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Assessing Children's Implicit Attitudes Using the Affect Misattribution Procedure

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In the current research, we examined whether the Affect Misattribution Procedure (AMP) could be successfully adapted as an implicit measure of children's attitudes. We tested this possibility in 3 studies with 5- to 10-year-old children. In Study 1, we found evidence that children misattribute affect elicited by attitudinally positive (e.g., cute animals) and negative (e.g., aggressive animals) primes to neutral stimuli (inkblots). In Study 2, we found that, as expected, children's responses following flower and insect primes were moderated by gender. Girls (but not boys) were more likely to judge inkblots as pleasant when they followed flower primes. Children in Study 3 showed predicted affect misattribution following happy-face compared with sad-face primes. In addition, children's responses on this child-friendly AMP predicted their self-reported empathy: The greater children's spontaneous misattribution of affect following happy and sad primes, the more children reported feeling the joy and pain of others. These studies provide evidence that the AMP can be adapted as an implicit measure of children's attitudes, and the results of Study 3 offer novel insight into individual differences in children's affective responses to the emotional expressions of others.

For the past 20 years, implicit social cognition has been a main area of inquiry within social psychology and other related disciplines (see Gawronski & Payne, 2010). Research in this area has aimed to circumvent the many limitations of self-report measures by examining the automatic associations that often guide our social judgments and behaviors. To accomplish this goal, a variety of measures designed to assess automatic affective evaluations have been created, with the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998) and sequential evaluative priming tasks (see Wentura & Degner, 2010, for a review) being among the measures most frequently administered to adults (Nosek, Hawkins, & Frazier, 2011). More recently, a new measure has been developed and is rapidly gaining in popularity: the Affect Misattribution Procedure (AMP; Payne, Cheng, Govorun, & Stewart, 2005). The goal of the present research was to develop a modified child-friendly version of the AMP and examine whether it could be used as an implicit measure of children's attitudes.

The term implicit is often used to describe measures that are completed without introspection, conscious intention, or deliberate processing of the construct of interest (Nosek, Greenwald, & Banaji, 2007). Although a great deal of research with adults has made use of implicit measures

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during the last two decades, it has only been in the last 10 years that a handful of researchers have begun to modify these measures to assess *children's* attitudes (see Olson & Dunham, 2010, for a review). As with adults, these methods have the potential to provide greater insight into attitudes and beliefs that might not be accessible to children through introspection alone. In addition, they have the ability to tap into social cognitions that children might be unwilling to share, particularly at specific stages of development when their awareness of social expectations and norms begins to emerge (e.g., Rutland, Cameron, Milne, & McGeorge, 2005). The AMP, which was developed for use with adults (e.g., Gawronski, Cunningham, LeBel, & Deutsch, 2010; Inzlicht, Gutsell, & Legault, 2012; Payne, Burkley, & Stokes, 2008; Payne, Govorun, & Arbuckle, 2008; Payne, Hall, Cameron, & Bishara, 2010), has the potential to be a useful new implicit measure of children's attitudes.

The AMP builds on the classic principle that it is common for people to make misattributions about the origin of their thoughts, feelings, and behaviors (see Loersch & Payne, 2011; Payne et al., 2005, 2010, for reviews). Although people often believe that their judgments are under their conscious control, research has consistently demonstrated that subtle cues or primes in our environment can profoundly impact our cognitions, affect, and behavior (Hofmann & Wilson, 2010; Loersch & Payne, 2011). Building on this notion, in the AMP, participants are presented with multiple trials in which they are briefly exposed to a prime (e.g., a smiling or crying face; 75 ms), a blank screen (125 ms), and a neutral target (e.g., an inkblot; 100 ms), which is masked until the participant indicates whether they believe the neutral target image is more or less visually pleasing than average (Payne et al., 2005). If the primes automatically elicit affect (e.g., a prime of a smiling face elicits positive affect), it will be misattributed to the neutral target (e.g., inkblot), thereby increasing the probability that the judgment of the neutral target will be biased in the direction of the prime (e.g., as more visually pleasing than average). Affect misattribution occurs when the affect that is automatically activated by the prime is subsequently misattributed to the neutral target (i.e., inkblots are judged as more visually pleasing following happy primes compared with sad primes).

The AMP is an implicit measure of attitudes due to the uncontrollable and unintentional nature of misattribution following affect-laden primes. Although participants provide an explicit response for each neutral target, research has provided evidence that the AMP is resistant to intentional responding as participants are unable to correct for the affect activated by the prime (Payne et al., 2005). Across several studies, even when adult participants were motivated to appear unbiased or were instructed to control for the influence of the prime, their judgments of neutral targets were systematically influenced by the valence of the preceding prime (Payne et al., 2013; Payne, Burkley, et al., 2008; Payne et al., 2005; cf. Bar-Anan & Nosek, 2012). Although this type of affect misattribution has been repeatedly demonstrated with adults, researchers have yet to determine whether similar effects emerge with children.

For a number of reasons, the AMP has the potential to be a particularly valuable measure for use with children. Relative to other implicit measures that have been adapted for older children (see Degner & Wentura, 2010), the AMP requires a small number of trials and uses straightforward instructions, and effects are not based on response latencies, which can be influenced by children's focus and/or temporary distractions. In addition, the task structure of the AMP allows researchers to easily create absolute attitude estimates toward each target group of interest in addition to a relative score (e.g., Payne et al., 2005; see also Bar-Anan & Nosek, 2014). Without diminishing the importance of research with other child-friendly implicit measures that has been conducted to date, due to the methodological and practical benefits offered by the AMP, we believe that this measure has the potential to be another valuable tool for researchers interested in studying children's implicit cognition.

OVERVIEW

The primary goal of the current research was to determine whether children in middle (5–7 years of age) and late (8–10 years of age) childhood[1] would show misattribution effects following affect-laden primes. In Study 1, we primed children with attitudinally positive and negative images (Payne et al., 2005; see also Degner & Wentura, 2010, for a similar validation procedure with an affective priming task for children) that were quickly replaced by neutral targets (inkblots) that children assessed as being pleasant or unpleasant. We anticipated that both younger and older children would show misattribution effects and be more likely to judge inkblots following positive primes (e.g., cute animals) as pleasant compared with inkblots following negative primes (e.g., aggressive animals). In Study 2, we presented different non-social attitude objects (flowers and insects) as affect-laden primes (Greenwald et al., 1998; see also Baron & Banaji, 2006, for a similar validation procedure with a child-friendly IAT), and we manipulated the duration of primes and targets to determine whether specific timing parameters optimized effects on the child-friendly AMP (ch-AMP). We again anticipated a misattribution effect. However, based on previous research that showed boys to have more ambivalent attitudes toward flowers and insects (Baron & Banaji, 2006; Cvencek, Greenwald, & Meltzoff, 2011), we expected this effect to be moderated by gender, with boys showing an attenuated priming effect.

