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Negative Reinforcement in Infant Care Simulation: Alternative Caregiver Responses to Prevent Child Abuse

Miriam Tye
University of South Florida, miriamtye@gmail.com

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by

Miriam A. Tye

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ABSTRACT

This study was conducted to replicate and extend previous research on infant caregiver behavior by demonstrating negative reinforcement of infant caregiver behavior in response to crying and teaching appropriate care responses under conditions of inconsolable crying. A computerized infant simulator was used to create a laboratory simulation of infant caregiving. In Study 1, participants were exposed to negative reinforcement conditions and an extinction condition. In the negative reinforcement condition, participants engaged in caregiving responses to escape from the cry. In the extinction condition, the cry was inescapable and two of three participants stopped engaging in the previously reinforced caregiving response. Data was collected on cumulative duration of caregiving responses. In Study 2, participants were taught a task analysis of appropriate care responses under conditions of inconsolable crying using behavior skills training. Data were collected on percentage of completed appropriate care responses. Results showed acquisition of appropriate care responses following training.

INTRODUCTION

Crying is one of the most frequently cited reasons for child abuse, especially for victims less than 2 years old (Dykes, 1986; Hoffman, 2005; Kajese et al., 2011). Shaken baby syndrome (SBS) is one of the most common forms of physical abuse of infants and often involves infant crying (Dykes, 1986; Hoffman, 2005). SBS is inflicted by violently shaking the infant by the shoulders or arms, is characterized by no external trauma to the head or neck and signs of intracranial injury, and may result in death, visual impairment, motor deficits, seizures, and/or developmental delays (Dykes, 1986). In cases of child abuse homicide in Kansas, inconsolable crying was reported in 44% of the deaths (Kajese et al., 2011).

Infant crying is one of the most identified problems by parents during the first year of their child's life (McKim, 1987). Typically, infants cry approximately 2 hr per day during the first 3 months which is shown to be the time period when infant crying peaks (Hunziker & Barr, 1986; St James-Roberts & Halil, 1991; St. James-Roberts, Hurry, & Bowyer, 1993). Excessive crying by infants is often attributed to colic which is defined as "crying for a total of more than 3 hr per day, occurring more than 3 days per week, and lasting for more than 3 weeks" (Wessel, Cobb, Jackson, Harris, & Deitwiler, 1954, p. 426). Clinical samples of infants with identified excessive crying have been compared to normative nonclinical samples to demonstrate that clinically identified excessive crying rates are significantly higher than normative crying rates therefore validating the definition of colic (St. James-Roberts & Halil, 1991; St. James-Roberts et al., 1993). Caregivers report excessive crying in 5-40% of infants (Elliot, Drummond, & Barnard, 1996; Hide & Guyer, 1982).

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Considering the link between crying and child abuse, risk for abuse is significantly higher for younger children (Kajese et al., 2011; Keenan et al., 2003; Lyman et al., 2003; Palusci, 2011; U.S. Department of Health and Human Services, 2012; Wu et al., 2004). The *Child Maltreatment 2011* report shows that younger children are most vulnerable to child maltreatment with victims less than 3-years-old comprising 27% of cases and children less than 1-year-old having the highest rate of victimization at 21.2 per 1,000 children (U.S. Department of Health and Human Services, 2012). These statistics are similar across individual states. Of nearly 190,000 children born in Florida in 1996, 2.4% of infants had records of maltreatment between 3 days and 1 year old (Wu et al., 2004). A survey of child homicide in Jefferson County, Alabama for the years 1988-1998 showed that 56.6% of the victims were less than 1-year-old (Lyman et al., 2003). A similar survey in Kansas from 1996-2007 showed nearly 80% of cases of child abuse homicide were with victims under 2 years old with 34.7% of victims less than 1 year old (Kajese et al., 2011). In 152 cases of children 2 years old or younger diagnosed with traumatic brain injury in North Carolina in 2000-2001, infants had a higher incidence rate of 29.7 per 100,000 over 1-2 year olds at 3.8 per 100,000 (Keenan et al., 2003).

Caregiver characteristics that are prevalent in child abuse cases include caregivers who are less than 30 years old, mother's education level at less than high school graduate, single parents, history of child abuse, parenting three or more children, and recipients of Medicaid (Cadzow, Armstrong, & Fraser, 1999; Kajese et al., 2011; Keenan et al, 2003; Lyman et al., 2003; U.S. Department of Health and Human Services, 2012; Wu et al., 2004). These risk factors associated with cases of child abuse should be considered when researching caregiver behavior and developing prevention programs to target the issue of child maltreatment.

