Children's Attributions of Knowledge and Trustworthiness to Persons with Disabilities

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This is a pre-press draft of a manuscript accepted for publication at *Cognitive Development*.

Abstract

Children's inferences about people's knowledge and epistemic trustworthiness can be swayed by seemingly unimportant qualities, such as their personality traits or appearance. Very little is known about how children reason about the minds and statements of persons with disabilities. In this study, we examined children's inferences about the knowledge and epistemic trustworthiness of people who had physical or auditory disabilities; disabilities that had no actual bearing on the quality of their visually-derived knowledge or claims. U.S. children ages 3.00-6.99 years (N = 76) were presented with scenarios in which a character who was disabled looked inside a box and another character who was typically-developing simply held that same box (without looking inside). Children were asked who knew what was inside the box. Then, the two characters made contrasting claims about what object the box contained, and children were asked to endorse one of the characters' claims. Regardless of characters' abilities, children across the age-range were significantly more likely to attribute knowledge to characters who had seen inside the boxes. This pattern was found even among the youngest participants (3-year-olds), and became more pronounced with age. As well, across the entire age range, children's trust in informants' claims did not differ depending upon characters' disabilities. By 4.5 years, children preferred claims provided by characters who had seen the boxes' contents, and this pattern, too, became more pronounced with age. Thus, children's attributions of knowledge and trustworthiness to persons were not swayed if they possessed an irrelevant physical or perceptual disability.

Keywords: theory of mind; epistemic trust; disability concepts; social cognition

Children's Attributions of Knowledge and Trustworthiness to Persons with Disabilities

Children acquire much of their knowledge by interacting with and observing others (e.g., Gelman, 2009; Harris, 2012; Harris, Koenig, Corriveau, & Jaswal, 2018; Lane, 2018; Mills, 2013). The people whom children attend to and learn from vary in many ways: some are kind and others malicious; some are more knowledgeable than others; many will be typically-developing and others may be atypically-developing. Prior studies have identified that young children's inferences about people's knowledge and epistemic trustworthiness can be swayed by seemingly unimportant qualities, such as persons' kindness or physical attractiveness (e.g., Bascandziev & Harris, 2014; Johnston, Mills, & Landrum, 2015; Landrum, Mills, & Johnston, 2013; Lane, Wellman, & Gelman, 2013). We ask whether young children's beliefs about persons' knowledge and epistemic trustworthiness waver when persons possess disabilities that, in reality, have no bearing on the actual quality of their knowledge or claims. Previous work has identified that children may hold negative attitudes towards persons with disabilities (Diamond & Hestenes, 1996; Diamond, Hong, & Tu, 2008; Diamond, Le Furgy & Blass, 1993), and it is possible that such attitudes could negatively color how children think about those persons' minds, ideas, and assertations.

More than half (61%) of adults in the U.S. live with one or more disabilities that disrupt their daily life (Okoro, Hollis, Cyrus & Griffin-Blake, 2018). Mobility disabilities affect 13.7% of U.S. adults, and perceptual (auditory and visual) disabilities affect more than 10%. Children as young as 3-years may have rudimentary understandings of what it means for someone to experience enduring difficulties moving, seeing, or hearing (Diamond & Hestenes, 1996; Diamond, Hong & Tu, 2008). Yet, very little is known with regard to how children reason about the minds and statements of these persons, which may influence how children socialize with and learn from these persons. In the current study, we examine how young children attribute knowledge to persons with physical (walking) disabilities or perceptual (hearing) disabilities, versus persons who are typically-abled. As well, we explore children's trust in the claims of persons with and without these disabilities. We explore how such mental-state attributions and epistemic trust varies over the course of early development, between the ages of 3 and 6 years. In the following sections, we discuss research on children's knowledge attributions and epistemic trust, then outline how this research informs the current study's design and our hypotheses.

Children's Epistemic Inferences and Epistemic Trust

By at least 3-years of age, most children can articulate that different people possess different knowledge (Ronfard et al., 2018; Wellman & Bartsch, 1988; Wellman & Liu, 2004). As part of an emerging theory-of-mind (ToM), they understand that people's knowledge can be constrained by their perceptions—someone may not know about the contents of an unfamiliar box until they look inside the box; someone may not know what another person is saying aloud until they are nearby (Lane, Evans, Brink, & Wellman, 2016; Pillow, 1989; Pratt & Bryant, 1990). In one of the earliest studies to explore this development, Pillow (1989) had either the child participant or a gender-matched puppet look into a plastic container in which an experimenter had hidden a toy. Children were asked *knowledge* questions (i.e., "Do you know what color the dinosaur in here is?", "Does [puppet's name] know what color the dinosaur in here is?") and *perception* questions (i.e., "Do you see the dinosaur in here?", "Does the puppet see the dinosaur in here?"). Three- and 4-year-olds reported that only the person (or puppet) who had looked inside the box could see the toy and know its color. Similar findings have been obtained using different study paradigms. Pratt and Bryant (1990) had 3-and 4-year-olds watch as one child held a box and another child looked inside the same box. Participants were asked forced-choice questions about the scenarios (e.g., “Who knows what is inside the box – John or Fiona?”) and open-ended questions (e.g., “Does Lucy know what is in the box?”). Participants typically reported that it was the person who *looked* inside the box who knew what the box contained. Other work reveals that children at this age also appreciate that people can gain knowledge through auditory perception (Lane et al., 2016; Melis, Call, & Tomasello, 2010). Thus, young preschoolers often appreciate that one’s knowledge is informed by what one perceives.

Particularly relevant to the current study, young children also account for informants’ perceptual access to information when children evaluate their claims – i.e., informants’ knowledge factors into children’s *epistemic trust* (Birch, Vauthier, & Bloom, 2008; Koenig & Harris, 2005; Lane & Harris, 2015; Ma & Ganea, 2010; Robinson, Champion & Mitchell, 1999; Sabbagh & Baldwin, 2001). For example, Robinson et al. (1999, Experiment 1) showed children 3-6 years what was inside two identical boxes; one held a teddy bear and the other held a snowman. The boxes were placed in a bag and one was picked out. Children were asked what they thought was inside the selected box, a teddy bear or a snowman (children did not look inside the box again). Then, an adult either saw the *outside* of the box or looked *inside* the box, was asked the same question, and always gave an answer that *opposed* the child’s initial guess. The child was then asked, “So which one is it?” Across the age range, children more often switched their answers to align with the adult’s statement when the adult had seen *inside* the box, rather than when the adult merely saw the *outside* of the box. Thus, young children are able to distinguish between people who are knowledgeable vs. ignorant based on their perceptual experiences, and children use this information about persons’ knowledge to guide their epistemic trust.