The goal of Study 3 was to further our understanding of the development of children's implicit social cognition by using the ch-AMP to examine whether affect misattribution would occur when happy and sad faces served as primes. Emotional expression conveys important social information that influences person perception (see Freeman, Johnson, Adams, & Ambady, 2012, for a review), and the processing of emotional expression can occur automatically under conditions of limited awareness (Rohr, Degner, & Wentura, 2012). Furthermore, the ability to detect, decode, and respond to facial expressions is a key component of emotional competency and these skills have been shown to contribute to important aspects of development, such as peer relations, academic success, and positive health-related behaviors, across the life span (see Buckley & Saarni, 2006, for a review). These skills can be critical for successfully navigating the social world; it is important to be able to promptly identify and respond to the emotions of others to appropriately regulate one's own behavior during social interactions (Buckley & Saarni, 2006). In Study 3, we examined whether children would show affect misattribution on the ch-AMP in response to happy and sad primes. Consistent with what has been found with adults (e.g., Donges, Kersting, & Suslow, 2012; Rohr et al., 2012), we anticipated a misattribution effect for these socially relevant targets, with children showing an implicit preference for happy compared with sad target faces.

In Study 3, we also sought to extend this research by examining whether individual differences in children's implicit social cognition as measured by the ch-AMP could predict

[1]This age categorization is similar to what has previously been used in research examining the development of children's implicit social cognition (e.g., Baron & Banaji, 2006; Dunham, Baron, & Banaji, 2006).

self-reported empathy. Given that empathy has been defined as “vicarious affective arousal resulting from an identification with the emotional state of another person” (Chapman, Zahn-Waxler, Cooperman, & Iannotti, 1987, p. 140), we anticipated that children who spontaneously experience more intense affect in response to emotion-laden prime images, as indicated by stronger priming effects, would report feeling more pronounced empathy toward others. Such a finding would be the first demonstration that children’s automatic affective response toward smiling and crying targets can predict their self-reported empathetic responses.

STUDY 1

The goal of Study 1 was to examine children’s affect misattribution following attitudinally positive and negative primes using a procedure modeled after Payne et al. (2005).

Method

Participants. Seventy children were recruited from and tested in a community setting in the Greater Toronto area. The sample included 30 younger children aged 5 to 7 years old (15 boys, 15 girls; median age = 6 years) and 40 older children aged 8 to 10 years old (18 boys, 21 girls, 1 not reported; median age = 9 years). The racial/ethnic composition of the sample was 68% White, 20% Multiracial, 6% East/Southeast Asian, 3% Latin American, and 3% South Asian or Middle Eastern. Parental permission was obtained prior to participation.

Procedure. As part of a larger study, participants completed an AMP (Payne et al., 2005) that was modified slightly to be appropriate for use with children (ch-AMP). Children were told that they would play a “decision game” in which they would see briefly presented inkblots.[2] After researchers showed each child what a typical inkblot looks like, they told children that their task was to indicate whether each inkblot was “nice looking” or “not so nice looking” by pressing one of two computer keys. The keys associated with the response options were counterbalanced between participants, and children were encouraged to make use of both of these response options. To provide an ostensible rationale for showing prime images and to circumvent controlled responding while ensuring that children attended to the primes, participants were told that each inkblot would be preceded by a picture that they should try to remember because they might be asked about the pictures later. It was stressed that “this picture will just let you know that the inkblot is coming” and that children were to make decisions about the *inkblot*.

[2]Inkblots were used as neutral targets instead of Chinese characters (Payne et al., 2005) to control for potential familiarity with Chinese characters that might occur as a consequence of our racially diverse participants and testing location. To determine target neutrality, seven adults rated 102 inkblots on a 3-point scale (negative [−1], neutral [0], positive [+1]) and a 2-point scale (negative [0], positive [+1]). Scores were summed across the seven raters for each of these two scales. Twenty-two of the inkblots were consistently rated as positive or negative (e.g., the summed scores were equal to or greater than |5| on the 3-point scale or were less than 2 or greater than 5 on the 2-point scale). These inkblots were removed from the pool. A one-sample t test on the summed scores for the remaining 80 inkblots revealed that the mean of the 3-point scale was not significantly different from neutral ($M = 0.19$, $SD = 1.98$), $t(79) = 0.85$, $p = .40$.

Each trial began with a blank screen for 540 ms to 1,020 ms, followed by a prime presented for 75 ms, a blank screen for 75 ms, a neutral inkblot for 125 ms or 150 ms,[3] and a mask that remained on screen until a response was made. Following 10 practice trials in which shapes were presented as primes, children completed two critical blocks, each including 16 trials. In each block, children were sequentially and randomly presented with one of eight positive (e.g., puppies, a bunny) and one of eight negative (e.g., a growling bear, an attacking shark) prime images that were judged a priori by the authors to be unambiguously positive and negative, respectively. Each prime was followed by an inkblot that was randomly selected without replacement from a set of 80. The two critical blocks were separated by a break screen that provided children with the opportunity to rest and ask questions. Throughout the task, a header with the word "unpleasant" above a simple line drawing of a frowning face and the word "pleasant" above a simple line drawing of a smiling face remained at the top of the screen to remind participants of their response options. Using the procedure outlined by Payne et al. (2005, Study 1), responses demonstrated acceptable internal consistency (α = .73).

Results and Discussion

The proportion of inkblots judged favorably was calculated separately for trials presenting positive and negative primes (Payne et al., 2005). The responses of six children were removed because they either intentionally rated the prime image (n = 3) or used the same response key for every item (n = 3). A 2 (prime valence: positive vs. negative) × 2 (participant gender: boys vs. girls) × 2 (participant age: younger vs. older) analysis of variance (ANOVA) with the first factor within subjects revealed a main effect of prime valence, $F(1, 60) = 56.47$, $p < .001$, $\eta_p^2 = .49$; children were more likely to judge inkblots as pleasant when they followed positive as compared with negative primes (Figure 1). When comparing the priming effects to chance (.5), children were reliably more likely to judge inkblots following positive primes as pleasant, $t(63) = 9.38$, $p < .001$, $d = 1.17$, and inkblots following negative primes as unpleasant, $t(63) = -2.57$, $p = .01$, $d = 0.32$. This priming effect did not differ by participant gender or age, Fs < 2.10, ps > .15, η_p^2s < .04.

This result demonstrates that children as young as 5 years of age show priming effects. This finding is important as it provides initial evidence that affect-laden stimuli can elicit affective responses in children that can subsequently be misattributed to a neutral target. As such, these data suggest that a modified version of the AMP can be used to assess children's implicit cognition, even early in development (i.e., 5–7 years of age). In Study 2, we sought to extend these initial findings by (a) examining the effect of manipulating presentation times for primes and targets, and (b) presenting primes that have been used previously in research examining implicit attitudes: flowers and insects.

STUDY 2

In Study 2, we again examined whether children would show affect misattribution following attitudinally valenced primes. Flowers and insects were selected as primes because previous

[3]For just less than half of the participants (n = 30), the inkblots were presented for 125 ms. For all other participants, the inkblots were presented for 150 ms. The proportion of pleasant responses following positive and negative primes did not differ by target duration, Fs < 0.26, ps > .61.

