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Assessing Parental Attributions through an Implicit Measure: Development and Evaluation of the Noncompliance IAT

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Abstract

Objectives—Assessing parental attributions can be challenging given the reticence of some caregivers to report information that may be considered controversial or pejorative. To address this issue, recent efforts have focused on expanding existing parenting assessment batteries to include implicit measures. One of the most common methods for implicit assessment, the Implicit Association Test (IAT), had not yet been adapted to assess parental attributions. Two studies evaluated the psychometric properties (including convergent, concurrent, incremental, and predictive validity) of the novel Noncompliance IAT (N-IAT).

Methods—Study 1 included a low-risk sample of mothers ($N = 60$) of preschoolers. Study 2 included a diverse and higher risk sample of mothers and fathers who were assessed at three time points: immediately before the birth of their first child ($N = 202$ women; $N = 144$ male partners) and then 6 and 18 months after the birth.

Results—Findings from both studies supported the utility of the N-IAT as a measure of implicit parental attributions. The N-IAT demonstrated evidence of convergent and concurrent validity (e.g., significant correlations with explicit attribution measures and with measures of parenting) in both studies. The longitudinal design of Study 2 allowed for the evaluation of incremental and predictive validity; N-IAT scores before childbirth predicted later N-IAT scores, with indications that the N-IAT could demonstrate incremental validity related to child abuse risk. Study 2 also demonstrated moderate test stability for mothers and fathers.

Conclusions—These results suggest that the N-IAT may be a helpful adjunct to assessments of parental attribution.

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Author Contributions S.M.R. Designed and executed Study 1, completed data analyses for Study 1, developed the N-IAT, worked with CMR in revising the N-IAT, and collaborated with C.M.R. in writing the manuscript. C.M.R. conducted Study 2 and performed those analyses.

Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Study 1 was approved by the Yale University Institutional Review Board (IRB) and Study 2 was approved by the University of Alabama Birmingham IRB.

Informed Consent Informed consent was obtained from all individual participants included in the studies.

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Keywords

Implicit Association Test; Parent attributions; Noncompliance; Analog tasks; Psychometrics

A vast literature supports the connection between parenting practices and child behavior, and the impact of parenting on child development and outcomes is evident in a large and growing body of research (for reviews see Holden 2015 and Patterson and Fisher 2002). Yet parenting practices themselves are influenced by a variety of factors, including what parents think about parenting and how they understand their children's behavior. Parental attributions refer to causal schemas related to how parents evaluate and understand children's behavior. Although attributions might be positive, negative, or neutral, research in this area has focused primarily on parents' perceptions and understanding of negative or undesirable behavior (Bugental and Happaney 2002). Parental attributions of their children's behavior (e.g., viewing problem behavior as intentional versus unintentional; adopting situational versus personal explanations for behavior) directly impacts parent-child interactions (Dadds et al. 2003; Smith Slep and O'Leary 1998). Parents who hold more negative attributions about their children's misbehavior tend to perceive their children as displaying more behavior problems (Nelson et al. 2013). In addition, parents who view child misbehavior as intentional are harsher in their discipline techniques, seem angrier in interactions with their children, and engage in more overreactive parenting (Leung and Smith Slep 2006; Smith Slep and O'Leary 1998).

At the extreme end of the parenting continuum, negative parental attributions of child behavior are observed in abusive mothers (Haskett et al. 2006) and may contribute to child abuse risk (Black et al. 2001; Montes et al. 2001; Rodriguez et al. 2016). Negative child attributions predict mothers' child abuse risk even beyond personal psychological distress (Rodriguez and Tucker 2015), as such causal attribution biases toward children are evident in the parenting stress experienced among abusive parents (Mash and Johnston 1990). Negative attributions during pregnancy predict mothers' later harsh parenting and involvement in child protective services (Berlin et al. 2013). Consequently, parents' negative appraisals of children's behavior have been implicated in adverse parenting practices.

Such negative appraisals are theorized to transpire as part of the Social Information Processing (SIP) model as applied to abuse risk (Milner 2000). According to the SIP model, these negative attributions are most apparent in child behaviors that appear ambiguous to at-risk parents (Milner 2000). Abusive mothers, for example, respond similarly to positive and negative child behavior (Wahler and Dumas 1989). Even in non-abusive samples, angrier mothers were inclined toward negative appraisals of child behaviors, particularly when those behaviors appear ambiguous (Dix et al. 1990). Indeed, at-risk parents are more likely to perceive their children's behavior negatively (Daggett et al. 2000), wherein heightened child abuse risk was observed in those who also perceived more behavior problems in their children (McElroy and Rodriguez 2008; Rodriguez 2018). Thus, at-risk parents tend to hold more negative perceptions and evaluations of children's behavior, even when children's actual behavior is not objectively negative.

Given these findings, the need to accurately assess both parenting practices and parental attributions of child behavior is clear, and multiple methods exist to assess these constructs. Observational methods have been used to assess parenting practices, child behavior, and their bidirectional influences (Aspland and Gardner 2003; Dishion and Granic 2004). These observational tools yield valuable information but are relatively expensive and time-consuming, requiring coders to train in a specific system, achieve reliability, and code recorded interactions. More commonly, self-report questionnaires are administered wherein parents directly report on their behavior, experiences, and beliefs (e.g., Abidin 1992; Milner 1994). The widespread availability of these questionnaires, and the ease with which they can be administered, make them a popular assessment strategy for a variety of research questions.