However, young children's epistemic inferences and epistemic trust can be misguided when people possess certain traits (Fusaro et al., 2011; Johnston et al., 2015; Landrum et al., 2013; Lane et al., 2013; Marble & Boseovski, 2020). For example, Lane and colleagues (2013), asked children ages 3 to 6 years to identify which of two characters knew the contents of a novel box. One character was described as having a negative trait, such as meanness, and looked inside the box. The other character was described as having a positive trait, such as niceness, and did *not* look in the box. When asked who knew what was inside the box, 3- to 4-year-olds typically reported that it was the character with the positive trait (e.g., niceness), even though that character *never actually looked* inside the box. In contrast, 5- and 6-year-olds typically (accurately) reported that the character who *had looked* inside the box knew what was inside (despite their negative trait). Afterwards, the two characters made conflicting claims about what object was inside the box. Children were asked to endorse one of their claims. Younger 3- and 4-year-olds were especially influenced by the characters' traits, typically endorsing the claims of characters who had positive traits, even though they had not perceived the box's contents. Older five- and six-year-olds typically endorsed claims by the characters who had seen inside the box, despite their negative traits. Thus, the general valence of characters' traits can influence young preschoolers' knowledge attributions and epistemic trust, but these effects diminish as children progress into middle childhood.

Young children's over-attribution of knowledge and trustworthiness to persons with positive traits suggests that their epistemic inferences and epistemic trust are subject to "halo effects." Halo effects involve attributing clusters of positive qualities to persons who have other positive qualities, and clusters of negative qualities to persons with negative qualities (negative halo effects are also termed "horns effects" or "reverse halo effects"). These effects have been identified among children (e.g., Dion, 1973; Marble & Boseovski, 2020) and adults (e.g., Dion, Berscheid, & Walster, 1972; Eagly, Ashmore, Makijani & Longo, 1991; Forgas & Laham, 2017; Nisbett & Wilson, 1977). For example, in a classic study, 3- to 6-year-olds inferred that other children whom they judged to be attractive were more likely to behave prosocially, and that children whom they judged to be unattractive were more likely to behave antisocially (Dion, 1973). The current study investigates how descriptions of characters as being physically- or perceptually-disabled affect children's inferences about their knowledge and epistemic trustworthiness. Children watch as a disabled character looks inside a box, and a typically-abled character does *not* look inside the same box. Then children report who knows what is inside the box and ultimately endorse one character's claim about the contents of the box. This directly tests whether children's epistemic inferences and epistemic trust in informed persons is swayed when those persons possess disabilities.

Concepts of Persons with Disabilities

Much of the work on young children's behaviors toward or treatment of peers with disabilities employs measures such as sociometric ratings (e.g., whether someone is liked "a lot," "a little," or "not at all"), friendship nominations (who is identified as a "best friend" from pictures of classmates), and inclusion/exclusion decisions (e.g., decisions about who should be included in play). In a classic study, Diamond and colleagues (1993) asked children in integrated preschool classes to provide sociometric ratings and friendship nominations for their classmates—some classmates were typically-developing and other classmates had disabilities (intellectual, orthopedic, and/or perceptual). For sociometric ratings and friendship nominations, 4-year-olds (but not 3-year-olds) preferred same-sex, typically-developing classmates. More recent work has found that preschoolers make decisions to include/exclude peers based on the specific limitations imposed by their physical disabilities (e.g., Diamond and Hestenes, 1996) and they (e.g., Diamond et al., 2008; Nabors & Keyes, 1997). For example, Diamond and colleagues (2008) found that typically-developing children were less likely to include peers with a physical disability in activities that involved motor components (e.g., kicking a ball and running outside, dancing, playing blocks, putting a puzzle together on the floor).

The findings that children with disabilities are be judged as less desirable friends and playmates suggest that young children may hold negative general impressions of persons with disabilities (at least, relative to their impressions of typically-developing persons). Accordingly, we anticipated a negative halo effect in the current study: the disability label and accompanying description would be interpreted as negative qualities, which would lead children to attribute clusters of other negative qualities to disabled individuals, including with regard to their knowledge and trustworthiness. Given past work demonstrating that young children's epistemic attributions may be swayed depending upon the valance of people's traits (e.g., Johnston et al., 2015; Landrum et al., 2013; Lane et al., 2013; Marble & Boseovski, 2020) we hypothesize that children (especially 3- and 4-year-olds) will attribute less knowledge to and have less trust in characters who are physically- or perceptually-disabled (vs. typical characters). An additional motivation for this prediction is that children prefer to learn from people who seem more socially-competent or engaged (Marble & Boseovski, 2020). Given that children with disabilities are more often excluded from play and social relationships (as discussed earlier), there is even more reason to expect that children will trust the claims of persons with disabilities less than those of typically-developing persons.

In one of the few studies to directly evaluate children's epistemic trust in informants with physical disabilities, Jaffer and Ma (2015) showed 4- and 5-year-olds an image of a familiar object and asked if they knew either a novel fact about the object or how to perform a novel action with the object. For example, children were shown a ski and asked, “Do you know how to do the skiing move called the Daffy?” When children admitted they did not know, they were shown images of two adults, one depicted as obese or physically-disabled (in a wheelchair) and one depicted as neither obese nor disabled. The researchers told children, “One of them knows better. Let’s listen to what they say!” Each adult described a different fact or action, and children were asked to report which fact was true or which action they would perform. Children more often endorsed claims made by the typical person as opposed to the physically-disabled or obese person. In a second study, before the adults made claims about a novel object, they first labeled familiar objects. Obese or physically-disabled adults labeled the objects correctly, and typical adults labeled them incorrectly. When these adults later made conflicting claims about novel objects, children (as a group) demonstrated no preference for anyone’s claims, despite having evidence that the obese and physically-disabled characters were more reliable. Thus, preschoolers’ trust in the claims of informed persons was diminished when those persons were depicted as obese or physically-disabled.