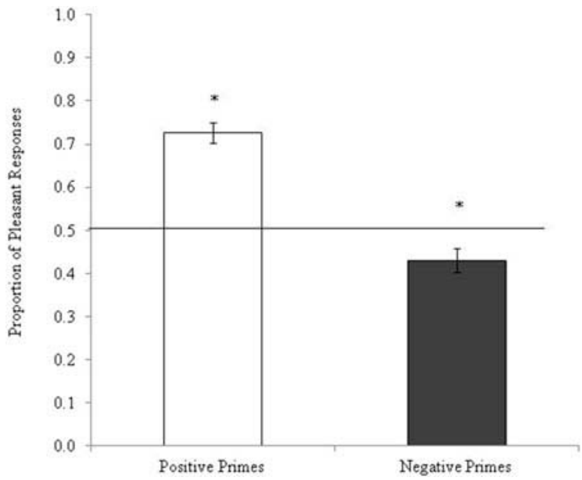

FIGURE 1. Proportion of pleasant (vs. unpleasant) responses by prime type in Study 1. Error bars represent standard error. *$p < .05$ for comparison to chance responding (.5).

research has demonstrated that both adults (Baron & Banaji, 2006; Greenwald et al., 1998) and children (Baron & Banaji, 2006; Cvencek, Greenwald, et al., 2011; Thomas, Smith, & Ball, 2007) typically demonstrate an implicit preference for flowers in comparison with insects, and as such, it has been argued that "the ability to detect a preference for flowers (relative to insects) indicates that the measure is working" (Cvencek, Greenwald, et al., 2011, p. 196; see also Baron & Banaji, 2006; Greenwald et al., 1998). In addition, this relative preference is typically more pronounced for girls as compared with boys (Baron & Banaji, 2006; Cvencek, Greenwald, et al., 2011). Therefore, using these primes provided us with the opportunity to examine whether a similar gender difference would emerge on the ch-AMP.

After the ch-AMP, children completed a child-friendly flower-insect IAT (ch-IAT) comparable to what has been used in previous research (Baron & Banaji, 2006; Cvencek, Greenwald, et al., 2011). When completing the ch-IAT, participants categorize images into superordinate groups, and reaction times are used to create a relative score (preference for flowers relative to insects). By contrast, on the ch-AMP, prime images are not required to be categorized into superordinate groups. Instead, responses following each prime (e.g., sunflower or wasp) are compiled to estimate implicit preference for single categories (e.g., flowers or insects), which can be combined into a relative preference score (positivity toward flowers relative to insects).

In Study 2, we anticipated that attitude estimates on these two implicit measures would show a similar pattern of results, despite the differences in task structure. We anticipated that by 5 years of age, children would have developed affective responses to the categories of flowers and insects (Baron & Banaji, 2006; Cvencek, Greenwald, et al., 2011) and toward specific exemplars from these categories, such as a sunflower or wasp. However, given that affective responses elicited by categories (e.g., insects) and individual exemplars from the categories (e.g., a wasp) can differ (Degner & Wentura, 2010; Fazio & Olson, 2003; Livingston & Brewer, 2002; Olson & Fazio, 2003), we expected to find a small, if any, relationship between children's responses on the two measures.

In addition, we expected that girls in our sample would demonstrate an implicit preference for flowers as compared with insects on both the ch-AMP and ch-IAT; such a finding would be consistent with gender differences found in previous studies that have used a ch-IAT (e.g., Baron & Banaji, 2006; Cvencek, Greenwald, et al., 2011). We also predicted that for boys, who are culturally encouraged to have a less positive orientation toward flowers and a more positive orientation toward insects compared with girls (Cvencek, Greenwald, et al., 2011), this pro-flower bias would be attenuated.

A second goal of this study was to examine whether the priming effect would be moderated by different timing parameters for the ch-AMP. In line with more recent procedural variations of the AMP used with adults, we removed the blank screen (e.g., Bar-Anan & Nosek, 2012, Study 2; Inzlicht et al., 2012; Payne et al., 2010, Study 1; see also Payne et al., 2005, Study 3), and as a within-subjects variable, we manipulated the duration of the primes and targets. Based on previous research with adults (Payne et al., 2005, Studies 3 and 4), we expected priming effects to emerge regardless of the duration of the stimuli. Nonetheless, we manipulated the timing to determine whether priming effects would be more pronounced under specific parameters.

Method

Participants. Fifty-seven children were recruited from and tested in a community setting in the Greater Toronto area. The sample included 30 younger children aged 5 to 7 years old (13 boys, 17 girls; median age = 6 years) and 27 older children aged 8 to 10 years old (14 boys, 13 girls; median age = 9 years). The racial/ethnic composition of the sample was 54% White, 21% East/Southeast Asian, 16% Multiracial, and 9% South Asian.

Procedure. After obtaining parental permission, children completed the ch-AMP. The task was similar to that in Study 1, with the exception that the instructions were changed to be more consistent with those used for adults (Payne et al., 2005). Children were told:

> To warn you that the inkblot is coming, you will see a real-life image before each inkblot. Since we are interested in what you think only of the *inkblot*, try not to let this picture change your answers. Please tell us about the *inkblot* as best you can, no matter what picture (is) in front of it.

In each trial, participants viewed a prime followed by an inkblot and a mask that remained on screen until a response was made. To ensure that children understood the task instructions, participants first completed 2 paper-based practice trials presenting one positive (i.e., dolphin) and one negative (i.e., garbage) prime image (International Affective Picture System [IAPS]; Lang, Bradley, & Cuthbert, 2005). The paper-based trials were comparable to the computerized ch-AMP trials, with the exception that stimuli were presented on paper. The experimenter rapidly presented the child with a blank sheet of paper, followed by a paper containing a prime image, then a picture of an inkblot, and finally a printed copy of a mask image. Once the mask was covering the other sheets of paper, children were asked to verbally identify whether the inkblot was "nice" or "not so nice" and point to the corresponding computer key that they would use in the upcoming computer task. During these paper-based practice trials, the experimenter emphasized that children were to judge the inkblots and not the real-life images. The paper-based trials were followed by 10 practice trials completed on the computer. To familiarize children with each of the timing parameters (see paragraph below), in the computer-based practice trials, stimuli were presented for the same duration as in the standard (n = 4), long-prime (n = 3), and long-target (n = 3) conditions. To ensure that children were judging the inkblots, after the first practice trial on the computer, children were asked, "What were you judging?" If a child reported judging the real-life image or the mask, it was stressed that the task required them to judge the inkblot.

After the practice trials, participants completed three blocks containing the critical trials. Each block contained 24 trials, which included eight pictures of flowers (e.g., sunflower, violet, roses, chrysanthemum), eight pictures of insects (e.g., beetles, wasps, cockroaches, mosquitoes), and eight neutral grey squares (Payne et al., 2005) as the primes, each presented individually and in random order. Prime and target durations were manipulated within subjects, and each randomly ordered block presented a different timing paradigm. In the *standard* condition, primes were presented for 75 ms and inkblots were presented for 225 ms. In the *long-prime* condition, primes were presented for 425 ms and inkblots were presented for 225 ms. In the *long-target* condition, primes were presented for 75 ms and inkblots were presented for 675 ms. Each block was separated by a break screen, during which children were reminded that their task was to judge the inkblots.