In spite of their popularity, questionnaires must be used with caution. Many self-report measures of parenting are susceptible to response distortions because of social desirability concerns. Parents may perceive one response to be more preferable than others, particularly when the questionnaires directly probe the use of harsh punishment techniques and parenting behaviors that are considered controversial or abusive (e.g., Costello and McNeil 2014). In fact, nearly 30% of parents with documented histories of maltreating their children denied any engagement with child protection agencies and, instead, self-reported parenting practices similar to parents without histories of maltreatment (Bennett et al. 2006). Findings like these suggest many parents are reticent to respond honestly about their own parenting behavior and beliefs. From a clinical perspective, collecting accurate data in these situations is essential to ensure that appropriate interventions and resources are provided. Ultimately, the concerns with observational tools and self-report measures have led researchers to develop alternative methods that can supplement and strengthen our assessment capabilities, with the hope that an expanded repertoire of tools can lend confidence to the conclusions drawn from the self-report literature.

An alternative approach to self-report questionnaires, which assess explicit parental behaviors and attitudes, is the use of implicit measures (Fazio and Olson 2003). Rather than directly and explicitly probing about behaviors, attitudes, and beliefs, implicit measures are designed so that participants cannot readily discern the concept being assessed or the scoring procedures. One of the benefits of implicit measures is that participants generally are less able to manipulate their responses to appear more favorable either because they cannot identify a desirable response or because they are unaware of how to control their responses. Such tasks vary with regard to how readily the participant can deduce the intent of the task. Thus, the more obvious and explicit the aim of the task, the more readily participants can engage in conscious response selection, thereby yielding higher correlations with explicit self-report measures; more implicit tasks, in contrast, typically result in lower correlations with explicit self-report methods (Fazio and Olson 2003).

To date, multiple implicit measures have been used within the parenting domain. For example, a subliminal word-priming task using hostile words has been employed to evaluate implicit parental attitudes toward children (Farc et al. 2008). Primed parents interpreted ambiguous pictures of children as more hostile, particularly for those parents at high risk of abusing their children (Farc et al. 2008). Alternatively, a go/no-go association task (a rapid

word-sorting approach) has been used to evaluate mothers' implicit attitudes toward physical punishment (Sturge-Apple et al. 2015). In addition, eye tracking was employed to assess the degree of difficulty parents experienced when reading vignettes of child misbehavior; parents spent more time reading vignettes that depict information inconsistent with their attributions about child behavior (e.g., slowing when reading that a child is culpable when the situation was accidental; Rodriguez et al. 2012). Collectively, this research implies that implicit measures can provide insight into parents' automatically activated reactions and beliefs, highlighting the need for additional research on nontraditional implicit assessment approaches.

One widely used method for implicit assessment of attitudes is the Implicit Association Test (IAT), which assesses the strength of relationships between concepts (Fazio and Olson 2003). In standard IAT protocols, participants classify words that appear on a computer screen as quickly as possible by pressing one of two different keys on the computer keyboard (Greenwald et al. 1998). Research on the IAT operates on the premise that it is easier to make behavioral responses to concepts that are strongly associated than to concepts that are weakly associated. Given that reacting to strongly related concepts is easier than reacting to weakly related concepts, the responses for strongly associated concepts should be initiated more rapidly. Since the original published work on the IAT, many variants of the IAT have been developed to evaluate implicit attitudes on a wide range of topics, including attitudes about interpersonal violence toward women (Eckhardt et al. 2012). In general, IAT measures appear to add novel information beyond what is provided in explicit self-report measures (e.g., Nock and Banaji 2007). Indeed, topics about which an individual may be reticent to reveal an unpopular or controversial view (e.g., related to racism, interpersonal violence, self-harm behavior) are particularly important to assess through an IAT paradigm. Although the IAT has been widely used, no variants have been developed to assess parent attributions of children's behavior.

To expand existing assessment tools, we developed the Noncompliance IAT (N-IAT) and evaluated its psychometric properties in two studies. Such an implicit assessment could confirm whether the existing findings for parental attributions of child behavior are not dependent on self-report given that many findings are limited by shared method bias. The first study (Study 1) served as a pilot study for the N-IAT in a small sample of mothers at low risk for child maltreatment to determine the viability of using an IAT to assess parental child attributions. The N-IAT was hypothesized to demonstrate associations with an explicit measure of negative attributions (indicating concurrent validity) and other parenting-related constructs (e.g., perceptions of child behavior problems, maternal mental health problems, parenting stress), indicating convergent validity. The second study (Study 2) offered an opportunity to replicate and extend the findings to a larger, more diverse, and higher risk sample of both mothers and fathers. Similar to Study 1, both concurrent and convergent relationships were examined; however, the longitudinal design of this study permitted evaluations across three time-points. Evidence for the predictive validity of the N-IAT scores was also examined. Specifically, N-IAT scores at the Time 1 were expected to predict child abuse risk at Time 3. As evidence for incremental validity, we examined whether N-IAT scores at Time 1 accounted for variance in child abuse risk at Time 3 above and beyond explicit measures of parental attributions also obtained at Time 1. Furthermore, test stability

of the N-IAT scores was evaluated for mothers and fathers. Given that Study 2 included mothers and fathers, potential gender differences in N-IAT responses were explored.