The Current Study

The current study expands on the method employed by Jaffer and Ma (2015) in notable ways. First, the current study examines how children’s consideration of persons’ knowledge is affected by their having a physical (walking) disability *or* a *perceptual* (hearing) disability (a less obvious personal quality, relative to mobility or obesity status). Second, in the current study, persons with the atypical quality (the physical or perceptual disability) have visual access to the critical information, whereas persons with the more typical quality (no disability) *lack* that perceptual access. This allows us to directly test how children weigh perceptual access vs. the presence of a disability when making inferences about people's knowledge and epistemic trustworthiness. If both informants were equally informed, children may choose to trust characters with relatively desirable/normative qualities simply because they are *forced* to make a dichotomous decision and only one quality (disability) differs between informants; findings from such a paradigm might overestimate the influence of otherwise trivial factors in children's social cognition. The current method is also more reminiscent of real circumstances that children might face, as it is extremely rare in the real world for people to differ on *just one* factor.

Whereas most work, including Jaffer and Ma's (2015), employed visual depictions of disability (e.g., a person in a wheelchair), we provide only *verbal* descriptions of disabilities: all persons, regardless of ability status, are depicted in chairs with no visual differences aside from typically-varying features such as hair color/type, skin tone, and clothing color. We used this method because we are interested in how persons' possession of a disability (not their appearance) influences children's epistemic trust. Visual markers of disability, such as medical equipment, may negatively skew children's impressions of persons with disabilities (e.g., Diamond et al., 2008; Huckstadt & Shutts, 2014). And visual attractiveness alone can influence children's epistemic trust (e.g., Bascandziev & Harris, 2014). Thus, eliminating visual markers of disability can eliminate these superficial confounds. Still, we hypothesized that the youngest children would demonstrate diminished trust in persons with disabilities, even when those disabilities are not depicted: 3- and 4-year-olds would endorse statements from a *typically-developing* child (vs. a child with a disability) regardless of who had perceived the relevant information. Based on previous work, we anticipated that 5- and 6-year-olds would endorse statements from the person who had *perceptual access* to the relevant information, regardless of their ability status.

Method

Participants

Seventy-six children ranging from 3.13 to 6.97 years (M_{age} = 5.11 years; 33 girls; 43 boys) were recruited from a medium-sized city in the Southeastern United States. An additional two participants in the target age range (3-6 years) were interviewed, but their data were excluded because they either chose to not complete the study or were too distracted to attend to the study instructions. Our target sample size was informed by previous research that has evaluated age-related differences in children's knowledge attributions and epistemic trust (e.g., Fusaro et al., 2011; Lane et al., 2013; Pillow, 1989), and exceeded the sample required (n = 55) to have power (.80) to detect medium-sized effects (f^2 = .15) of single coefficients in a regression including seven predictor variables, with α = .05 (as calculated in G*Power 3.1; Faul et al., 2007)[1]. We aimed to recruit between 16 and 20 children at ages 3, 4, 5, and 6 years. Fifty of the participants were recruited from the greater metropolitan area by calling parents of children in the target age range (e.g., using contact information from State birth records). Interested parents brought their children to a quiet room in a lab on the University's campus, where parents provided consent to participate and their children completed the study. The remaining 26 participants were recruited from a local private school through the distribution of informed consent documents. Children whose parents signed and returned the consent document were interviewed in a quiet room at their school. This study was part of a larger project exploring children's concepts about persons with disabilities.

[1] This is a conservative estimate of the required sample size. Repeated measures regression models, such as those reported here, generally have greater statistical power than OLS regressions due to there being multiple observations per participant (Guo et al., 2013). Multi-level models (MLM), like those used here, also offer greater statistical power than similar repeated-measures ANOVA models (Quené & van den Bergh, 2004).

Family demographic information was provided via a voluntary parent questionnaire, completed by all but one parent. For questions about participants' race and ethnicity, parents could select more than one category. Most participants (88%; *n* = 66) were identified by their parents as "White/Caucasian", followed by 6.67% (*n* = 5) as "Black/African American", 6.67% (*n* = 5) as "Asian/Asian American", and 2.67 % (*n* = 2) as "Hispanic or Latino". Of the parents who completed these questionnaires, 6.67% (*n* = 5) reported completing some college, 24% (*n* = 18) reported completing a Bachelor's degree, 37.33% (*n* = 28) reported completing a Master's degree, and 32% (*n* = 24) reported completing a Doctorate. Participant recruitment, parent consent, child assent, and all study procedures were approved by [*blinded for review*] University's Institutional Review Board (# *blinded for review*).

Materials

Materials included a clear plastic container, with dividers that created six sections. Inside the container were laminated vector-graphics (approximately 1.5 x 2.5 inches) depicting seated characters (18 girls, 18 boys), and six different boxes (purple, red, orange, yellow, green, blue). The characters were all seated (to avoid depicting equipment that might be required for some characters to stand upright) and differed in terms of their hair color, hair style, eye color, clothing color, and skin tone. Appendix A depicts examples of these graphics. A small audio recorder was used to document each study session (if parents consented).

Procedure

Introduction to Disabilities. Each participant spent several minutes building rapport with the experimenter (E) prior to the study. E then invited the participant to sit to their left, on the same side of a table. E randomly selected two characters' graphics (matched to the participant's gender) from the plastic container on the table. E described one as having a physical (walking) disability: “This boy’s/girl’s legs don’t work. They can’t get out of their chair and move around if they want to. They can’t run around the playground. They can’t walk to the front of the classroom to ask the teacher questions if they need help.” Comprehension questions (e.g., “So what part of this boy’s/girl’s body doesn’t work?”; “Can this boy/girl walk?”) were then asked to ensure that, before completing the focal part of the study, all children had some exposure to physical and perceptual disabilities. E either affirmed children’s answers (e.g., “Yeah, their legs don’t work.”; “Yeah, because their legs don’t work.”), or corrected children’s answers (e.g., “Actually, their *legs* don’t work.”; “Actually, they *can’t* walk, because their legs don’t work.”). E described the other character as having a perceptual (hearing) disability: “This boy’s/girl’s ears don’t work. They can’t hear if a firetruck is coming down the street. They can’t hear the school bell at the end of the day. They can’t hear their friends yelling on the playground.” Similar comprehension-check questions were asked about this character, and answers were again either affirmed or corrected accordingly. The order in which the two characters with disabilities were presented was counterbalanced across participants within each age group. Overall, 76.3% of participants (n = 58) correctly answered both introductory questions about physical disability, and 81.6% (n = 62) correctly answered both introductory questions about perceptual disability.