The prevalence of infant maltreatment and the relationship between infant crying and caregiver behavior necessitates experimental research on this connection between crying and caregiver responses. However, experimental manipulation of infant crying is difficult because of lack of control over when infants cry and because of the ethical considerations with the potential for child abuse. A few studies have overcome this problem by using experimental simulations to evaluate the relationship between crying and caregiver behavior.

A small number of studies have conducted experimental evaluations of caregiver behavior and infant crying by using a recorded infant cry and requiring the caregivers to perform simulated tasks to represent responses to infant crying (e.g., Donovan, 1981; Donovan & Leavitt, 1985, 1989; Donovan, Leavitt, & Walsh, 1990; Thompson, Bruzek, & Cotnoir-Bichelman, 2011). In the series of studies conducted by Donovan and colleagues, these authors presented an infant cry to mothers via a tape recorder and assessed their performance on a simulated caregiving task under various pretreatment and treatment conditions. Donovan (1981) assessed mothers' performance on learning a task that would effectively terminate the infant cry after the mothers were exposed to a pretreatment condition in which the cry was inescapable. Results of this study showed that when given a shuttle box task that would terminate the cry when operated correctly, the mothers who experienced the inescapable cry in the pretreatment condition required more trials to reach acquisition criterion on the task that would result in termination of the cry, had greater number of failures to escape the cry, and had longer response latencies than mothers who did not experience the inescapable cry during pretreatment. Donovan and Leavitt (1985) extended this line of research by demonstrating that the effect of an inescapable cry on caregiver's behavior could be reversed by attributing the failure to escape the cry to that specific setting in which the crying infant may have been especially difficult instead of a global

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attribution of the caregiver's failure. This study also found that when mothers were told that the infant cry in the recording was crying from a "difficult" infant, mothers from both the escapable pretreatment condition and the inescapable pretreatment condition showed debilitated performance on the solvable task. Donovan and Leavitt (1989) and Donovan et al. (1990) further examined caregiver responsiveness to infant cries under various conditions by manipulating mothers' perception of control over termination of the infant cry. The experimenters manipulated perception of control by terminating the recorded infant cry contingent on the mothers' response on an intermittent schedule during the pretreatment condition. Results of these studies showed that mothers who overestimated their control over termination of the infant cry had greater debilitated performance on the solvable task in the test condition following an inescapable cry pretreatment condition. This series of studies demonstrate the learned helplessness paradigm described by Miller and Seligman (1975) within an infant caregiving model by showing that mothers exposed to an inescapable cry are less proficient at terminating infant crying when an effective response is available. These results suggest that caregivers who experience excessive and persistent infant crying may be more susceptible to poor caregiving or neglect.

Thompson et al. (2011) further evaluated the effects of crying on caregiver behavior by targeting more natural infant caregiving tasks. The purpose of this study was to evaluate sensitivity of caregiver behavior to negative reinforcement and extinction conditions within an experimental laboratory simulation. Eleven undergraduate students with varying levels of infant caregiving experience participated in this experiment. To simulate more natural caregiving responses than were used in the previous research, the authors evaluated caregiver responses such as rocking, playing, and feeding using a baby doll and a recorded cry. Throughout the study, the experimenter controlled the presentation and termination of the recorded cry from

behind a one-way mirror. Horizontal rocking, vertical rocking, feeding, and playing were the target responses measured in this evaluation. The experimenter exposed the participants to negative reinforcement conditions targeting the various caregiving responses and to an extinction condition to test the sensitivity of the caregiver's behavior to the conditions associated with control over termination of the infant cry. In the negative reinforcement condition, the experimenter played the recorded infant cry until the participant performed the target response for 3 consecutive s. If the participant stopped performing the target response for 3 consecutive s, the experimenter presented the infant cry again. In the extinction condition, the experimenter presented the infant cry for the entire session independent of the participant's responses. To demonstrate control when caregiver behavior was not responsive to extinction, the experimenters used a no cry condition in which no cry was presented for the entire session. Results of this study showed caregiving responses of nine participants were controlled by negative reinforcement (i.e., the participant would feed the baby doll when the cry was terminated contingent on feeding, rock the baby doll when the cry was terminated contingent on rocking, and would not perform any of the target behaviors in the extinction condition when there was no way to stop the cry). Two of the participants were highly resistant to extinction as they continued to perform one or more of the target caregiving behaviors when these behaviors were not effective responses to terminate the cry. This study demonstrated that caregiver behavior is sensitive to contingencies associated with the termination of the infant cry and that caregiver behavior is partially under the control of negative reinforcement. It also demonstrated that caregivers who know a variety of responses that may be effective at terminating infant crying are likely to provide some form of care in attempt to console the baby. Despite its contribution to the literature on caregiver behavior and infant crying, there are several limitations to this study. First, the participants in this study may