Study 1

Method

Participants—Study 1 participants included 60 mothers of preschool-age children; these mothers represented a subset of participants from a larger experimental study about stress and parenting preschool-age children in the Northeast (Rabbitt 2013). This subset of participants comprised the control group from that larger study. They are demographically representative of the full study sample but did not undergo experimental manipulations that might impact their N-IAT performance. The average age of mothers was 38.27 years ($SD = 6.03$). In terms of race/ethnicity, 76.7% self-identified as Caucasian, 16.7% Hispanic/Latina, and 6.7% Asian. Ninety percent of the mothers were married. Most of the mothers (61.7%) reported either full-time or part-time employment. All mothers completed high school, and nearly 90% completed college. Most mothers had more than one child with an average of 2.08 children ($SD = 0.94$) per household. The identified preschool-age children included 32 boys and 28 girls, with an average age of 3.52 years ($SD = 1.13$). Mothers identified 73.3% of their children as Caucasian, 13.3% Hispanic/Latino/a, 3.3% Asian, and 10.0% biracial or multi-racial. Most children (88.3%) attended either a preschool or daycare program.

Procedures—Participants were recruited through early childhood education centers, databases of parents who completed prior child development research studies, and community postings. Mothers of children between the ages of 2 and 6 years old contacted the research team to schedule their 1-h lab session. After the session was scheduled, several questionnaires were sent to participants to complete in the days before the lab protocol. Mothers were instructed to complete these questionnaires before the scheduled session, during which they completed additional paperwork (specifically, the SCL-90 and vignette-based questions) and lab-based tasks (including the N-IAT). The university's Institutional Review Board approved all study procedures.

Measures

Noncompliance Implicit Association Test: The N-IAT is an implicit analog task based on the original IAT design and scoring procedures (Greenwald et al. 1998, 2003; Nosek and Sriram 2007) that is designed to assess parental attributions regarding child misbehavior. Parents completed a “warm-up” IAT (classifying flowers and insects) to ensure that they understood the activity. This widely used and researched version of the IAT (Greenwald et al. 1998; Nosek et al. 2007) served to ensure that all participants understood the general procedures of the IAT paradigm before completing the N-IAT. After the flower-insect practice IAT, the parents completed the N-IAT. Participants were presented with words related to child behavior and instructed to classify them as quickly as possible into obeying/disobeying and good/bad categories. The positive “good” category included: *marvelous*, *superb*, *pleasure*, *beautiful*, and *joyful*; the negative “bad” words included: *tragic*, *horrible*, *agony*, *painful*, and *terrible*. The “obeying” stimuli included: *listen*, *follow directions*, *agree*, *pay attention*, and *cooperate*; the “disobeying” stimuli included: *temper tantrum*, *refuse*, *talk*

back, yell, and argue. Participants completed seven blocks within the N-IAT, including a test trial block and a critical trial block for the “obeying/good” items and a test trial block and a critical trial block for the “obeying/bad” items. In one critical test block, participants pressed the same computer key in response to both “disobeying” and “bad” stimuli, and a different computer key for both “obeying” and “good” stimuli. In the second critical test block, the opposite sorting was performed, pairing “obeying/bad” on the same computer key and “disobeying/good” on the other. The presentation of the critical blocks was counterbalanced to address commonly observed order effects in existing IATs (Nosek et al. 2007). Both the warm-up IAT and the N-IAT were administered using Inquisit™ by Millisecond Software.

Faster and more accurate sorting is expected when parents are categorizing in a way that is consistent with their underlying attributional belief. Through several randomized trials, a difference (D) score between the critical test blocks is generated, ranging from -2 to $+2$. A positive score in this range indicates faster categorization when “obeying” and “good” stimuli are paired and when “disobeying” and “bad” stimuli are paired; this score suggests positive views of compliant behavior and negative views of noncompliant behavior. A score of zero indicates no change in speed of categorization based on the word stimuli pairings. A negative score indicates faster categorization when “obeying” and “bad” stimuli are paired and when “disobeying” and “good” stimuli are paired; this score suggests negative views of compliant behavior and positive views of noncompliant behavior.

For example, the IAT effect identifies differences (D scores) in response times to the “obeying-bad” (incongruent condition) relative to “obeying-good” (congruent condition); whereas slowing should be observed in the incongruent condition, less slowing and thus smaller difference scores between these two categories would suggest a less positive attribution for obedient behavior. Similarly for misbehavior, slowing would be observed in the “disobeying-good” (incongruent) condition relative to the “disobeying-bad” (congruent) condition, but more relative speeded responding to the congruent condition “disobeying-bad” pairing would suggest more negative attributions for disobedient behavior. Therefore, *smaller* D scores across trials are postulated to reflect *more* negative behavior attributions.