Perceptual Access Scenarios. Children were presented six scenarios, each featuring a novel, nondescript box, and two characters who differed in their visual access to the contents of the box. For each scenario, E introduced children to the two new characters by name. Character graphics were randomly selected from the plastic container and placed to the left and right of the box graphic.

Typically-developing Persons. To evaluate how children attribute knowledge to and trust typically-developing persons, the first scenario included two typically-developing characters (i.e., who had no disabilities). E narrated a story (while manipulating the characters' graphics) in which one character looked inside the box by lifting a flap that covered the box top; the other character simply picked up the *closed* box and placed it back down (without looking inside) (for an example, see Appendix A). Children were then asked *memory-check* questions: "So did [*name*] look inside the box?" If the child answered the question correctly, affirmative feedback was provided ("Yeah, (*point*) [*character name*] *did* look in the box."). If the child did not answer correctly, corrective feedback was offered ("Actually, (*point*) [*character name*] did *not* look in the box."). After E established that the child knew which character had looked inside the box, E asked the child about the characters' *knowledge*: e.g., "Point to who *knows* what's inside the box. Blake or Kurt?" E then demonstrated as one character claimed that a certain object was in the box (e.g., "a stick"), and the other character claimed that a *different* object was in the box (e.g., "a rock"). Then, E asked the *claim endorsement* question; e.g., "What do *you* think is in here (*point to box*), a stick or a rock?" This scenario and series of questions were then repeated once more with different boxes and different purported box contents.

Persons with disabilities. After the first two scenarios with the two typically-developing characters, to evaluate how children attribute knowledge to and trust persons with physical or perceptual disabilities, E introduced a *new* set of characters (characters' graphics were again randomly selected) that were part of two new scenarios; one character was either physically-disabled or perceptually-disabled (the type of disability was presented in counterbalanced order across participants within each age group), and the other character was typically-developing. The typically-developing character was introduced as follows: "This is [*Name*]. His/her [ears/legs] work, so he/she can [hear/walk]. For the character with a disability, E provided a description similar to that given during the *Introduction to Disabilities* portion of the study; e.g., “Remember when we talked about boys/girls whose ears/legs don’t work? [*Name*] is one of those boys/girls. [*Name*] can hear/walk, but he/she can*not* walk/hear.” To ensure that children were paying attention and remembered the characters’ abilities, they were asked, “Point to the boy/girl whose ears/legs do *not* work?”, and “Point to the boy/girl whose ears/legs *do* work.” If children answered these questions correctly, E provided affirmative feedback. If children did not answer the questions correctly, E provided corrective feedback. A new box graphic was placed between the two characters, and E narrated a scenario in which the character with a disability looked inside the box, and the typically-abled character picked up the box (without looking inside). Children were asked *knowledge* and *claim endorsement* questions, like those used for the previous character pair. This scenario and series of questions were then repeated once more with different boxes and purported box contents.

Finally, E introduced a *new* pair of characters that were involved in two new scenarios; one character possessed the remaining disability (i.e., if a character with a physical disability had been included in the prior scenarios, then a character with a perceptual disability was included in these two scenarios), and the other character was typically-developing. The procedure with this pair of characters was the same as for the previous pair—two scenarios were presented in which the character with the disability looked in a box, and the typically-developing character did not. Similar *knowledge* and *claim endorsement* questions were asked for these scenarios.

The current study was a part of a larger study exploring children’s concepts of disabilities; the protocol described above was delivered either at the beginning (n = 38) or at the end (n = 38) of the larger study session (with order counterbalanced across participants). The other tasks in the study session, which are unrelated to the current research questions, assessed children's judgements of and reasoning about norm violations committed by *different* characters (with different appearances and different names) who had disabilities. The "Introduction to Disabilities" portion of the protocol, described above, always came at the beginning of the larger protocol. The entire study session lasted approximately 20 minutes, with the tasks reported herein lasting approximately 8-10 minutes. After each session, children were offered a small toy as a gift.

Scoring

Correct responses to each *memory-check* question were assigned scores of 1; incorrect responses were assigned scores of 0. For each of the three pairs of scenarios (typical/typical; typical/physically-disabled; typical/perceptually-disabled) *memory-check* scores could range from 0-4. For the *knowledge* questions, children earned 1 point each time they attributed knowledge to the character who had looked inside the box. For each of the three pairs of scenarios (typical/typical; typical/physically-disabled; typical/perceptually-disabled) *knowledge-attribution* scores could range from 0-2. For the *claim endorsement* questions, children earned 1 point each time they endorsed information provided by the character who had looked inside the box. For each of the three pairs of scenarios (typical/typical; typical/physically-disabled; typical/perceptually-disabled) *claim-endorsement* scores could range from 0-2.

Results

Preliminary analyses assessed whether children's performance differed if they completed these tasks as the beginning of the testing session versus at the end of the session. Children's performance for each type of question—Memory Check, Knowledge Attribution, and Claim

Endorsement—was equivalent regardless of presentation order, all $|t\text{'s}(74)| < .55$, all p's > .58. Thus, presentation order is not considered further.

Memory Check Questions

Before exploring how children attributed knowledge to and trusted the characters in these scenarios, it is important to first establish whether children attended to and remembered key details of each scenario, namely which character looked into each of the boxes. We also wished to evaluate whether children's memory for who looked into the boxes was distorted by their having a disability. Thus, we first examine children's performance on the memory-check questions concerning whether each character had looked inside of the boxes ("Did X look inside the box?"). For each character (typically-abled, physically-disabled, and perceptually-disabled) children answered four forced-choice questions about whether the character had looked inside the boxes; thus, chance performance is 2.00. In general, children were very accurate in answering these questions, averaging a score of 3.77 (out of a maximum 4.00) across the three characters.