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not represent populations that are at risk for abusing or neglecting infants. Second, typical caregiving responses were not well simulated to represent natural conditions of infant care with the baby doll and infant cry playing on a tape recorder. Third, the experimenters did not measure abusive or neglectful responses that could have occurred in response to inconsolable crying. Lastly, this experiment may not represent natural conditions because the length of exposure to the cry was relatively short.

Limitations of Thompson et al. (2011) suggest future research should continue to explore the relationship between infant crying and caregiver behavior using infant simulators to create a more natural simulation of infant crying and care responses. An infant simulator is a computerized, life-size doll that is designed to simulate actual infant responses and allow users to experience infant care responsibilities. Most research with infant simulators has been limited to studies evaluating their effectiveness for teen pregnancy prevention (e.g., Barnett & Hurst, 2004; Divine & Cobbs, 2001; Herrman, Waterhouse, & Chiquoine, 2011). Stocco, Thompson, and Floeckher (2013) used data from the typical infant simulation program of high school students to describe the caregiving experience and collect preliminary data to consider the use of infant simulators in abuse prevention programs. Twenty-five high school students participated in the infant simulation experience as part of a health class. Data were collected on the percentage of proper care responses defined as providing the effective care response to terminate crying during each crying episode. The simulators also recorded data on mishandling (shaking, rough handling, improper positioning, and failure to provide head support) and physical abuse. Results showed that only 12% of participants demonstrated proper care responses during every crying episode, all but one participant mishandled the baby, and physical abuse was recorded for four participants. This study demonstrated that infant simulation in the typical high school experience

may provide a history of unsuccessful caregiving that sometimes results in abusive responses toward the baby. However, it may be possible to use infant simulators in abuse prevention programs by creating a simulation experience that provides a history of successful caregiving. The National Center on Shaken Baby Syndrome distributes educational materials to new parents to increase knowledge of typical infant crying and prevent infant abuse (Barr et al., 2009). The center's recommendation for frustrated caregivers' responses to inconsolable crying include placing the baby in a safe location or with another caregiver and walking away to engage in relaxing activities such as listening to music or taking a walk before returning to check on the baby (Barr, 2013). These recommendations could be included in an infant simulation program designed to teach abuse prevention skills.

Research has demonstrated a connection between infant crying and caregiver behavior by showing a link between rates of crying and caregiver responsiveness and showing a functional relationship between caregiver responses and these responses' ability to affect infant crying within an experimental manipulation. The purpose of this study was to replicate Thompson et al. (2011) by demonstrating negative reinforcement of infant caregiver behavior (Study 1) and to extend the literature by teaching appropriate care responses under conditions of inconsolable crying (Study 2). This study also extended previous research by using infant simulators to create a laboratory model of infant caregiving that provided lifelike responses from the infant and required common caregiving responses from the participants. In addition, this study measured abusive responses of caregivers that occurred in response to infant crying.

STUDY 1

The purpose of Study 1 was to replicate and extend the results of Thompson et al. (2011) by demonstrating negative reinforcement of infant caregiver behavior using infant simulators.

Participants and Setting

The participants were three female college students recruited from a university campus, ages 21 (Bailey), 23 (Sara), and 26 (Kari). The participants completed a childcare experience questionnaire to obtain information on type of experience with infants, approximate hours of experience, and responsibilities (see Appendix A). Bailey reported no experience caring for infants. Kari and Sara reported assisting with care of siblings or nieces and nephews with parents of the infant present. All sessions were conducted in a therapy room with a one-way mirror.

Materials

The materials included a Real Care® infant simulator, a chair, infant carrier, bottle, blanket, and diapers. The Real Care® Baby-II Plus is an infant simulator with wireless technology, personal identification bracelets to ensure caregiver accountability, lifelike head and neck to detect mishandling, and realistic cries, coughing, coos, and burps. The infant simulator cries, and the caregiver must respond to the infant's needs by feeding, burping, rocking, or diapering the infant. The simulator records the responses of the caregiver and provides a percentage of correct caregiving responses and a frequency count of mistreatment.