As noted previously, standard IAT procedures were used in both the administration and scoring of the N-IAT (see Greenwald et al. 2003). Consistent with these procedures, trials were evaluated for elimination based on two criteria: (1) data in the trial included latencies greater than 10,000 milliseconds, and (2) data in the trial included latencies less than 300 milliseconds for more than 10% of the trials. One participant was removed from the dataset because of latencies greater than 10,000 milliseconds. No participants had latencies less than 300 milliseconds for more than 10% of the trials.

Child behavior vignette ratings: Mothers provided ratings on six vignettes developed specifically for this study describing child noncompliance. Each vignette included a child (without gender specified) and a mother with a focus on a specific instance of child misbehavior (e.g., yelling “No”; having a temper tantrum; ignoring a parental request). Mothers responded to questions about each of the specific child behaviors depicted in the vignette using a 5-point scale. Mothers rated the seriousness of the behavior (from “*It is not a problem at all*” to “*It is a very serious problem*”), rated the need for punishment (from

“*The child definitely does not need to be punished*” to “*The child definitely needs to be punished*”), and noted their embarrassment if their child engaged in the behavior (from “*I would not be embarrassed at all*” to “*I would be very embarrassed*”). A higher score indicates a more negative reaction to the vignette and more negative behavior attributions.

Child Behavior Checklist: The CBCL (Achenbach 1991) is a widely used measure of child behavior problems, including 113 parent-rated items of externalizing and internalizing child behavior problems. For each item, parents note the degree to which the listed behaviors describe their child on a 3-point scale from 0 (*not true*) to 2 (*very true or often true*), yielding a total problem score (with *higher* scores indicating more behavior problems). The CBCL has demonstrated strong internal consistency, test-retest reliability, and validity (Achenbach 1991).

Symptom Checklist: The SCL-90 (Derogatis and Cleary 1977) was included as a measure of parental psychopathology. Based on 90 items, parents use a 5-point scale (from *not at all* to *extremely*) to rate their experience of several areas relevant to psychopathology (e.g., depression, anxiety, obsessive-compulsive symptoms), yielding a global distress score; a *higher* score indicates more distress related to psychopathology. The SCL-90 evidences internal consistency and validity and has been used extensively in the assessment of parental psychopathology (e.g., Derogatis and Cleary 1977; Kazdin and Whitley 2006).

Parenting Stress Index: The PSI (Abidin 1990) was included to provide a measure of stress as it specifically relates to the parenting role. The scale comprises 120 items (101 rated on a 5-point scale and 19 *yes-no* items) and contains three main subscales: stress related to parent functioning, stress related to the child, and a combined total perceived stress score (with *higher* scores suggestive of more perceived stress). The PSI has demonstrated adequate-to-good internal consistency (depending on the domain examined) and adequate test-retest reliability and concurrent validity (Abidin 1990).

Data analyses—Prior to running any analyses examining the psychometric properties of the N-IAT, an exploratory factor analysis was run within SPSS 24 to evaluate the latent structure of items assessing explicit maternal attitudes toward child noncompliance. Once the latent structure of maternal attitudes toward noncompliance was established, descriptive statistics were run on all central study variables to examine their distributions. To evaluate evidence of the convergent validity of N-IAT scores, a bivariate correlation was run with explicit maternal attitudes toward child noncompliance. Next, to evaluate evidence of concurrent validity, unadjusted relationships between N-IAT scores and maternal psychopathology, parenting stress, and child behavior problems were examined using bivariate correlations.

Results

Based on the results of the exploratory factor analysis suggesting strong overlap across questions (details available from first author upon request), responses for all child behavior vignette items were summed to create a single total score representing general maternal attitudes toward noncompliance ($\alpha = 0.91$). Descriptive statistics revealed that the

distributions of all variables approximated normality and transformations were not required. Demonstrating evidence of convergent validity, N-IAT scores were correlated significantly, albeit modestly, with explicit maternal attitudes toward child noncompliance ($r = -.30$, $p = .023$). Demonstrating evidence of concurrent validity, N-IAT scores correlated significantly with indices of maternal psychopathology (SCL-90 scores, $r = -.48$), parenting stress (PSI Total scores, $r = -.54$), and child behavior problems (CBCL Total scores, $r = -.47$), with all p -values $< .001$.

Study 2

Method

Participants—This sample involved families from an ongoing prospective longitudinal study, the “Following First Families: Triple-F Study,” which is monitoring the progression of parent-child aggression risk in first-time families in a large, urban city in the Southeast. Primiparous mothers were recruited during the last trimester of their pregnancy. The study oversampled for risk, with half of the families representing greater sociodemographic risk (e.g., based on such markers of age, education, income). The current analyses involve data from the families enrolled in three waves of the study.

The Time 1 sample included 202 primiparous women and 150 male partners. Average age of the expectant mothers was 26.03 years ($SD = 5.88$) and for expectant fathers, 28.89 years ($SD = 6.11$). In terms of expectant mothers’ race/ethnicity, 51% self-identified as Caucasian, 47% African-American, 1% Asian, and 1% Native American/Alaskan; of these mothers, 3% also identified as Hispanic/Latina. For expectant fathers, 53.3% identified as Caucasian, 46% as African-American, and 0.7% as Asian; 2.7% additionally identify as Hispanic/Latino. Nearly 87% of mothers reported they were in a relationship with the father of the expected child. Median educational attainment for mothers and fathers was some college or vocational training. Over 43% of expectant mothers were receiving federal public assistance, with 46.5% of the mothers living within 150% of the federal poverty line, and over 50% reporting an annual household income between \$30–39,000 for an average family size of two.