A multilevel regression predicted children's performance on these questions, with Age as a continuous variable and characters' Ability (typically-abled, physically-disabled, perceptually-disabled) nested within participant. This analysis revealed significant effects of characters' Ability. Although children were very accurate in remembering when typically-abled persons looked inside the boxes (M = 3.70, SD = .65), they were slightly more accurate in remembering the looking behavior of persons with physical disabilities (M = 3.83, SD = .44; β = .76, SE = .38, z = 2.01, p = .044, 95% CI [.02, 1.51]) or perceptual disabilities (M = 3.78, SD = .56; β = .78, SE = .38, z = 2.05, p = .040, 95% CI [.03, 1.52]). This analysis also revealed a significant association between participants' Age and their memory performance (β = .21, SE = .06, z = 3.75, p < .001, 95% CI [.10, .32]), which did not vary by characters' abilities (i.e., there was no significant interaction of Age x character Ability). As depicted in Figure 1, even the youngest children were very accurate—a general linear hypothesis (GLH) test (collapsing across Ability) revealed that children at 3.5 years performed significantly above chance ($\chi^2 = 63.87$, $p < .001$). However, there was a general age-related increase in children's performance. Thus, even the youngest children accurately remembered who looked into the boxes; children's memory was not distorted if the character possessed a physical or auditory disability. These and all future analyses are conducted in Stata 14 (StataCorp, 2015). Complete output for all regression analyses can be found in Supplementary Materials.

Knowledge Attributions

We next turn to the first focal research question: whether children's knowledge attributions differed for persons with and persons without disabilities. For each character-pair (*typical*-typical, *physically-disabled*-typical, and *perceptually-disabled*-typical), following the memory-check questions, children were asked which character *knows* what is inside the box. For two trials per character-pair, children earned 1 point each time they correctly identified that the character who looked inside the box was knowledgeable (for *knowledge attribution* scores ranging from 0-2).

A multilevel regression predicted children's correct knowledge attributions, with Age as a continuous variable and the characters' Ability (typically-abled, physically-disabled, perceptually-disabled) nested within participant. This analysis revealed only one significant effect: a positive association between participants' Age and correct knowledge attributions ($\beta = .15$, $SE = .05$, $z = 2.79$, $p < .01$, 95% CI [.04, .25]). As evident in Figure 2, there was a general age-related increase in accurate knowledge attributions, which was similar whether the character who looked in the box was typically-developing or if they had a physical or perceptual disability.

There was no significant main effect of character Ability and no significant interaction of character Ability X participant Age. (Multilevel Poisson regression analyses revealed similar results. Complete output for all regression analyses can be found in Supplementary Materials.)

We further investigate children's knowledge attributions as a function of their age, with GLH tests against chance computed at ages 3.5 years, 5 years, and 6.5 years (averaged across Ability). At all three ages, children's performance was significantly above chance (i.e., 1.00); all χ^2s > 18.00, *p*s < .001. Thus, even the youngest children tended to correctly attribute knowledge to characters who had visual access to relevant information, regardless of whether those characters were typically-abled or possessed a disability.

Claim Endorsement

Finally, we turn to the question of whether children's *epistemic trust* in the characters differed whether characters were typically-abled or possessed a disability. For each character-pair (*typical*-typical, *physically-disabled*-typical, and *perceptually-disabled*-typical), following the *knowledge attribution* questions, the two characters provided conflicting claims about what object was in the box, and children were asked to endorse one of those claims. For two trials per character-pair, children earned 1 point each time they endorsed the claim of the character who had looked inside the box (for *claim endorsement* scores ranging from 0-2).

A multilevel regression predicted children's claim endorsement, with Age as a continuous variable and character Ability (typically-abled, physically-disabled, perceptually-disabled) nested within participant. This analysis revealed only one significant effect: a positive association between participants' Age and their claim endorsement (β = .24, *SE* = .07, *z* = 3.54, *p* < .001, 95% CI [.11, .37]). As illustrated in Figure 3, there was a general age-related increase in children endorsing the claims of the character who *had* looked inside the box; this trend was similar whether the character who looked in the box was typically-developing or if they had a physical or perceptual disability. There was no significant main effect of character Ability and no significant interaction of Ability X participants 'Age. (Multilevel Poisson regression analyses revealed similar results. Complete output for all regression analyses can be found in Supplementary Materials.)

We further examined children's epistemic trust as a function of their age, with GLH tests against chance computed at ages 3.5 years, 5 years, and 6.5 years (averaged across Ability). At 3.5 years, children endorsed the characters' competing claims at chance levels (M = .98; χ^2 = .01, p = .922). By 5 years, children more often endorsed the claims of the characters who had looked inside the boxes (M = 1.41; χ^2 = 14.38, p < .001); and this trend was even stronger at 6.5 years (M = 1.84; χ^2 = 23.57, p < .001). For more precision (and to more directly compare our findings against those of prior epistemic-trust studies with samples of 4-year-olds, who often average 4.5 years), we conducted supplementary analyses that identified that preferential trust in the informed characters' claims was evident as early as 4.5 years (M = 1.27, χ^2 = 4.74, p = .029).

Thus, at no point in early development was children's epistemic trust swayed by the fact that an informant possessed a disability. By approximately 4-years onward, children preferentially endorsed the claims of characters who had perceived relevant information, whether those characters were typically-abled or possessed a disability.

Discussion

The current study was designed to explore children's attributions of knowledge and epistemic trustworthiness to people with disabilities. U.S. children 3-6 years were presented scenarios with two characters—one who looked inside a novel box and one who did not. Children were asked which character knew what was inside the box and were asked to endorse one of those character's claims about what was inside the box. Children as young as 3-years typically attributed knowledge to the characters who had seen inside the box, whether those characters were typically-abled or possessed a disability. Although 3-year-olds did not yet demonstrate a preference for any character's claims about the box's contents, by approximately 4 years old children typically preferred claims provided by the characters who had seen inside the box, whether those characters were typically-abled or possessed a disability. Both of these patterns strengthened through age 6 years. In the following sections, we explore these findings in greater detail, and integrate them with prior work on children's knowledge attributions, epistemic trust, and concepts of physical and perceptual disabilities. We also outline potential directions for future study.

Children's Judgements Were Not Swayed by Informants' Disability Status

The first goal of this study was to determine whether children's attributions of knowledge to persons differ if persons possess a physical or auditory disability that has no actual bearing on their visually-derived knowledge. Previous work on children's theory-of-mind reveals that, by at least 3-years of age, most children appreciate that people who perceive (see or hear) relevant information will have *knowledge* of that information (Lane et al., 2016; Pillow, 1989; Pratt & Bryant, 1990; Wellman & Bartsch, 1988; Wellman & Liu, 2004). However, we hypothesized that children would less accurately attribute knowledge to persons who were physically- or perceptually-disabled. This hypothesis was inspired by studies demonstrating that children often hold negative biases towards peers with disabilities--as evident in their sociometric ratings of peers and friendship decisions (Diamond & Hestenes, 1996; Diamond et al,, 1993; Diamond et al., 2008)--and that children underestimate the knowledge of persons with 'negative' physical or dispositional attributes (Johnston, et al. 2015; Landrum, et al.; Lane, et al., 2013). Contrary to our hypothesis, children did *not* differ in the knowledge that they attributed to persons who were typically-abled versus those who were disabled. Children as young as 3-years correctly attributed knowledge to persons who had seen relevant information, regardless of whether they had a physical disability, auditory disability, or were typically-abled.