Participants then completed a picture-based IAT (Greenwald et al., 1998) that was reduced in length to be child-friendly (ch-IAT; Cvencek, Greenwald, et al., 2011; Rutland et al., 2005; Williams & Steele, 2011). In one critical block, participants categorized color images of flowers (i.e., daisies, sunflowers, plumeria, and a chrysanthemum; n = 4) and positive objects (i.e., a bunny, a seal, a birthday party, and Disney characters; n = 4) using one computer key, and they categorized color images of insects (i.e., a wasp, a mosquito, a swarm of wasps, and cockroaches; n = 4) and negative objects (i.e., a garbage can, litter, a gas can, a collapsed house; n = 4; IAPS; Lang et al., 2005) using another computer key. In the other critical block, the keys used to identify flowers and insects were reversed; insects and positive objects were categorized with one computer key, and flowers and negative objects were categorized with another. The critical blocks consisted of 12 "practice" and 20 "test" trials (Greenwald, Nosek, & Banaji, 2003; Rutland et al., 2005) and were counterbalanced between participants. Throughout the task, pictorial headers representing the categories (i.e., simple line drawings of a smiling face, frowning face, flower, and insect) were appropriately positioned in the upper left and right corners of the screen. Incorrect responses were identified with a blue "X," and a correct response was required to move the task forward. Responses on the ch-AMP (α = .67) and ch-IAT (α = .83; as per Bosson, Swann, & Pennebaker, 2000) demonstrated comparable internal consistency to what has been previously found with adults (Payne et al., 2005; Williams & Steele, 2011).

Results and Discussion

Child-Friendly Affect Misattribution Procedure. To examine whether children demonstrated affect misattribution, the proportion of inkblots judged favorably following flower, neutral, and insect primes was calculated separately for the three duration conditions. The data from two children were removed from the ch-AMP analyses either because they intentionally rated the prime image (n = 1) or used the same response key for every item (n = 1). Responses were analyzed using a 3 (prime: flower vs. neutral vs. insect) × 3 (duration: standard vs. long

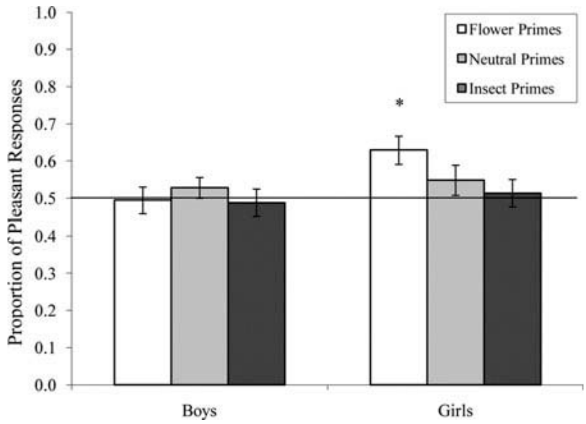

FIGURE 2. Proportion of pleasant (vs. unpleasant) responses by prime type and gender of participant in Study 2. Error bars represent standard error. *$p < .05$ for comparison to chance responding (.5).

prime vs. long target) × 2 (participant gender: boy vs. girl) × 2 (participant age: younger vs. older) ANOVA with the first two factors within subjects. Regardless of duration condition or participant age, Fs < 2.25, ps > .13, η_p^2s < .05, the expected linear trend for the priming effect emerged, $F(1, 51) = 4.40$, $p = .04$, $\eta_p^2 = .08$, and this was qualified by a Prime × Gender interaction, $F(2, 102) = 3.03$, $p = .05$, $\eta_p^2 = .06$ (Figure 2).

To decompose the Prime × Gender interaction, two (prime: flower vs. neutral vs. insect) within-subjects ANOVAs were conducted separately for boys and girls. For boys, no significant effect emerged, $F(2, 48) = 0.65$, $p = .53$, $\eta_p^2 = .03$, $F(1, 24) = 0.02$, $p = .88$, $\eta_p^2 = .001$, for the linear trend. By contrast, girls demonstrated a main effect of prime, $F(2, 58) = 4.19$, $p = .02$, $\eta_p^2 = .13$, $F(1, 29) = 7.09$, $p = .01$, $\eta_p^2 = .20$, for the linear trend. Girls were more likely than chance (.5) to judge inkblots following flower primes as pleasant, $t(29) = 3.43$, $p = .002$, $d = 0.63$. Judgments of inkblots following neutral, $t(29) = 1.20$ $p = .24$, $d = 0.22$, and insect primes, $t(29) = 0.38$, $p = .71$, $d = 0.07$, did not differ significantly from chance. As expected, girls were also more likely than boys to judge inkblots following flower primes as pleasant, $t(53) = 2.55$, $p = .01$, $d = 0.69$. There were no significant differences between girls' and boys' ratings following neutral, $t(53) = 0.40$, $p = .69$, $d = 0.11$, or insect, $t(53) = 0.63$, $p = .63$, $d = 0.13$, primes.

Child-Friendly Implicit Association Test. The improved scoring algorithm outlined by Greenwald et al. (2003; see also Bar-Anan & Nosek, 2014) was used to create D scores. No participants were removed on the basis of fast responding (i.e., ≥ 10% of responses less than 300 ms); however, trials with response latencies greater than 10,000 ms were eliminated (< 1% of responses). As recommended by Cvencek, Meltzoff, and Greenwald (2011), we also removed children with a high error rate (i.e., > 35% of responses were incorrect; $n = 2$) or who were slow responding (i.e., average response latency was ≥ 3 standard deviations greater than the mean response for the sample; no children met this criteria) from the analyses involving the ch-IAT. For each child, the mean response latency for practice-congruent trials (i.e., Flower + Pleasant /

Insect + Unpleasant) was subtracted from the mean response latency of the practice-incongruent trials (i.e., Flower + Unpleasant / Insect + Pleasant) and was divided by the standard deviation of each child's responses on all of the practice trials combined. A similar score was created based on responses to test trials, and the two scores were averaged into a single *D* score, where higher values indicate greater preference for flowers relative to insects.

To examine whether a similar gender difference would emerge on the ch-IAT, *D* scores were analyzed with a 2 (participant gender: boy vs. girl) × 2 (participant age: younger vs. older) between-subjects ANOVA. A main effect of gender emerged, $F(1, 51) = 4.47$, $p = .04$, $\eta_p^2 = .08$, such that girls showed a stronger relative preference for flowers over insects ($D = 0.67$, $SD = 0.44$) as compared with boys ($D = 0.41$, $SD = 0.56$). No other effects emerged, $F\text{s} < 2.40$, $p\text{s} > .12$, $\eta_p^2\text{s} < .05$. One-sample *t* tests comparing *D* scores to 0 revealed that both boys, $t(25) = 3.75$, $p = .001$, $d = 0.74$, and girls, $t(28) = 8.34$, $p < .001$, $d = 1.55$, demonstrated an implicit preference for flowers relative to insects.