Response Measurement

Trained observers collected data on duration of caregiving responses and frequency of mishandling responses using the ABC Data Pro data collection application on an iPhone. Scoring

duration of caregiving responses started when the response occurred for 3 s and stopped when the response ceased for 3 s. Caregiving responses included rocking and feeding. Rocking was defined as holding baby in arms or on lap and moving in an up and down, forward and back, or side to side motion that creates visible movement of the baby's body or placing baby in the car seat and moving the seat in a forward and back motion that creates visible movement of the baby's body. Feeding was defined as holding the bottle to the mouth of the baby. Cumulative seconds of caregiving responses were graphed in 1 min bins. Mishandling responses were scored as a frequency measure. Mishandling was defined as shaking (moving the baby in a rapid forward and back or side to side motion causing uncontrolled rapid movements of the baby's head), rough handling (hitting, kicking, throwing, or dropping the baby), and failure to provide head support.

Interobserver Agreement

To determine interobserver agreement, a second observer independently collected data on caregiver responses during 100% of sessions. Interobserver agreement was calculated by dividing each session into 10-s intervals. The data collectors' records were compared on an interval-by-interval basis. For duration measures, the smaller duration of responses recorded was divided by the larger duration of responses recorded. The percentages for each interval were summed, divided by the total number of intervals, and multiplied by 100%. Mean agreement scores for Bailey, Kari, and Sara were 93% (range, 82% to 100%) for rocking and 96% (range, 92% to 100%) for feeding, 81% (range, 72% to 89%) for rocking and 95% (range, 87% to 99%) for feeding, and 80% (range, 73% to 91%) for rocking and 95% (range, 89% to 99%) for feeding, respectively.

Procedures

Each participant was informed that the purpose of the experiment was to observe infant care skills in response to crying in a simulated caregiving situation. Prior to each session, the experimenter delivered instructions to the participant:

> "Infants cry for a lot of different reasons. Do what comes naturally to care for the baby. You will hear the baby make a chime sound when it is turned on. To provide care for the baby, you must first touch the identification bracelet to the baby and listen for the chime. I will demonstrate proper use of the identification bracelet. "

Session duration was a maximum of 30 min. During reinforcement conditions, sessions were terminated following 5 consecutive min of the target behavior with a 10 s error margin for brief periods in which the target behavior ceased and resumed. During extinction and no cry conditions, sessions were terminated following 5 consecutive min of the absence of the most recently reinforced target behavior.

Negative reinforcement (Sr-). The experimenter set the baby simulator to cry requiring care in the form of one of the caregiving responses (e.g. rocking, feeding, etc.). The baby simulator cried until the participant began performing the target response. The baby simulator began crying again if the target response stopped for approximately 3 consecutive seconds. The purpose of this condition was to assess if care responses are under the control of negative reinforcement in the form of escape from the cry.

Extinction. The experimenter set the baby to cry for the entire session independent of participant's responses. The purpose of this condition was to provide a control for the Sr-condition and to simulate natural conditions of inconsolable crying in which abusive or neglectful responses may typically occur.

No cry. This condition was only implemented as a control for Bailey when the participant's care responses were not responsive to extinction (i.e., the participant continued to engage in caregiving responses that were not contacting reinforcement in the form of escape from the cry). During no cry sessions, the simulator was set to not cry for the entire session.

Experimental Design

A reversal design was used to demonstrate experimental control.

Results and Discussion

Results demonstrating negative reinforcement of simulated infant caregiving for all participants are depicted in Figure 1. These data show caregiving responses under the control of negative reinforcement in the form of escape or avoidance of the infant cry. Data are presented as cumulative seconds of caregiving responses within sessions. Breaks in the data path indicate the start of a new session. In Sr- feeding conditions, Bailey and Sara acquired the feeding response to terminate the cry within one session. Kari did not initially acquire the feeding response to meet the session termination criteria in three sessions. After meeting the reinforcement criteria for rocking, Kari engaged in feeding to terminate the cry and met the reinforcement criteria. Rocking did not extinguish during Sr- feeding conditions for all participants, but this did not effect the reinforcement of the feeding response. All participants acquired the rocking response and met the reinforcement criteria within one Sr- rocking session. Criteria for extinction were met in one session for Bailey and Sara. The extinction criterion was 5 min of the absence of the previously reinforced response, which was feeding in all cases. Although the feeding response met the extinction criteria, participants continued to rock the baby throughout extinction sessions with the exception of the end of the initial extinction session for Sara. Bailey's feeding responses were resistant to extinction as they continued to occur