The second goal of the study was to investigate whether children's trust in informed persons' claims is diminished when those persons possess a physical or auditory disability. One of the only prior studies to explore this issue found that children's epistemic trust in persons' claims was diminished if they were visually depicted as possessing a physical disability or as obese (Jaffer & Ma, 2015). Moreover, children were equally likely to endorse the claims of disabled or obese characters who had recently demonstrated accuracy (by correctly labeling objects) vs. the claims of typical characters who had recently demonstrated *inaccuracy* (by falsely labeling objects). In the current study, we refrained from using *visual* markers of physical or perceptual disability—all characters were seated, and did not possess special equipment—because imagery alone might sway children's responses (e.g., Bascandziev & Harris, 2014). Even without this imagery, we hypothesized that after hearing verbal descriptions of characters' disabilities, the youngest children (3- to 4-year-olds) would prefer the claims of typically-abled persons vs. persons with disabilities, regardless of which person had perceived the critical information. Inconsistent with our predictions, characters' disabilities did *not* influence the epistemic trust of children at any age. By approximately 4 years, children tended to endorse the claims of the characters who had visual access to (and thus, knowledge of), what was inside the box. This pattern held whether the character was physically-disabled, perceptually-disabled, or had no disabilities.

These findings suggest that children may not conceptualize physical or perceptual disabilities (conveyed via verbal descriptions) as particularly negative attributes, or that perhaps children do not treat disability status alone as grounds for making inferences about the quality of people's knowledge. Recall that most prior research that has identified children as having relatively negative impressions of persons with disabilities (vs. typical persons) employed images that highlight persons' physical differences or their use of disability equipment (Diamond & Hestenes, 1996; Diamond et al., 2008; Huckstadt & Shutts, 2014). We purposely chose to *not* visually depict persons' disabilities or their equipment, so as to not skew children's epistemic inferences based on appearances alone (see Bascandziev & Harris, 2014). Thus, removing this imagery bolstered the internal validity of our study. However, we acknowledge that, in the real world, these markers may be salient and permanent for many persons with disabilities. Perhaps if we had included visual markers of disability, then we might have found that those markers negatively influenced children's knowledge attributions or their epistemic trust. Future research could test this possibility by systematically varying the presence of visual markers of disability when evaluating children's knowledge attributions and epistemic trust.

One may question whether these findings simply reflect that our materials did not successfully convey characters' disabilities to children, or that children forgot about characters' disabilities. Our method and data do not support this interpretation. When we introduced characters, we provided detailed descriptions of their abilities or disabilities, children were asked comprehension questions about the part of the body that was affected by each disability ("So what part of this girl's body doesn't work?") and were asked about the implications of each disability ("Can this girl walk?"). Children typically performed very well on these questions, and if a child did not accurately answer a question, they were corrected. Then, for each scenario that included a character with a disability, we verbally highlighted the disability (e.g., "Remember when we talked about girls whose legs don't work? [Name] is one of those girls. [Name] can hear, but she cannot walk."), we again tested children's comprehension (e.g., "Point to the girl whose legs do not work?") and provided corrective feedback if necessary. Furthermore, work on children's moral cognition has found that these identical disability descriptions *do* influence children's evaluations of non-normative behaviors performed by persons with disabilities (Granata et al., in press). In sum, it is unlikely that children simply did not understand or remember that a character possessed a disability. Instead, our findings suggest that children's epistemic inferences were not swayed simply because a character possessed a disability.

The current study was designed to investigate U.S. children's attributions of *visually-derived* knowledge to persons who possess a physical or auditory disability, and to examine children's trust in those persons' subsequent claims about what they had or had not seen. We found that most preschoolers' knowledge attributions and epistemic trust were not swayed if persons possessed a disability. However, this does not necessarily indicate that children think that person's knowledge and epistemic trustworthiness are equivalent whether or not they possess disabilities. Future studies might employ other paradigms to further evaluate how children conceptualize the minds of persons with and without disabilities, for example by evaluating whether children believe that the *types* of knowledge that persons possess (e.g., knowledge of specific facts or domains; Lane, Wellman, & Evans, 2014; Lutz & Keil, 2002) or their epistemic trustworthiness around certain *topics* varies along with their ability status. Further, it is important to note that we studied children in one context--participants from predominately middle-class families in a Southeastern U.S. city. If a similar study were performed with children raised in another context then different results might be obtained, given that the contexts in which children live vary in how persons with disabilities are interpreted and treated. In general, parents of children in the current sample were highly-educated. It is possible that children's performance on the knowledge-access questions might have been higher than average, given prior work identifying relations between parental education and children's theory-of-mind in some samples (e.g., Ebert et al., 2017). The current findings thus serve as a starting point in identifying how young children come to conceptualize the minds and messages of persons with disabilities.