Relationship Between the Measures. To examine whether the implicit measures were correlated, we first converted responses on the ch-AMP into a relative preference score to make it more comparable to the ch-IAT *D* scores (e.g., Bar-Anan & Nosek, 2012, 2014). We did this by subtracting the proportion of pleasant responses following insect primes from the proportion of pleasant responses following flower primes (Bar-Anan & Nosek, 2014; Payne et al., 2005). As such, higher scores indicate a relative preference for flowers over insects. Although in the anticipated direction, children's responses on the ch-AMP and those on the ch-IAT were not significantly related, $r = .24$, $p = .09$. In addition, given the gender difference observed on these measures, we examined whether the scores of boys or girls would be significantly correlated. They were not related for boys, $r = .12$, $p = .59$, or for girls, $r = .26$, $p = .17$, despite the similar pattern of results that emerged on both of these measures. We also examined the relationship between each of the absolute attitude estimates on the ch-AMP and the ch-IAT *D* scores. We first controlled for baseline responding by subtracting the proportion of pleasant responses following neutral primes from the proportion of pleasant responses following the flower and insect primes, respectively (Bar-Anan & Nosek, 2012, 2014; Payne et al., 2005); higher scores indicate more automatically activated positivity in response to category primes as compared with neutral primes. Responses following flower primes were not significantly related to *D* scores, $r = .13$, $p = .37$, nor were responses following insect primes, $r = -.16$, $p = .25$.

In sum, in line with our hypotheses, a gender difference emerged on both implicit measures, with girls demonstrating greater implicit preference for flowers as compared with boys. Given that girls are culturally encouraged to have more positive attitudes toward flowers relative to boys (e.g., Cvencek, Greenwald, et al., 2011), it is perhaps not surprising that even when these pictures were not categorized by their superordinate group (flowers), they evoked more positive affect for girls that was reliably misattributed to the neutral inkblots. Taken together, these findings provide additional evidence that the ch-AMP can be effectively used as an implicit measure of attitudes in childhood.

It is worth noting, however, that the ch-AMP failed to produce a significant gender difference in priming effects for insects. Although it is possible that this finding was due to a shortcoming with this measure when adapted for use with children, given our other results, we believe that a more likely explanation is that both boys and girls feel some degree of ambivalence toward insects that can produce temporary discomfort or harm (e.g., a wasp sting) but also pique curiosity, provide benefits to our ecosystem (e.g., pollination), or are a source of entertainment when featured in storybooks and cartoons. As such, it is likely that these exemplars were not sufficiently consistent at spontaneously evoking negative affect that could be subsequently misattributed. It is also possible that previously established gender effects on flower–insect ch-IATs (Baron & Banaji, 2006; Cvencek, Greenwald, et al., 2011) largely reflect gender differences in attitudes toward flowers and/or attitudes toward the larger category of "insects." This latter possibility is consistent with the larger effect sizes that emerged for the ch-IAT as compared with the ch-AMP, a point that is revisited in the General Discussion. These possibilities once again highlight the importance of having multiple measures available to gain a more nuanced understanding of children's implicit cognition.

STUDY 3

In Studies 1 and 2, we established the ch-AMP as a potential implicit measure of children's attitudes by demonstrating that primes could elicit predictable affective responses that were subsequently misattributed to neutral stimuli. In Study 3, we aimed to extend these findings by examining whether children would show affect misattribution following socially relevant primes, specifically happy and sad faces. We selected these affect-laden faces as our socially relevant targets because having the ability to spontaneously and rapidly identify and react to others' emotions is important for successfully navigating social interactions (Buckley & Saarni, 2006), and we therefore anticipated that, like adults, children would have developed this ability. Accordingly, we anticipated that, like adults (e.g., Donges et al., 2012; Rohr et al., 2012), children would show predictable priming effects toward the members of these groups, with children providing more pleasant responses following smiling primes as opposed to crying primes. This pattern of results would provide some initial evidence that the ch-AMP can be used to assess children's implicit social cognition and that viewing happy and sad target faces spontaneously evokes predictable affect in children. As in Study 2, we also administered a comparable ch-IAT.[4] Consistent with our previous results, we predicted that attitude estimates on the ch-AMP and ch-IAT would show a similar pattern, with children demonstrating an implicit preference for happy relative to sad faces on both measures. However, given the differences in the task structure, we again anticipated a small, if any, relationship between the two measures.

A second goal of Study 3 was to examine whether individual differences in affect misattribution could predict empathy. Empathy has been defined as "vicarious affective arousal resulting from an identification with the emotional state of another person" (Chapman et al., 1987, p. 140). Accordingly, individuals high in empathy are more likely to share in another's emotional state, an ability that has been linked to prosocial behavior and social competence across

[4]Studies with adults have shown that greater positive affect emerges in response to happy as compared with sad faces (e.g., Donges et al., 2012; Rohr et al., 2012). Although the happy/sad ch-IAT has not been validated with children, this measure was included to examine whether children would show a similar pattern of implicit preference on both the ch-AMP and ch-IAT. Because "the IAT is a very flexible task that can be used to assess almost any type of association between pairs of concepts" (Gawronski & De Houwer, 2014, p. 285) and research with this measure has demonstrated robust effects across a variety of domains with both children (see Olson & Dunham, 2010, for a review) and adults (see Gawronski & De Houwer, 2014, for a review), we felt that this was a useful measure for comparison, despite the lack of prior use with children.

childhood (e.g., Eisenberg & Miller, 1987). Because attitudes measured by the ch-AMP reflect affect that is automatically activated by individual prime images (Payne et al., 2005) and empathy is an emotional reaction to the experiences of another *person*, we anticipated that responses on the ch-AMP would predict empathy. Specifically, we expected that children who spontaneously experience more intense emotions in response to these affect-laden prime images, as evidenced by stronger priming effects, would report greater empathy toward others. This finding could provide important new evidence that individual differences in implicit attitudes as measured by affect misattribution can predict children's self-reported feelings toward others. In addition, because some have suggested that the IAT measures implicit attitudes toward categories (Greenwald et al., 1998) that may reflect both culturally shared assumptions and personal beliefs (see Fazio & Olson, 2003; Teige-Mocigemba, Klauer, & Sherman, 2010, for reviews), we were less certain whether responses on the ch-IAT would similarly predict empathy. Therefore, we examined the relationships between children's responses on both implicit measures and their self-reported empathy. To test the incremental validity of the implicit measures, we specifically examined whether the ch-AMP would predict self-reported empathy above and beyond the ch-IAT.

Method

Participants. Eighty-four children were recruited from and tested in a community setting in the Greater Toronto area. The sample included 35 younger children aged 5 to 7 years old (17 boys, 18 girls; median age = 6 years) and 49 older children aged 8 to 10 years old (27 boys, 22 girls; median age = 9 years). The racial/ethnic composition of the sample was 52% White, 17% East/Southeast Asian, 17% South Asian or Middle Eastern, and 14% Multiracial.

Procedure. After obtaining parental permission, children completed the ch-AMP. As in Study 2, participants were told that they would be shown a real-life image to signal that an inkblot was coming, and they were informed that their task was to rate the inkblot regardless of the preceding picture. The timing from the long-prime condition in Study 2 was used because informal observation suggested it was the most engaging timing parameter for children. In each trial, participants viewed a prime for 425 ms followed by an inkblot for 225 ms and a mask that remained on screen until a response was made. Children first completed 2 paper-based practice trials followed by 10 practice trials on the computer.