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throughout the extinction condition. Bailey engaged in feeding for several seconds every couple minutes, which resulted in only slight increases for this response but extended the sessions. A no cry condition was implemented to demonstrate control, and Bailey did not engage in caregiving responses in this condition. Experimental conditions were replicated for all participants to demonstrate experimental control. No participant mishandled the baby during any condition. However, anecdotally, comments related to not knowing what the baby wanted, sighing, and requests to turn the volume down on the baby or to resume sessions on another day occurred more frequently during or following sessions in the extinction condition.
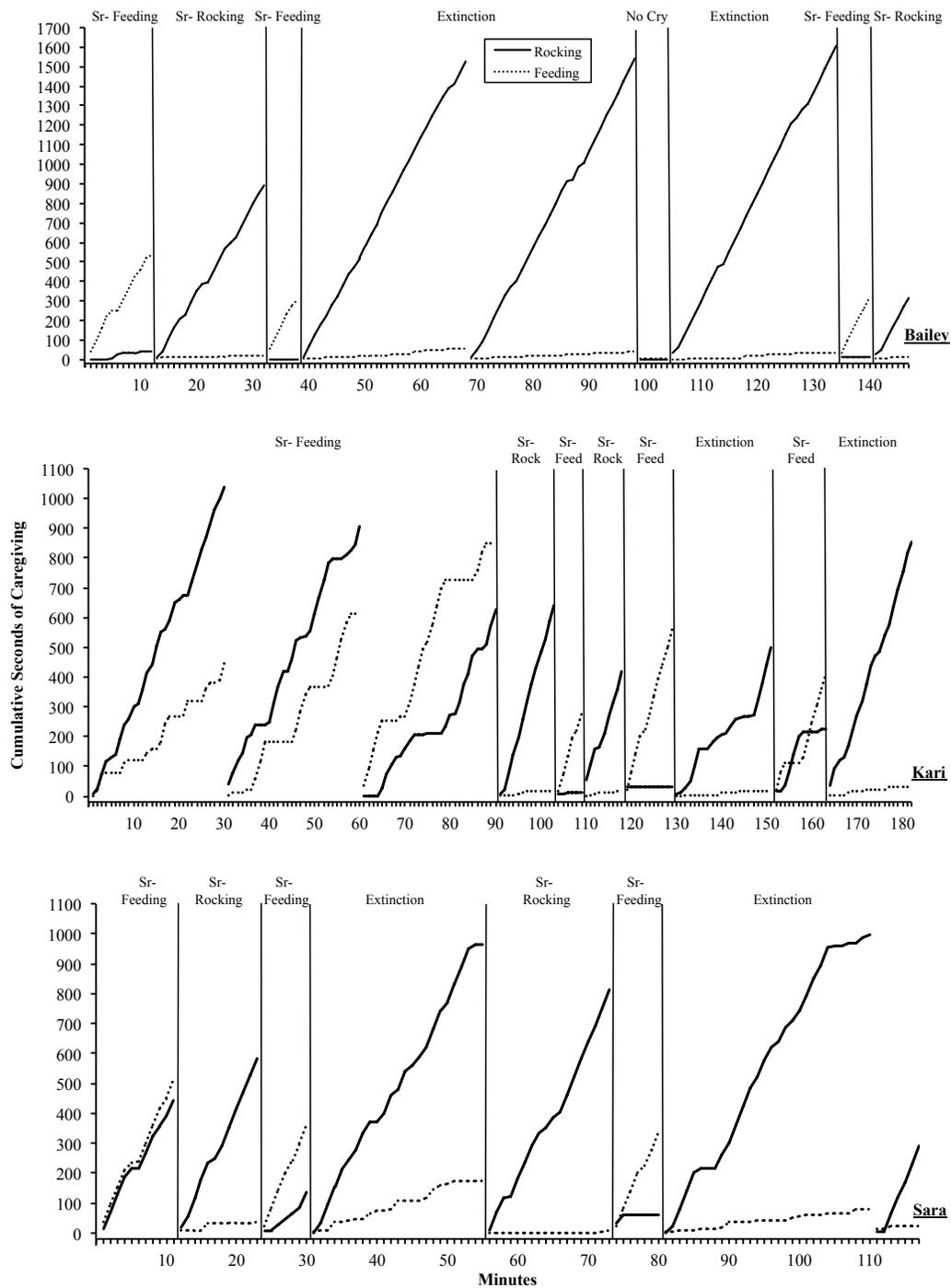
Figure 1. Results from Study 1 for Bailey, Kari, and Sara. Cumulative duration of caregiving in seconds is depicted on the y-axis. On the x-axis, 1-min bins of data are depicted. Start of a new session is indicated by breaks in the data path.