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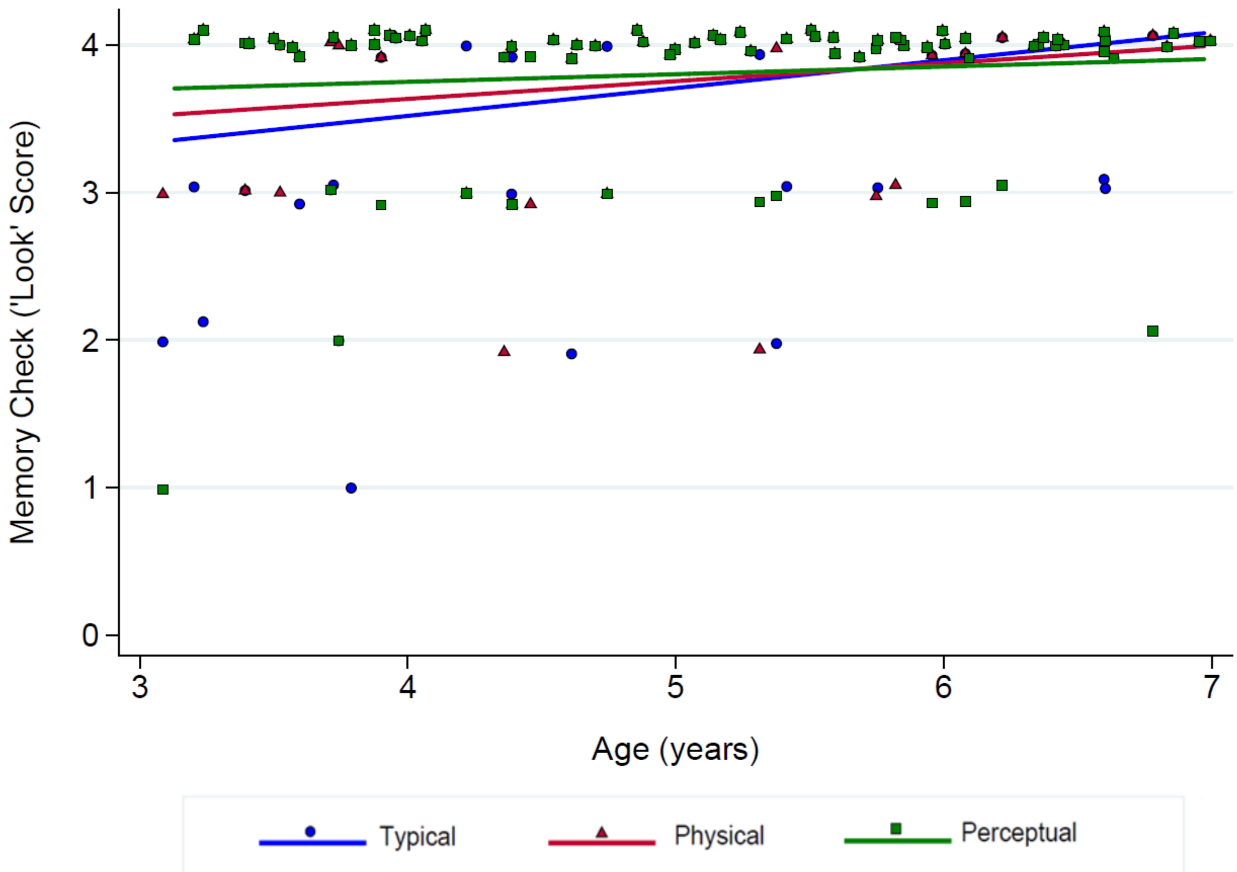


Figure 1. Fitted lines depicting age-related trends in children's correct answers to memory-check questions concerning which of two characters *had* looked inside a box and which had *not* looked inside a box (across two trials, for a maximum score of 4). Data points are non-fitted values, with jitter added to enhance readability. The character who looked inside the box was either typically-abled, physically-disabled, or perceptually-disabled. Due to the nature of fitted lines that assume normal distributions, depicted values may exceed the upper-bound of the criterion variable's range.

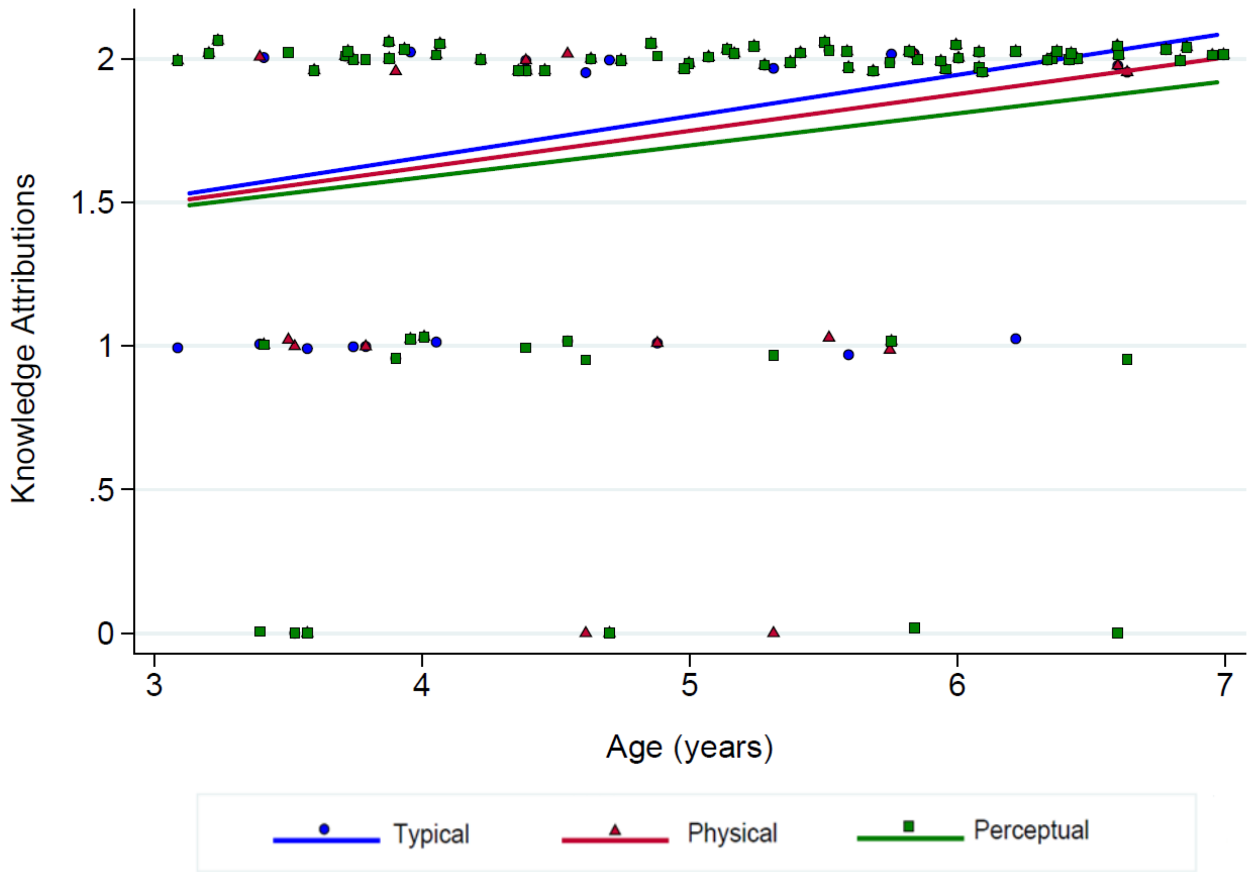


Figure 2. Fitted lines depicting age-related trends in children's correct attributions of knowledge to characters who had looked inside a box (and thus possessed knowledge of the box's contents) across two trials (with a maximum score of 2). Data points are non-fitted values, with jitter added to enhance readability. The character who was knowledgeable was either typically-abled, physically-disabled, or perceptually-disabled. Due to the nature of fitted lines that assume normal distributions, depicted values may exceed the upper-bound of the criterion variable's range.