After the practice trials, participants completed two blocks of critical trials. Each block contained 24 trials, which included eight pictures of a happy face (i.e., a boy [n = 4] or girl [n = 4] who was smiling or laughing), eight pictures of a sad face (i.e., a boy [n = 4] or girl [n = 4] who was crying or pouting), and eight neutral grey squares (Payne et al., 2005) as the primes. Each prime was presented individually and in a random order. Each block was separated by a break screen, during which children were reminded that their task was to judge the inkblots. To remove the potential confound of emotive content from judgments of the inkblots, the header images used in Studies 1 and 2 were modified slightly. In the current study, the word "unpleasant" appeared above a simple line drawing of a rain cloud and the word "pleasant" appeared above a simple line drawing of the sun.

Participants then completed a picture-based ch-IAT as in Study 2. Positive objects included images of kittens, puppies, a beautiful vista, and Disney characters (n = 4), and negative objects included images of an overflowing garbage can, litter, a gas can, and a collapsed house (n = 4; IAPS; Lang et al., 2005). The flower images were replaced with happy faces (i.e., two boys and two girls who were smiling), and the insect images were replaced with sad faces (i.e., two boys and two girls who were crying). Throughout the task, pictorial headers representing the categories (i.e., simple line drawings of a rain cloud and the word "unpleasant," the sun and "pleasant," a line drawing of a smiling face, and a line drawing of a frowning face) were appropriately positioned in the upper left and right corners of the screen to remind children of their response options. Incorrect responses were identified with a blue "X," and a correct response was required to move the task forward. Responses on the ch-AMP (α = .73) and ch-IAT (α = .74) demonstrated comparable internal consistency to what has been previously found with adults (Payne et al., 2005; Williams & Steele, 2011).

Finally, children completed three items modified from Nesdale, Griffith, Durkin, and Maass (2005) to assess empathy. Children responded to items asking whether they feel empathy when someone is *hurt* ("When you see a boy or girl being hurt, how upset do you get?"), *crying* ("When you see a child who is crying, how much do you feel like crying too?"), and *happy* ("When you see someone who is happy, how happy do you feel?") using a 4-point unipolar scale that ranged from 1 (not at all) to 4 (very), α = .52. Each point on the scale was identified by a cartoon face with an expression that systematically increased in size (i.e., "not at all" was accompanied by a neutral face, and "very" was accompanied by an extremely sad [Questions 1 and 2] or happy [Question 3] face).

Results and Discussion

Child-Friendly Affect Misattribution Procedure. To examine whether children demonstrated affect misattribution in response to our social stimuli, the proportion of inkblots judged favorably following happy, neutral, and sad primes was calculated separately. The data from nine children were removed from the analyses because they indicated rating the prime image at least some of the time (n = 3), used the same response key for every item (n = 2), or expressed an

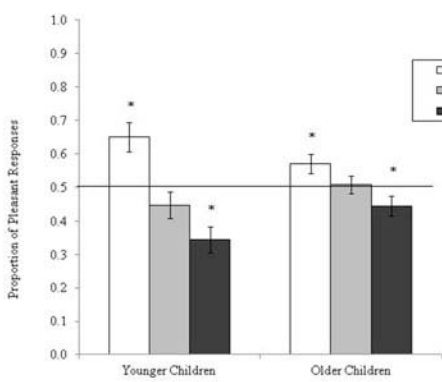

FIGURE 3. Proportion of pleasant (vs. unpleasant) responses by prime type and age of participant in Study 3. Error bars represent standard error. *p < .05 for comparison to chance responding (.5).

awareness of the purpose of the task (e.g., that the primes would influence their responses; n = 4). Responses were analyzed using a 3 (prime: happy vs. neutral vs. sad) × 2 (participant gender: boy vs. girl) × 2 (participant age: younger vs. older) ANOVA with the first factor within subjects. Although not directly relevant to the current theorizing, a main effect of gender emerged. Regardless of the preceding prime, girls (M = 0.55, SD = 0.11) were more likely to judge inkblots as pleasant as compared with boys (M = 0.45, SD = 0.13), $F(1, 71) = 13.87$, $p < .001$, $\eta_p^2 = .16$. Importantly, the expected linear trend for the priming effect emerged, $F(1, 71) = 35.07$, $p < .001$, $\eta_p^2 = .33$, and was qualified by a Prime × Age interaction, $F(2, 142) = 4.52$, $p = .01$, $\eta_p^2 = .06$ (Figure 3). No other effects emerged, Fs < 2.50, ps > .11, η_p^2s < .04.

To decompose the interaction, within-subjects ANOVAs were conducted separately for younger and older children. Younger children demonstrated a significant priming effect, $F(2, 62) = 17.57$, $p < .001$, $\eta_p^2 = .36$; $F(1, 31) = 23.72$, $p < .001$, $\eta_p^2 = .43$, for the linear trend. Younger children were significantly more likely to judge inkblots following happy primes as pleasant, $t(31) = 3.44$, $p = .002$, $d = 0.61$, and inkblots following sad primes as unpleasant, $t(31) = –3.97$, $p < .001$, $d = 0.70$, relative to chance (.5). Judgments of inkblots following neutral primes did not differ significantly from chance, $t(31) = -1.36$, $p = .18$, $d = 0.24$. A priming effect also emerged for the older children, $F(2, 84) = 5.38$, $p = .006$, $\eta_p^2 = .11$; $F(1, 42) = 8.81$, $p = .005$, $\eta_p^2 = .17$, for the linear trend. When comparing the priming effects to chance (.5), older children were more likely to judge inkblots following happy primes as pleasant, $t(42) = 2.47$, $p = .02$, $d = 0.38$, and inkblots following sad primes as unpleasant, $t(42) = -1.98$, $p = .05$, $d = 0.30$. Judgments of inkblots following neutral primes did not differ significantly from chance, $t(42) = 0.28$, $p = .78$, $d = 0.04$. Although similar priming effects emerged for both age groups, younger children were more likely to judge inkblots following sad primes as unpleasant compared with older children, $t(73) = -2.16$, $p = .03$, $d = 0.43$. Responses to inkblots following happy, $t(73) = 1.61$, $p = .11$, $d = 0.32$, and neutral, $t(73) = -1.34$, $p = .19$, $d = 0.27$, primes did not differ by age.

Child-Friendly Implicit Association Test. To examine whether a similar pattern of results emerged on the ch-IAT, D scores were created as outlined in Study 2. Trials with response latencies greater than 10,000 ms were eliminated (i.e., < 1% of responses; Greenwald et al., 2003), and participants with high error rates (i.e., > 35% of responses were incorrect; n = 4) and slow response latencies (i.e., individual average response latency ≥ 3 standard deviations greater than mean response for the sample; n = 1) were removed from analyses involving the IAT (Cvencek, Meltzoff, et al., 2011). A 2 (participant gender: boy vs. girl) × 2 (participant age: younger vs. older) between-subjects ANOVA did not reveal any significant main effects or interactions, Fs < 0.60, ps > .44, η_p^2s < .01. One-sample t tests comparing the D scores to 0 revealed that both younger (D = 0.97, SD = 0.26), $t(29) = 20.12$, $p < .001$, $d = 3.67$, and older (D = 0.92, SD = 0.35), $t(48) = 18.55$, $p < .001$, $d = 2.65$, children demonstrated an implicit preference for happy relative to sad faces.