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STUDY 2

The purpose of Study 2 was to evaluate procedures for teaching alternative appropriate care responses including ensuring the baby's needs were met, placing the baby in a safe location, and taking a break (see Appendix B) for situations in which an infant's cry may be inconsolable as demonstrated in the extinction condition from Study 1.

Participants and Setting

Participants were the same as those in Study 1. All sessions occurred in the same setting as in Study 1.

Materials

The infant simulator and other materials were the same as those in Study 1. In addition, a timer, headphones, and a device to play music were available during all sessions.

Response Measurement

Data were collected on the percentage of appropriate care responses completed correctly as recorded on the task analysis data sheet (see Appendix C). Rocking and feeding were defined as in Study 1. Burping was defined as holding the baby in arms in a vertical position and patting the baby's back. Diapering was defined as removing the baby's diaper and placing another diaper on the baby. Observers collected data using pencil and paper. Each item on the task analysis was scored as completed or not completed. The percentage of completed steps was calculated by dividing the number of completed steps by the total number of steps. Integrity data was collected during training sessions. Observers recorded if the trainer provided instructions,

modeled the response, provided an opportunity for rehearsal, and provided feedback on the steps

of the task analysis (see Appendix D). Training integrity scores were 100% for all participants.

Interobserver Agreement

To determine interobserver agreement, a second observer independently collected data

during 64% of sessions. The observers' data were compared step-by-step on the task analysis and

each step was scored as an agreement or a disagreement. The number of agreements was divided

by the total number of steps and multiplied by 100%. Mean agreement scores across participants

were 99% (range, 93% to 100%) for baseline and 100% for post-training.

Procedures

Instructions given to participants prior to sessions were identical to Study 1. Baseline

sessions were 10 min in length. Post-training sessions ended after the participant completed the

entire appropriate care task analysis. Average length of post-training sessions was 10:05 (range,

7:45 to 11:35).

Baseline. Baseline sessions were identical to sessions in the extinction condition in Study

1.

Training. Training was conducted individually with each participant utilizing behavior

skills training to teach appropriate care responses. Observers did not collect data during training

sessions except to track participant's progress on acquisition of the skills. The infant simulator

was turned off during training sessions so crying was not present. The experimenter gave

instructions and modeled the steps on the task analysis. Participants rehearsed the steps, and the

experimenter provided feedback on each participant's performance of the task analysis steps. All

participants reached 100% completion of steps on the task analysis on the first rehearsal with the

baby during training.

Post-training. Post-training sessions were identical to the baseline condition.

Experimental Design

A multiple baseline across participants design was utilized to demonstrate experimental control.