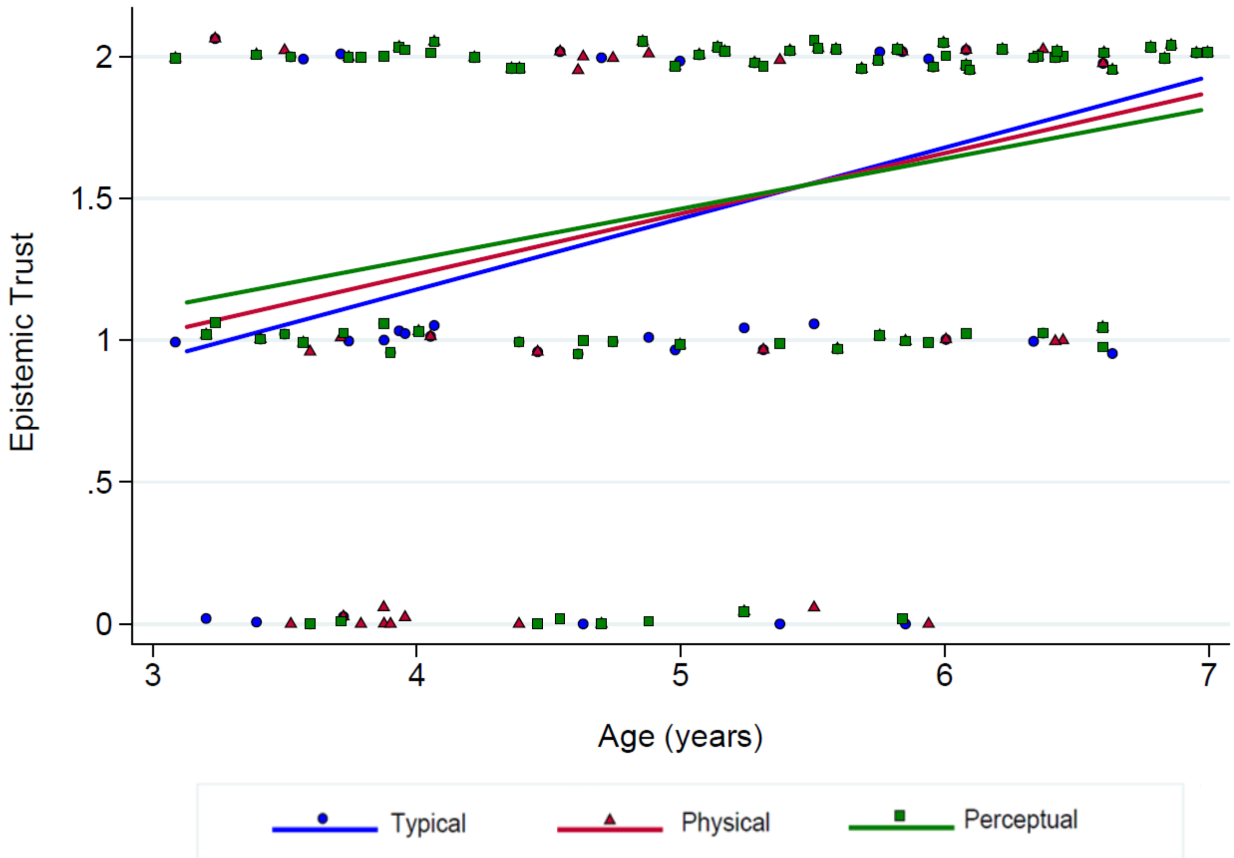
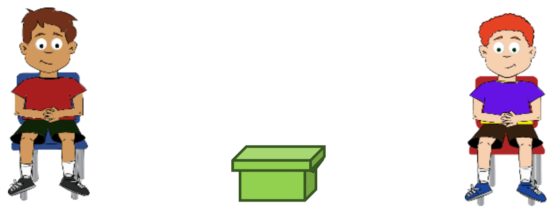
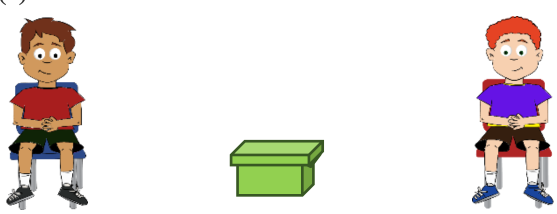


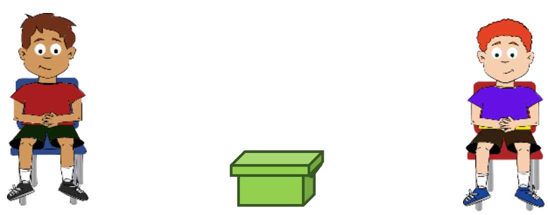
Figure 3. Fitted lines depicting age-related trends in children's endorsement of characters' claims about the content of boxes, for characters who possessed relevant knowledge (i.e., who had looked inside the boxes) across two trials (with a maximum score of 2). Data points are non-fitted values, with jitter added to enhance readability. The character who was knowledgeable was either typically-abled, physically-disabled, or perceptually-disabled.

Appendix A

Example Scenario and Graphics used to Establish Characters' Perceptual Access

<table>
<tr><td>(a)

This is a box. It has something inside that we can't see.</td><td>(b)

Blake touches the box but does not look inside.</td></tr>
<tr><td>(c)

(Move closed box between characters)</td><td>(d)

Kurt opens the box (open box) and looks inside (slightly tilt character toward box).</td></tr>
<tr><td colspan="2">(e)

Then he closes the box (close box and move box between characters).</td></tr>
</table>