Relationship Between the Measures. To examine the relationship between these implicit measures, we created a ch-AMP preference score that mirrored the ch-IAT D score by subtracting the proportion of pleasant responses following sad primes from the proportion of pleasant responses following happy primes (Bar-Anan & Nosek, 2014; Payne et al., 2005); higher scores indicate more pleasant responses following happy versus sad primes. Again, although in the anticipated direction, responses on the ch-AMP and ch-IAT were not significantly correlated, $r = .18$, $p = .14$. Because an interaction with age emerged on the ch-AMP, we also examined whether the scores were significantly correlated for younger, $r = .27$, $p = .16$, or older children, $r = .09$, $p = .58$; however, they were not. Finally, we created absolute attitude estimates by subtracting the proportion of pleasant responses following neutral primes from the proportion of pleasant responses following happy and sad primes, respectively (Bar-Anan & Nosek, 2012, 2014; Payne et al., 2005). Although in the anticipated direction, neither the responses following happy primes, $r = .10$, $p = .39$, nor responses following sad primes, $r = -.13$, $p = .28$, were significantly correlated with ch-IAT D scores.

Empathy. To examine whether self-reported empathy would be predicted by each implicit measure, we first averaged the three empathy items into a single score, with higher values indicating greater empathy ($M = 3.04$, $SD = 0.64$). Empathy was positively correlated with the relative ch-AMP preference score ($r = .39$, $p < .001$). Empathy was also significantly correlated with the absolute attitude estimate for sad ($r = -.33$, $p = .004$), but not happy ($r = .19$, $p = .10$), primes. Finally, despite a lack of relationship between the ch-AMP and the ch-IAT, empathy was also significantly related to the ch-IAT ($r = .24$, $p = .03$).

To examine the incremental validity of the ch-AMP in predicting self-reported empathy over and above the ch-IAT, we performed hierarchical regression analyses. In Step 1 we controlled for the age of the participant (effect coded as −1 for younger children, 1 for older children) and the gender of the participant (effect coded as −1 for girls, 1 for boys) as responses on the ch-AMP differed by these variables. In Step 2, we entered the ch-IAT D scores, and in Step 3, we entered the ch-AMP preference score. The model was not significant at the first step, $F(2, 68) = 0.45$, $p = .64$, $R^2 = .01$. However, including the ch-IAT in the second step significantly increased the amount of variance explained, $\Delta F(1, 67) = 4.74$, $p = .03$, $\Delta R^2 = .07$. The ch-IAT was significantly related to empathy ($\beta = .26$), $t = 2.18$, $p = .03$, whereas age and gender were not (βs $< .12$), ts < 1.0, ps $> .35$. In Step 3, the ch-AMP significantly increased the amount of variance explained, $\Delta F(1, 66) = 15.63$, $p < .001$, $\Delta R^2 = .18$. As expected, when entered in the model, the ch-AMP significantly predicted empathy ($\beta = .45$), $t = 3.95$, $p < .001$; however, the ch-IAT was no longer a significant predictor ($\beta = .20$), $t = 1.84$, $p = .07$. Age also significantly predicted empathy in the third step ($\beta = .24$), $t = 2.14$, $p = .04$, with older children expressing greater empathy than younger children. Gender did not reliably contribute to the model ($\beta = .17$), $t = 1.61$, $p = .11$. In line with our expectations, controlling for participant age and gender, children's misattributed affect in response to happy and sad primes, as measured by the ch-AMP preference score, was significantly related to their self-reported empathy.[5]

The results of this study provide further evidence that the ch-AMP can be successfully used as an implicit measure of children's attitudes. In line with our hypotheses, children demonstrated

[5]To examine the incremental predictive ability of absolute attitude estimates on the ch-AMP, we conducted similar hierarchical regression analyses where the relative ch-AMP preference score was replaced by adjusted responses following happy (centered) and sad (centered) primes ($r = .18$, $p = .13$) in the third step of the model. Including the ch-AMP priming indexes in the third step significantly increased the amount of empathy variance explained above and beyond that explained in the ch-IAT, $\Delta F(2, 65) = 8.21$, $p = .001$, $\Delta R^2 = .19$. Responses following happy ($\beta = .34$), $t = 3.00$, $p = .004$, and sad primes ($\beta = -.38$), $t = -3.34$, $p = .001$, reliably predicted empathy, whereas the ch-IAT was no longer a significant predictor ($\beta = .20$), $t = 1.80$, $p = .08$, in the model. Age was a significant predictor in the third step ($\beta = .24$), $t = 2.13$, $p = .04$, and gender did not significantly contribute to the model ($\beta = .19$), $t = 1.71$, $p = .09$. Controlling for participant age and gender, children's automatically activated positivity in response to happy primes and negativity in response to sad primes were significantly related to their self-reported empathy.

affect misattribution following happy and sad primes. Replicating previous effects with adults (e.g., Donges et al., 2012; Rohr et al., 2012), both younger and older children showed the anticipated priming effect on the ch-AMP, providing additional evidence that this measure can be used to assess implicit social cognition in childhood. Somewhat unexpectedly, this effect was more pronounced for our younger participants. This age difference could reflect younger children's increased tendency to focus on perceptual cues when processing others (Aboud, 2008), a finding worthy of future investigation. In addition, girls, as compared with boys, were more likely to judge inkblots as pleasant, regardless of the preceding prime. Similar age and gender effects did not emerge on the ch-IAT.

Importantly, in the current study, we also found that individual differences in children's responses on the ch-AMP were related to empathy. Spontaneous affect misattribution in response to emotional exemplars was related to the degree to which children reported *feeling* the joy and pain of others. A similar relationship emerged between children's self-reported empathy and their implicit associations on the ch-IAT, although not as consistently; when both measures were entered into the model, responses on the ch-AMP accounted for more variance in children's empathy than did responses on the ch-IAT, and the ch-IAT *D* score no longer significantly contributed to the model. This study is the first to demonstrate that children's self-reported empathic feelings toward others can be predicted by their responses on a child-friendly implicit measure.

GENERAL DISCUSSION

The results from these three studies provide evidence that with slight procedural changes, the AMP can be a valid and reliable implicit measure of children's attitudes. In Study 1, children demonstrated evidence of affect misattribution; they were more likely to judge neutral inkblots following positively valenced primes as pleasant as compared with inkblots following negatively valenced primes. In Study 2, predicted gender differences in children's attitudes emerged on the ch-AMP. Mirroring the pattern of bias typically found on a more established measure, girls showed a greater implicit preference for flowers compared with boys. Finally, in Study 3, we provided evidence that the ch-AMP can be used as an implicit measure to assess children's affective responses toward social targets, specifically happy and sad children. As expected, children showed more positive affect misattribution following smiling as opposed to crying primes. In addition to providing further evidence for the validity of the ch-AMP, the results of Study 3 also provide the empirically novel and theoretically interesting finding that individual differences in priming effects on this ch-AMP are significantly related to self-reported empathy.