Parents were reassessed when their infant was 6 months (± 2 weeks) for Time 2 and when their toddler was 18 months (± 3 weeks) for Time 3. At Time 2, one computer issue interfered with the N-IAT delivery; two babies were deceased and thus no longer eligible to continue in Triple-F, and one other child was hospitalized. Thus, at Time 2, we retained 93% of available mothers, $n = 185$. At Time 3, we retained 180 mothers. For fathers, a computer issue interfered with the N-IAT delivery for one father at Time 2. However, Triple-F also allows fathers to enter the study even if they did not participate in an earlier timepoint to reflect the reality of how families are often constituted (e.g., some women were not in a relationship at Time 1 but were now parenting with a partner at Time 2, whereas other mothers had a different partner at each time point). Thus, cross-sectional findings at Time 2 involve 141 fathers and at Time 3, 142 fathers. Of this group, 119 fathers (73%) participated from Time 1 to Time 3.

Procedure—Participants were recruited with flyers distributed at local hospitals' obstetric/gynecological clinics and associated childbirth classes. Primiparous expectant mothers contacted the lab to arrange the first session for themselves, and whenever possible, their male partner. Fathers were eligible if they planned to parent the child, although they were not required to be in a relationship with the mother. In-home or lab visits, depending on personal circumstances or preference, were conducted in 2½–3-h sessions. Parents completed the electronically delivered protocols privately on laptop computers. The university's Institutional Review Board approved all procedures in the longitudinal study.

Measures—Noncompliance IAT Like Study 1, participants completed a warm-up IAT activity (classifying flowers and insects) to ensure that they understood the general procedures (e.g., instructions, computer keyboard use) and then were presented with the N-IAT. Given that this sample was more at-risk and received less formal education than the preliminary study, the word stimuli for the N-IAT were simplified slightly for the “good” and “bad” words. The positive “good” category included: *pleasure, best, beautiful, and excellent*; the negative “bad” words included: *terrible, painful, worst, and horrible*. The “obey” stimuli included: *listen, follow directions, agree, pay attention, and cooperate*; the “disobey” stimuli included: *temper tantrum, refuse, talk back, yell, and argue* (See Fig. 1 for a summary of the IAT procedures). The same well-established scoring procedures that were used in Study 1 were used in this study. Just as in Study 1, D scores can range from –2 to +2, with positive scores indicating faster and more accurate sorting of stimuli when “obey” and “good” were paired and when “disobey” and “bad” were paired and smaller difference scores suggesting more negative appraisals of child behavior.

Infant Crying Questionnaire: The ICQ (Haltigan et al. 2012) was used as a comparison measure of negative child attributions. The ICQ is a self-report questionnaire in which respondents indicate what they believe about infant crying in general and what they hope to accomplish when they respond to their infant's cries. The ICQ contains 43 items rated on a 5-point scale from (1) *never* to (5) *always*. Based on factor analyses, five subscales can be derived: Attachment (8 items regarding a parent's desire to convey security to their child); Minimization (9 items that view crying as manipulation or nuisance); Directive Control (8 items where the parent aims to control child behavior); Spoiling (3 items where the parent believes responding to crying spoils the baby); and Communication (3 items where the parent views crying simply as a form of communication). Attachment and Communication are oriented as *higher* scores for positive parenting beliefs whereas Minimization, Directive Control, and Spoiling are scored such that *higher* scores indicate more negative crying attributions.

Video Ratings: The Video Ratings (Leerkes and Siepak 2006) served as a separate assessment of parental attributions (administered only at Time 1 and 2). Two one-minute videos are presented depicting babies crying while playing with a toy with no further explanation. After each video, parents are asked to indicate on 18 questions their attributions for the baby crying using a 4-point scale per item. Three subscales representing distinct factors have been identified: Minimizing Attributions (5 items that suggest temporary or physical explanations accounting for the baby crying); Negative/Internal Attributions (6

items suggesting the crying is purposeful because they are spoiled); and Situational/Emotional Attributions (4 items suggesting the child is upset only by that situation and simply does not know how to feel better). Composite scores across both videos result in *higher* Situational/Emotional Attribution and *lower* Minimizing and Negative/Internal Attributions indicative of more negative crying attributions.

Adult-Adolescent Parenting Inventory-2: The AAPI-2 (Bavolek and Keene 2001) was used as a measure of child abuse potential, assessing the beliefs and behaviors regarding child-rearing characteristic of abusive parenting. Forty items are rated on a 5-point scale from (1) *strongly disagree* to (5) *strongly agree*. Summed total scores were oriented such that *higher* scores suggest greater child abuse risk. AAPI-2 total scores demonstrate good internal consistency ($\alpha = .85$), concurrent validity (Conners et al. 2006), and discriminability between abusive and comparison parents (Bavolek and Keene 2001).