Results and Discussion

Results for Bailey, Kari, and Sara are depicted in Figure 2. After training on appropriate care responses during inconsolable crying, all participants showed an immediate increase from baseline levels in percentage of completed steps. Bailey's performance increased from a baseline mean of 26% to 100% completion of appropriate care steps following training. Kari's mean percentage of completed steps was 34% in baseline and increased to 91% in post-training. In post-training sessions, Kari made errors by skipping a step for burping the baby or by listening to music for more than 3 min. Sara's performance increased from a baseline mean of 42% to 100% completion of appropriate care steps in post-training. During post-training sessions, participants would engage in all the care steps and place the baby safely in the infant seat and then completely turn away from the baby during the break while listening to music. During training, participants reported to the experimenter that they were glad to learn that they had not been doing something wrong that was making the baby cry in sessions with inconsolable crying. In addition, Sara reported that she felt more comfortable in post-training sessions when she had specific responses to perform to care for the baby even though it did not stop crying.
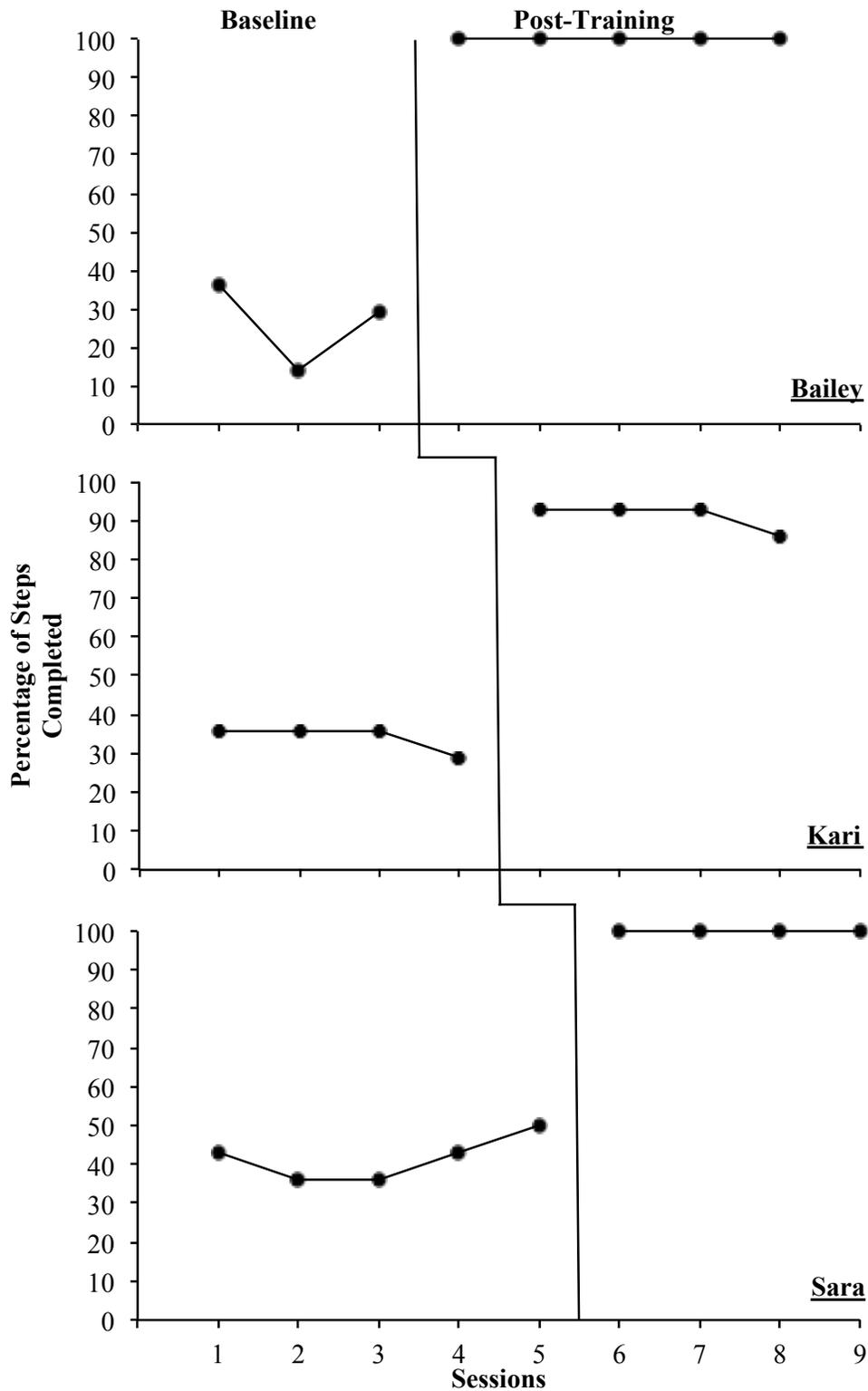
Figure 2. Results from Study 2 are depicted as percentage of steps completed on the task

analysis across baseline and post-training phases for Bailey, Kari, and Sara.

GENERAL DISCUSSION

The purpose of this study was to replicate Thompson et al. (2011) by demonstrating negative reinforcement of infant caregiver behavior and to teach appropriate care responses under conditions of inconsolable crying including ensuring the baby's needs were met, placing the baby in a safe location, and taking a break to listen to music. Results of Study 1 demonstrated negative reinforcement of simulated infant caregiving for all participants. All participants showed some resistance to extinction by continuing to engage in care responses that did not effectively terminate the cry. For Kari and Sara, the feeding response extinguished allowing them to meet the extinction criteria, but they continued to rock the baby in the absence of reinforcement during part of the extinction sessions. Bailey continued to engage in rocking and feeding throughout the extinction condition and never met the extinction criteria. Even with resistance to extinction, all participants' caregiving behavior showed sensitivity to the criteria in reinforcement conditions. In Study 2, performance of appropriate care responses during inconsolable crying increased following training for all participants.