There are several important aspects of these findings. From a practical standpoint, the results of Studies 2 and 3 reinforce the value of having different implicit measures of attitudes that can be administered to children. Despite the fact that a similar pattern of results emerged on the ch-AMP and the ch-IAT in Studies 2 and 3, responses on these measures were not significantly correlated, even when examining the relationship between both the absolute and relative scores on the ch-AMP and the ch-IAT *D* scores. In addition, in Study 3, implicit preferences measured by the ch-AMP accounted for more variance in self-reported empathy compared with those measured by the ch-IAT. Finally, there were notable differences across the studies in the effect sizes on each measure, with the magnitude of effects being larger on the ch-IAT as compared with the ch-AMP, possibly because participants demonstrated stronger implicit associations toward categories (as measured by the ch-IAT) as opposed to exemplars who may or may not be spontaneously viewed through a categorical lens (as measured by the ch-AMP; Degner & Wentura, 2010; Fazio & Olson, 2003; Livingston & Brewer, 2002; Olson & Fazio, 2003). Together these findings are consistent with the possibility that the ch-AMP and ch-IAT assess distinct constructs (e.g., Payne, Govorun, et al., 2008; see also Degner & Wentura, 2010; Fazio & Olson, 2003; Olson & Fazio, 2003, for similar arguments with evaluative priming tasks). However, this interpretation requires caution. Given that correlations between implicit measures and effect sizes can be attenuated by measurement error (e.g., method-related variance, internal consistency; Bar-Anan & Nosek, 2014; Baugh, 2002; Cunningham, Preacher, & Banaji, 2001) and that our studies may have been underpowered, future research is needed to provide additional evidence for the possibility that, even for young children, these measures tap into different constructs (e.g., Bar-Anan & Nosek, 2014; Degner & Wentura, 2010; Fazio & Olson, 2003; Gawronski & De Houwer, 2014; Olson & Fazio, 2003).

The relationship between children's affect misattribution following happy and sad primes and empathy is theoretically interesting in its own right. Although our empathy measure is limited by low internal consistency, this study is the first to show a statistically significant relationship between children's empathy and their automatic response toward affect-laden faces. This finding provides new insight into children's implicit social cognition by suggesting that children's self-reported experience of empathy might be intimately connected to the intensity of affect that they experience and/or their inability to inhibit this emotional response when seeing a child experiencing joy or sadness. Empathy is often defined as the ability to vicariously experience the feelings of others (Chapman et al., 1987; Eisenberg & Miller, 1987), and research has supported the link between children's self-reported empathy and the activation of brain regions associated with emotional processing (see Pfeifer & Dapretto, 2009, for a review). Contributing to this emerging body of work, the results of Study 3 demonstrate that self-reported empathy is related to children's affective experiences. We provide direct evidence that children's spontaneous affect misattribution toward happy and sad target faces is related to their subjective experience of empathy. Children who were more likely to automatically feel what others feel expressed higher levels of empathy.

Given that the ch-AMP allows for the examination of absolute evaluations and does not require that targets be categorized, it has the potential to be a valuable tool for future research examining the development of implicit cognition. Responses on the ch-AMP can be easily decomposed to estimate implicit attitudes toward single categories—for example, flowers and insects in Study 2 and happy and sad faces in Study 3. This is an important feature of this measure. The results of the ch-AMP allow us to assess girls' attitudes toward flowers in isolation of their attitudes toward insects in Study 2 and allow us to conclude that, as expected, girls show implicit positivity toward flowers. We extended these findings to socially relevant primes in Study 3 and found that individual differences in children's automatically activated affect on the ch-AMP were a better predictor of self-reported empathy than those on the ch-IAT.

Based on the findings of our latter two studies, it seems quite plausible that different implicit measures of attitudes may provide researchers with unique insights regarding the nature and emergence of children's attitudes (e.g., Degner & Wentura, 2010; Williams, Steele, & Durante, 2012). For example, research examining children's racial attitudes using the ch-IAT suggests that implicit pro-White relative to Black biases emerge early and remain stable across development (Baron & Banaji, 2006; Olson & Dunham, 2010; Rutland et al., 2005; cf. Cvencek, Nasir, O'Connor, Wischnia, & Meltzoff, 2015, who found developmentally related changes in academic–race stereotypes). However, recent findings with evaluative priming tasks instead suggest that implicit racial bias, in the form of prejudice toward outgroups, develops later in life and emerges only in early adolescence (Degner & Wentura, 2010; see also Aboud & Steele, in press). Using implicit measures, like the ch-AMP, that do not require racial exemplars be categorized by race and that allow for responses to be decomposed into absolute evaluations of categories will likely provide more nuanced insight into implicit social cognition across development. This is particularly important when creating age-appropriate interventions designed to improve social interactions across childhood. Because the ch-AMP can be used with young children (i.e., 5-year-olds), this measure provides an opportunity to more fully examine the emergence of implicit attitudes early in childhood, when these associations are first being acquired.

It should be noted that the AMP is just one of several measures available to assess adults' implicit cognition, and each of these measures presents different methodological strengths and challenges. In conjunction with the success of validating the traditional IAT and different priming measures for use with children, it would be useful to adapt additional IAT-based measures and scoring procedures, such as the single-category IAT (Karpinski & Steinman, 2006), go–no go task (Nosek & Banaji, 2001), and quad model (Conrey, Sherman, Gawronski, Hugenberg, & Groom, 2005), that allow for responses to be decomposed into evaluations of single categories. Having more measurement tools and techniques from which to draw will only serve to increase our understanding of how these associations form and change across the life span.

One potential criticism of the ch-AMP is that it can be sensitive to demand characteristics and that some participants may intentionally judge primes, which would undermine the implicit nature of the measure (Bar-Anan & Nosek, 2012; cf. Payne et al., 2013). In our studies, we found that a handful of children judged the prime images ($n = 3$, 4% in Study 1; $n = 1$, 2% in Study 2; $n = 3$, 3.5% in Study 3), and these participants were removed from the analyses. Although it is possible that other children judged the primes, we feel that, based on the data, it is unlikely. If the sample of retained children had judged primes instead of targets, we might expect more extreme (and internally consistent) responses than what were observed (see Bar-Anan & Nosek, 2012). To remove the confound of controlled priming effects, it is essential that instructions emphasize the importance of judging the neutral target image and that debriefing procedures include questions to ensure that the results represent unintentional attitude effects. Although emphasized in each study, the procedure used in Studies 2 and 3 highlighted these points to a greater extent; in line with the instructions used previously by Payne et al. (2005), we emphasized that responses toward the inkblot should be made regardless of the preceding prime image. As such, we would recommend that researchers aiming to make use of this measure administer the ch-AMP with instructions that are similar to those used in our latter two studies.

Given the surge in research examining implicit social cognition (see Gawronski & Payne, 2010, for a review), it is not surprising that theories are being developed and methods are being modified to examine the development of implicit attitudes in childhood. To address emerging questions about children's implicit cognition, it will be critical to develop measures that are appropriate for use with children. In the present research, we provided initial evidence that the AMP is a valid, internally reliable, and simple implicit measure that can easily be modified for use with children to assess a wide range of attitudes.

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