Child Abuse Potential Inventory: The CAPI (Milner 1986) is a widely recognized measure to screen for child abuse risk, with 160 *agree/disagree* items. Of these, only 77 are variably weighted to contribute to an Abuse Scale score, with higher scores indicative of greater abuse risk. Internal consistency (KR-20) for the Abuse Scale is high, ranging from .92 to .95 for abusive and non-abusive samples, respectively (Milner 1986). The CAPI Abuse Scale score also evidences predictive validity, with a correct classification rate of 89.2% of confirmed child abusers and 99% of controls (Milner 1994).

Data analyses—Statistical analyses were conducted with SPSS 24. Initial analyses evaluated evidence of normality across scores on the N-IAT, ICQ subscales, Video Rating subscales, AAPI-2 Total, and CAPI Abuse Scale for mothers and fathers separately with three time points. Those analyses suggested minimal skewness in scores for mothers or fathers, with evidence of kurtosis observed in six of 30 scores for mothers and five of 30 scores for fathers; the subsequent parametric statistics are generally robust with modest departures from normality. Bivariate correlational analyses were performed with comparison measures to determine convergent and concurrent relations with the N-IAT within the same time point; bivariate correlations with N-IAT were also conducted across time to provide evidence of predictive validity. Multiple regression was utilized to determine whether Time 1 N-IAT scores would demonstrate incremental validity in predicting Time 3 abuse risk (AAPI-2 Total or CAPI Abuse Scale scores) beyond variance attributable to self-report measures of negative child attributions. To avoid issues of multicollinearity by including multiple subscales from a single measure, the subscale from the Time 1 ICQ and from the Time 1 Video Ratings with the strongest associations (identified for mothers and fathers separately) with the Time 3 abuse risk measures were entered in the first step, followed by N-IAT scores in the next step; selecting these subscales for the multiple regression represents a conservative test of incremental validity (as N-IAT scores would have to exceed these relations), particularly given that both the AAPI-2 and CAPI are both explicit measures. Stability of N-IAT scores was evaluated using correlations of N-IAT scores across time points for mothers and fathers separately. Finally, mother-father comparisons on N-IAT scores were evaluated with paired sample *t*-tests.

Results

Similar to Study 1, the N-IAT scores evidenced convergent relationships with explicit measures of child attributions (ICQ and Video Ratings) and concurrent relationships with measures of child abuse risk for both mothers and fathers (see Table 1). N-IAT scores also evidenced predictive validity for both mothers and fathers. Mothers' N-IAT scores at Time 1 significantly predicted Time 2 AAPI-2 Total scores ($r = -.20, p < .01$) and CAPI Abuse Scale scores ($r = -.18, p < .05$) as well as Time 3 AAPI-2 Total Scores ($r = -.23, p < .01$) and CAPI Abuse Scale scores ($r = -.25, p < .001$). Similarly, for fathers participating at Time 1 and 2, N-IAT scores at Time 1 predicted Time 2 AAPI-2 Total scores ($r = -.27, p < .01$) and CAPI Abuse Scale scores ($r = -.25, p < .01$) and predicted Time 3 AAPI-2 Total scores ($r = -.21, p < .05$) and CAPI Abuse Scale scores ($r = -.27, p < .01$).

Providing evidence of the incremental validity of the N-IAT, multiple regression analyses were conducted to determine whether Time 1 N-IAT scores accounted for significant unique variance in Time 3 abuse risk beyond what would be attributable to the explicit attribution measures. Collinearity diagnostics indicated no evidence of multicollinearity for mothers or fathers (i.e., VIF values ranging from 1.01 to 1.40). In predicting Time 3 AAPI-2 Total scores, the N-IAT added significant unique variance beyond what was attributable to the ICQ or Video Rating scales for mothers only (see Table 2). However, the N-IAT at Time 1 accounted for significant unique variance for both mothers and fathers in predicting Time 3 CAPI Abuse Scale scores (see Table 2).

In terms of test stability, mothers' stability between Time 1 and Time 2 (time span > 6 months), between Time 1 and Time 3 (nearly 2 years), and between Time 2 and Time 3 (1 year) were as follows: $r = .36, .47$, and $.37$ (all $p < .001$), respectively. Similarly for fathers, Time 1 – Time 2, Time 1 – Time 3, and Time 2 – Time 3, were as follows: $r = .57, .57, .40$ (all $p < .001$), respectively. Based on paired sample t-tests for the couples, mothers and fathers attained comparable N-IAT scores at Time 1, $t(143) = .83, p > .05$, Time 2, $t(139) = 1.06, p > .05$, and Time 3, $t(138) = 1.14, p > .05$.

Discussion

The current investigation evaluated the psychometric properties of a novel implicit measure of parental attributions of child behavior: the Noncompliance IAT. Evidence gleaned from two studies – the first a study of low-risk mothers and the second a study of diverse and higher-risk mothers and fathers – supported the utility of the N-IAT as a measure of implicit parental attributions of child behavior.

First, both studies provided evidence for the convergent validity of the N-IAT. In each case, negative implicit attitudes toward a child's behavior as measured by the N-IAT were associated significantly with negative explicit attitudes toward a child's behavior as measured by vignette-based or video-based assessment tools. The magnitude of observed correlations was modest, as would be expected between implicit and explicit measures of similar constructs (Fazio and Olson 2003).

