments, with different facial features showing developmental trends in their influence. With age, children's face-based trust judgments gradually become adult-like. Current research has revealed certain trends and patterns, but several issues remain to be resolved.

5.2.1 Improving Research Methodologies

Facial stimuli are a major factor affecting appearance-based trust judgment research. Current studies use diverse face stimuli with variations across multiple dimensions (race, gender, age, authenticity), which may prevent direct comparison of results. Research shows that stimulus gender, age, and authenticity all influence trustors' judgments [**?**, **?**, **?**]. For example, Rottman et al. (2020) used adult faces in Experiment 1, finding adults showed stronger trust biases than children, but used child faces in Experiment 2, finding the opposite pattern. This may occur because individuals evaluate age-similar faces more strictly. Within-study differences using different-aged stimuli indicate potential interactions between stimulus characteristics and participant groups. Future research should examine how stimulus characteristics influence results, considering age, gender, race, and authenticity to systematically explore each dimension's impact and isolate each feature's unique influence on children's trust judgments. Additionally, facial feature dimensions may interact [**?**, **?**]. Silvestri et al. (2022) found individuals are more sensitive to trustworthiness cues in own-race faces. Does race moderate the effect of facial trustworthiness on children's trust judgments? Attractiveness and trustworthiness are highly correlated and conceptually overlapping [**?**, **?**], such that high-attractiveness faces are likely high-trustworthiness faces. Future research should examine interactions between different facial features and how they change across task demands, exploring age differences and developmental changes in how children integrate and weigh these features across tasks and ages to reveal developmental trends.

Current research relies primarily on behavioral experiments, revealing behavioral patterns but not underlying attentional and mental processes, potentially leading to errors and limitations in revealing internal mechanisms. Future research should employ eye-tracking, ERP, or fNIRS technologies to explore internal attentional and neural mechanisms of face-based trust judgments. Ideally, multiple techniques should be combined (e.g., simultaneous EEG and eye-tracking) [**?**, **?**] to explicitly probe attentional mechanisms during trust judgments and determine how they relate to neural processes. This approach can

distinguish covert attentional shifts (reflected in ERP responses but not viewing behavior) from overt shifts (reflected in viewing behavior) [?, ?], identifying specific visual cues used in facial inferences and determining which cues promote or hinder rational trust judgments. Attention is a source of variability in trust judgments [?, ?], and examining attentional and neural processes will help understand underlying cognitive strategies and mechanisms, refining current theories.

Most research examines children's trust judgments in laboratory settings, representing "distal trust" that differs from everyday "proximal trust" in close interactions [?, ?]. Incorrect trust judgments in real life can threaten children's safety (e.g., abduction). Li et al. (2020) examined children's trust judgments in real-world scenarios, finding they tend to trust women. Future research should strengthen ecological studies, expanding to more real-world contexts to examine how different appearance features influence children's trust judgments. Additionally, research should expand beyond strangers to include teachers, friends' parents, and online acquaintances [?, ?, ?, ?], which are important for children's social interaction and safety.

Face-based trust judgments involve risk, making their reliability worth investigating. Recent research proposed new methods to examine relationships between facial trustworthiness and behavior [?, ?]. Li et al. (2019) adapted this method to examine whether strangers' trustworthiness judgments of 8- to 12-year-olds' faces predicted their real-world trustworthiness and peer acceptance, finding that trustworthy-looking children showed higher actual trustworthiness and peer acceptance. This study used children's faces; future research should examine children's judgments of adult faces and reliability. Longitudinal studies covering broader age ranges should examine developmental trajectories of different trustworthiness levels and behaviors.

5.2.2 Exploring Developmental Characteristics of Face-Based Trust Judgments

Although this paper reviews developmental characteristics and age differences in children's face-based trust judgments, developmental trajectories remain controversial and uncertain due to lack of longitudinal research and limitations in age selection and study designs. For example, controversy remains about when children recognize different facial features, especially social features. Some research suggests infants are sensitive to facial trustworthiness [?, ?, ?], while other research finds this ability emerges at age 3 [?, ?]. To better understand development, we need in-depth examination of trust judgment characteristics at different ages, which will help reveal developmental processes and reduce controversies.

5.2.3 In-Depth Mechanism Exploration

Although this paper outlines four potential mechanisms—perceptual foundation, emotion and affect, general cognitive abilities, and social experience—evidence is primarily based on adult research. Future studies should explore developmental mechanisms in children. Trust judgment is a complex social decision with complex underlying mechanisms. Social experience is an important mechanism for developmental change, but direct empirical research is limited. Future research should examine how social experience accumulated through interaction influences children's face perception and adjusts their face-based trust judgments. For example, parent-child conversation about appearance may influence first impressions of strangers [**?**, **?**, **?**, **?**], and disadvantaged neighborhoods may influence trustworthiness perception [**?**, **?**]. More research is needed to clarify how different social experiences influence children's trust judgments of unfamiliar faces.

Additionally, cultural differences represent a special form of social experience. Individuals from different cultural backgrounds may evaluate and perceive facial features differently. For example, India's caste system influences trust judgments based on cleanliness [**?**, **?**], and Iranian cultural gender concepts influence Iranian children's trust judgments [**?**, **?**]. Ma et al. (2010, 2016) reported that different racial-cultural backgrounds influenced children's selective trust of different-race informants. Ma and Ganea (2010) studied children from a racially homogeneous small U.S. city, while McDonald and Ma (2016) studied children from a highly multicultural metropolis. Children with rich multi-race interaction experience were more credulous toward own-race adults' false testimony [**?**, **?**], while children from single-race interaction contexts were less credulous [**?**, **?**]. Despite recognizing culture's potential influence, 96% of research findings come from 16% of WEIRD samples [**?**, **?**]. Future research should examine whether cultural differences exist in how children perceive facial features and how these influence trust judgments, identifying which features show cross-cultural consistency and which show cultural variation. Additionally, research should reveal mechanisms underlying these cultural differences [**?**, **?**], helping to clarify how facial features influence trust judgments.

The relationship between faces and trust judgments also depends on decision-makers' characteristics [**?**, **?**]. Trustors' characteristics such as age [**?**, **?**, **?**], gender, personality [**?**, **?**, **?**], temperament [**?**, **?**], trust propensity [**?**, **?**], motivation, attitudes, and cognitive style [**?**, **?**, **?**] all influence facial judgments. Most such research uses cross-sectional surveys, requiring caution in causal inference. Future research should use experimental designs or longitudinal studies to further explore psychological processes and mechanisms of trust judgments, refining theoretical models of face-based trust judgments.

Table 1
Children's Trust Judgments Based on Facial Features

Authors/Year	Participants & Context	Trust Type	Paradigm	Main Conclusions
Gender				
Rackoff et al. (2022)	149 children aged 3–8 (73 girls), USA	Epistemic (trust in scientific/toy testimony)	Conflicting sources paradigm	Tendency to trust same-gender informants; girls' same-gender preference weaker when experimenter is male (gender stereotype activation)
Ma & Woolley (2013)	64 children aged 4 and 6, USA	Epistemic (learning new object functions, seeking new information)	Conflicting sources paradigm	Strong same-gender preference regardless of object color
Taylor (2013)	325 children aged 4–7 (158 girls), multiethnic USA	Epistemic (occupation-related knowledge)	Conflicting sources paradigm	Same-gender preference coexists with gender stereotypes; American children's inferences based on expertise rather than gender, Egyptian children more influenced by gender
Terrier et al. (2016)	Exp 1: 88 children aged 3–4 (41 girls); Exp 2: 85 children aged 3–4 (42 girls)	Epistemic (finding candy)	Conflicting sources variant (hide-and-seek game)	When epistemic cues are consistent, tendency to trust same-gender informants

Authors/Year	Participants & Context	Trust Type	Paradigm	Main Conclusions
Shenouda & Danovitch (2014)	74 children aged 3–5 (37 girls), multiethnic USA	Epistemic (finding candy)	Conflicting sources variant (hide-and-seek game)	Prefer to trust opposite-gender informants who have seen objects over same-gender who haven't
Boseovski et al. (2016)	106 children aged 3–4 (48 girls), upper-middle-class Iran	Epistemic (accuracy questions, learning preferences)	Conflicting sources paradigm	Epistemic task: No gender preference, trust counter-stereotypical experts, prioritize expertise; Social task: Same-gender preference
Mirtaheri et al. (2023)	30 children aged 4.8–8.2 with autism, 30 typically developing children aged 5–7 (8 girls), China	Social (preference for characters)	Conflicting sources paradigm	Tendency to trust same-gender; girls with higher sex-typing scores trust male informants more
McDonald & Ma (2016)	118 children aged 7, 9, 11 (58 girls), China	Epistemic (object names)	Conflicting sources paradigm	Credulous toward own-race informants; accent trumps race (when conflict, trust in-group accent)

Authors/Year	Participants & Context	Trust Type	Paradigm	Main Conclusions
Li et al. (2016)	30 children aged 4.8–8.2 with autism, 30 typically developing children aged 5–7 (8 girls), China	Epistemic (finding candy)	Conflicting sources variant (hide-and-seek game)	Both autistic and typically developing children trust own-race over other-race informants
Facial Attractiveness				
Bascandziev & Harris (2014)	32 children aged 4–6 (18 girls), USA	Epistemic (confirming objects in boxes)	Conflicting sources paradigm	Autistic children's selective trust related to facial attractiveness; typically developing children's not related
Bascandziev & Harris (2016)	132 children aged 4–5 (66 girls), USA	Epistemic (object names)	Conflicting sources paradigm	Children trust more attractive informants; when accuracy is equal, trust more attractive; no preference between low-attractiveness/high-accuracy and high-attractiveness/low-accuracy