Second, both studies provided evidence for the concurrent validity of the N-IAT. In Study 1, negative implicit attitudes toward a child's behavior were significantly associated with three

constructs that previously have been shown to relate to explicit measures of parental attributions: maternal psychopathology, parenting stress, and perceived child behavior problems (consistent with Callender et al. 2012; Nelson et al. 2013). In Study 2, both mothers and fathers who were at increased risk for abusing their children evidenced stronger negative implicit attitudes toward child behavior. These findings echo those identified with explicit reports of parental attributions (e.g., Berlin et al. 2013; Haskett et al. 2006; Montes et al. 2001; Rodriguez 2018) as well as implicit assessments of parental attributions (Rodriguez et al. 2012). By evaluating these associations with an implicit measure, rather than the typical reliance on self-reports, we can affirm that parents' negative child behavior attributions indeed appear to be related to abuse risk, parental psychopathology, parenting stress, and perceived child behavior problems.

Third, the longitudinal nature of Study 2 permitted evaluations of the predictive validity, the incremental validity, and the test-retest reliability of the N-IAT. For both mothers and fathers, negative implicit attitudes toward a child's behavior obtained before the birth of their first child was associated with increased risk for child abuse 18 months after the child's birth. Moreover, when explicit measures were included as predictors of child abuse, N-IAT scores obtained before the birth of the child incrementally predicted increased child abuse risk 18 months later for mothers and fathers. Our conservative statistical approach selected the two subscales in the more explicit measures of attributions alongside the N-IAT to predict explicit measures of later abuse risk; the observation that the N-IAT could contribute variance in explicit dependent variables beyond two explicit independent variables is both surprising and promising. Combined, such longitudinal findings suggest that the N-IAT might be useful in predicting future parenting behavior.

The N-IAT also demonstrated stability for mothers and fathers, even across a major life event (i.e., the birth of a child). Future research could also examine the test-retest reliability of the N-IAT at two points before the birth of a child and across shorter inter-test intervals. When N-IAT scores were examined within couples, mothers and fathers attained similar scores. This consistency within couples is noteworthy given the differences commonly observed between mothers and fathers in measures related to child behavior (e.g., De Los Reyes and Kazdin 2005). Relatively less work has actually considered paternal attributions of child behavior although couples appear to share similar attributions (see also Rodriguez et al. 2016; Rodriguez et al. 2017). Differences between parents, however, may emerge over time as parents assume different roles in child rearing (e.g., engage in different types of parenting activities, spend different amounts of time with children; Bianchi 2009; Yeung et al. 2001). In this case, it may be that differences within couples may become evident as children move into the preschool period.

Our identification of the N-IAT as an attribution task deserves consideration. As defined previously, parental attributions typically are considered explanations for understanding child behavior, with a particular focus on a more negative valence to child misbehavior (Bugental and Happney 2002). The N-IAT involves an evaluation or appraisal of specific types of child behavior (i.e., compliant and noncompliant behavior) as either positive or negative. From this perspective, the N-IAT is best conceptualized as one of implicit parental attributions.

Limitations

Some more general limitations related to the IAT paradigm and to our conceptualization of the N-IAT specifically as an attribution measure warrants attention. IATs and related implicit measures have been criticized on several grounds, including vulnerability to social desirability effects (e.g., Gawronski et al. 2007). After all, the categories used in this IAT (i.e., obey/disobey; good/bad) are presented in the task and participants could slow sorting of compatible blocks (e.g., sorting obey and good together), which may result in faked data that cannot be identified easily (see Fiedler et al. 2006 for a review). Therefore, it remains possible that some parents could have understood the activity at hand and intentionally manipulated their response times. In a broader sense, there are challenges associated with the type of indirect measurement that characterizes the IAT paradigm (Fiedler et al. 2006). It is impossible to know whether an IAT truly measures reactions to concepts (for example, disobeying in this study) or reactions to specific word stimuli (for example, temper tantrums in this study). Alternatively, IAT scores may reflect individual differences in strategies employed during timed tasks and may not necessarily reflect attitudes toward child behavior. Although these general critiques of the IAT are not limited to the N-IAT and are not easily addressed empirically, they must be acknowledged when interpreting results.

Some additional specific limitations are worth considering apart from those already noted. In terms of sample characteristics, relatively few participants identified as Hispanic in Study 2 and thus additional consideration of this group is warranted as differences in parenting practices and beliefs have been related to cultural group (e.g., Julian et al. 1994; Varela et al. 2004). Therefore, parents with different ethnic identities may react differently to the N-IAT. Moreover, future studies could evaluate whether the N-IAT scores are especially sensitive to detecting negative biases toward ambiguous behavior in particular by comparing parents' explicit ratings to positive, negative, and ambiguous child behavior. Finally, the other measures used in this study are largely explicit assessments; consequently, comparison with alternative methodologies would be informative. For example, future research could evaluate how the N-IAT can predict observed parent-child interactions or whether N-IAT scores can predict dependent variables that are assessed with analog tasks and/or implicit measures.