Authors/Year	Participants & Context	Trust Type	Paradigm	Main Conclusions
Tang et al. (2019)	195 children aged 4–6 (96 girls), China	Social (asking "who")	Conflicting sources paradigm	When high-attractiveness informant has 25% accuracy, children trust low-attractiveness informant with 75% accuracy; attractiveness effect weaker when children have relevant knowledge
Ma et al. (2014)	118 children aged 7, 9, 11 (58 girls), China	Social (e.g., trust to keep promises)	Forced-choice paradigm & vignette inter-view	At age 3, children begin selectively trusting trustworthy-looking individuals; probability increases with age
Facial Trustwor-thiness				
Li et al. (2016)	30 children aged 4.8–8.2 with autism, 30 typically developing children aged 5–7 (8 girls), China	Epistemic (finding candy)	Conflicting sources variant (hide-and-seek game)	Both autistic and typically developing children's selective trust not significantly related to facial trustworthiness

Authors/Year	Participants & Context	Trust Type	Paradigm	Main Conclusions
Ewing et al. (2015)	48 children aged 5–8 (23 girls), 55 aged 9–12 (27 girls), 40 adults (26 girls), Australia	Social ("how many tokens would you give this partner?")	Economic trust game	Children and adults trust trustworthy-looking partners more, investing more tokens
Mondloch et al. (2019)	30 adults (25 female) and 54 children aged 4–11 (32 girls), Australia	Social ("who would you choose for challenges?")	Storybook task (gold/silver treasure)	Children choose trustworthy-looking partners for challenges, believing they will keep secrets and protect cloaks
Charlesworth et al. (2019)	99 children aged 3–10 (57 girls), multiethnic USA	Social (helping/sharing), Dominance (lifting heavy objects/leading games), Competence (singing/drawing)	Forced-choice paradigm	Children aged 5+ believe trustworthy-looking faces more likely to perform trustworthy behaviors (sharing/helping)
Palmquist & DeAngelis (2020)	60 children aged 4–5 (32 girls), USA	Social (who is better at sharing), Epistemic (who draws better/knows object functions)	Forced-choice paradigm	Children aged 5+ believe competent-looking individuals more likely to draw the best pictures

Authors/Year	Participants & Context	Trust Type	Paradigm	Main Conclusions
Palmquist et al. (2020)	64 children aged 4–5 (30 girls), USA	Knowledge test, non-knowledge test	Forced-choice paradigm	Children aged 4–5 judge others' knowledge based on trustworthiness rather than competence
Siddique et al. (2022)	42 children aged 7–10 (31 girls), Australia	Social ("how many tokens would you give this partner?")	Multi-round economic trust game (treasure hunt + magic)	Children aged 5+ believe competent-looking individuals draw better and know object functions
Facial Dominance				
Charlesworth et al. (2019)	99 children aged 3–10 (57 girls), multiethnic USA	Social (helping/sharing), Dominance (lifting heavy objects/leading games), Competence (singing/drawing)	Forced-choice paradigm	Dominant-looking faces more likely to perform dominant behaviors (leading games/lifting heavy objects) than submissive faces
Mondloch et al. (2019)	30 adults (25 female) and 54 children aged 4–11 (32 girls), Australia	Social ("who would you choose for challenges?")	Storybook task (gold/silver treasure)	Children choose high-dominance partners for challenges, believing they will fight dragons and move boulders
Facial Expression				

Authors/Year	Participants & Context	Trust Type	Paradigm	Main Conclusions
Ewing et al. (2019)	48 children aged 5–8 (23 girls), 55 aged 9–12 (27 girls), 40 adults (26 girls), Australia	Social ("how many tokens would you give this partner?")	Economic trust game	Trust influenced by partner expression: happy > neutral > angry
Mondloch et al. (2019)	54 children aged 4–11 (32 girls), Australia	Social ("who would you seek help from for challenges?")	Storybook task (gold/silver treasure)	Choose happy-expression partners over angry/fearful partners
Van Der Zant et al. (2021)	15 children with autism aged 6–12, 15 typically developing children aged 6–12 (7 girls), 16 adults (12 female), Australia	Social ("who would you seek help from for challenges?")	Storybook task (gold/silver treasure)	Children do not consider happy-expression individuals more trustworthy than neutral-expression individuals
Clément et al. (2013)	50 children aged 4–5 (26 girls), China	Epistemic (learning new words)	Conflicting sources paradigm	Trust happy-expression faces over angry faces for information
Caulfield et al. (2014)	15 children with autism aged 6–12, 15 typically developing children aged 6–12 (7 girls), 16 adults (12 female), Australia	Social (e.g., trust to keep secrets)	Forced-choice paradigm & vignette interview	Both autistic and typically developing children consider happy faces more trustworthy than angry faces
Tang et al. (2019)	50 children aged 4–5 (26 girls), China	Social (trust who will keep promises)	Conflicting sources paradigm	Trust positive-expression faces more

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