Taken together, the results from both of these studies suggest the utility of the N-IAT in assessing parental attributions of child behavior. Such findings are consistent with the SIP theoretical model (Milner 2000), which suggests that at-risk parents may adopt a negative bias toward child behavior whereby misbehavior is not accurately differentiated from obedient behavior. We conceptualize the N-IAT as a tool to be added to existing explicit attribution measures rather than a replacement for those existing measures in order to lend a more comprehensive assessment of attributions. One of the many challenges associated with assessing parental attributions is that parents sometimes feel compelled to respond dishonestly when answering explicit questions about their beliefs about child behavior and parenting practices. Indeed, the highest risk parents may feel the most pressure to deny thoughts or behaviors that are controversial or viewed negatively. Previous research indicates that a sizable portion of parents with documented abuse histories deny abusive behavior in explicit assessment tools (Bennett et al. 2006). By expanding assessment protocols to

include implicit measures, researchers can gain valuable, broader information about parental attributions and more effectively identify and serve high-risk families.

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Task Description	Initial Target-Concept Discrimination	Associated Attribute Discrimination	Initial Combined Task	Reversed Target-Concept Discrimination	Reversed Combined Task
Sequence	1	2	3	4	5
Number of Trials	20	20	20 40	40	20 40
Task Instructions	•Obey Disobey•	•Good Bad•	•Obey •Good Disobey• Bad•	•Disobey Obey•	•Disobey •Good Obey• Bad•
Sample Stimuli	•Listen •Cooperate Refuse• Talk Back•	•Best •Excellent Terrible• Worst•	•Listen •Best Refuse• Terrible•	•Refuse Listen•	•Refuse •Best Listen• Terrible•

Fig. 1.

Block descriptions for the N-IAT (as used in Study 2). Note: Presentation of the combined tasks (sequence 3 and sequence 5) and the target-concept discrimination tasks (sequence 1 and sequence 4) were counterbalanced across participants

Table 1
Study 2 N-IAT means, standard deviations, and concurrent and convergent correlations for mothers and fathers

	Time 1		Time 2		Time 3	
	Mothers (<i>r</i>)	Fathers (<i>r</i>)	Mothers (<i>r</i>)	Fathers (<i>r</i>)	Mothers (<i>r</i>)	Fathers (<i>r</i>)
N-IAT M (SD)	1.049 (.404)	1.018 (.498)	.962 (.471)	.926 (.511)	.988 (.445)	.921 (.482)
<i>Attributions^a</i>						
Video Rating Minimize Attribution	.18**	.14	.16*	.11		
Video Rating Negative Attribution	.30***	.20*	.32***	.01		
Video Rating Situational Attribution	-.09	-.26**	-.35***	-.20*		
Infant Cry Quest Attachment	.16*	.31***	.43***	.29***	.28***	.38***
Infant Cry Quest Minimize	-.18**	-.40***	-.32***	-.36***	-.27**	-.20*
Infant Cry Quest Directive Control	.02	-.22*	-.05	-.14	.06	.15
Infant Cry Quest Spoil	-.10	-.28***	-.24**	-.14	-.20**	.01
Infant Cry Quest Communication	.18**	.23**	.30***	.13	.20**	.32***
<i>Abuse risk</i>						
Adult-Adolescent Parenting Inventory-2	-.23***	-.29***	-.25**	-.20*	-.28***	-.23**
Child Abuse Potential Inventory	-.19**	-.23**	-.20**	-.17	-.22**	-.20*

Note. N-IAT = Noncompliance Implicit Association Test

* *p* .05,

** *p* .01,

*** *p* .001

^a Lower N-IAT scores = more negative attributions; higher Video Rating Situational and lower Minimizing and Negative Attributions = more negative crying attributions; higher ICQ Attachment, Communication = more positive parenting beliefs; higher ICQ Minimization, Directive Control, and Spoil = more negative crying attributions; higher AAP1-2 and CAPI scores = greater abuse risk

Table 2

Study 2 multiple regression predicting Time 3 abuse risk

Mother's AAPL-2		β	t	Mother's CAPI		β	t
ICQ Directive Control		.35	5.39***	ICQ Directive Control		.18	2.53*
VR Negative Attribution		-.29	-4.38***	VR Negative Attribution		-.22	-2.97**
N-IAT		-.14	-2.09*	N-IAT		-.17	-2.34*
		$R^2 = .27, F(3,173) = 21.15, p .001$				$R^2 = .15, F(3,173) = 9.78, p .001$	
Father's AAPL-2		β	t	Father's CAPI		β	t
ICQ Minimize		.22	2.12*	ICQ Spoil		.20	2.12*
VR Negative Attribution		-.15	-1.51	VR Negative Attribution		-.17	-1.77 ^a
N-IAT		-.08	-.88	N-IAT		-.19	-2.10*
		$R^2 = .13, F(3,113) = 7.58, p .01$				$R^2 = .16, F(3,110) = 6.79, p .001$	

Note: N-IAT = Noncompliance Implicit Association Test, AAPL-2 = Adult-Adolescent Parenting Inventory-2, CAPI = Child Abuse Potential Inventory, ICQ = Infant Crying Questionnaire, VR = Video Ratings

* $p < .05$,

** $p < .01$,

*** $p < .001$

^a marginal, $p < .10$