The results of Study 1 are similar to those found by Thompson et al. (2011) by demonstrating that caregiver behavior is sensitive to contingencies associated with termination of the infant cry and that caregiver behavior is partially under the control of negative reinforcement. Two participants from Thompson et al. (2011) showed resistance to extinction but sensitivity to reinforcement conditions, as did Bailey in the current study. Further analysis of the variables that result in persistent responding in the absence of escape from the cry is necessary. The current study extended the work of Thompson et al. (2011) by teaching appropriate care responses under

extinction conditions as a method to prevent abuse that is likely to occur under these conditions. The appropriate care responses included basic recommendations from abuse prevention organizations including ensuring that all of the baby's needs are met, placing the baby in a safe location, taking a break by engaging in an activity where the caregiver is not able to hear the cry, and then going back and repeating these steps. Anecdotally, participants reported that they continued to try different care responses during extinction because they felt like they should be doing something but did not know exactly what they should do. Learning the appropriate care responses was helpful because it gave them some specific steps to follow and also gave an escape from the cry for part of the session.

The current study also extended the research by utilizing an infant simulator to create a more natural laboratory simulation of infant caregiving. The simulator allowed participants to experience the cry coming from the baby where previous studies utilized a tape player to present the cry. The simulator also responded to specific care responses by making a sucking noise when feeding while the baby was programmed to require feeding and by making whimpering noises occasionally during rocking when the baby was programmed for rocking. Full motion of the baby's neck required that participant's provide head support while handling the simulator. Utilizing an infant simulator in this study also has implications for future programs utilizing these babies as it demonstrated the use of the simulators to teach appropriate care for abuse prevention. Stocco et al. (2013) showed that typical programs using infant simulators may actually set the occasion for abuse or neglect of the baby, but the current study demonstrated that a program utilizing simulators can be arranged to create a history of appropriate infant caregiving and to teach abuse prevention.

One purpose of this study was to extend the research by measuring abusive responses toward the infant. However, across all conditions no mishandling responses were observed. This is likely due to limitations associated with the experimental setting. Participants' interactions with the baby may have been reactive to the presence of the experimenter and observers behind the one-way mirror. Although the infant simulator provides an improved simulation experience, the current programming options for the simulator did not allow for automated data collection of target behaviors in this study. Therefore, it was necessary to have sessions take place in the laboratory setting. Another factor that may have influenced the lack of mishandling was relatively short exposure to the cry in comparison to having an infant with colic. Participants were in session for no more than 1 hr one or two days per week in contrast to crying of a colicky infant occurring for more than 3 hr for at least 3 days per week. Another limitation of the experimental setting was that there were no competing activities in this setting. The presence of competing activities may have resulted in behavior that could be categorized as neglect.

The programming options for the infant simulator also presented some limitations in this study. As stated above, the data collection features of the simulator did not allow for automated data collection. The current system only provides information on the percentage of appropriate care responses and the frequency of mishandling and physical abuse and does not allow for a real time depiction of caregiver behavior. The simulator is programmed in care cycles that last a maximum of approximately 4 min. In these cycles, the baby will cry for the programmed care task (i.e., rocking, feeding, diapering, etc.) and then is quiet for a few seconds before it starts whining and escalates to a cry. If the caregiver engages in the appropriate response, the baby will respond according and then coo when the cycle has ended. The care cycles presented as problems in this study during extinction and with the ID bracelet. During extinction, the baby

would automatically get quiet for a few seconds at the end of each care cycle which may have resulted in adventitious reinforcement of a care response that was occurring at that moment resulting in an increase in that care response. According to the simulator's programming, the participant was required to scan the ID bracelet at the beginning of each cycle prior to engaging in care responses in order for the baby to register that care was being provided and to stop crying. Kari had difficulty identifying when a cycle had ended and would engage in care responses that should have been reinforced but were not because the ID bracelet had not been scanned. When this occurred, the experimenter provided additional training on the use of the ID bracelet, and Kari learned to use the baby and ID bracelet properly in sessions. Despite the limitations of programming options, the simulator allowed for a realistic simulation of caring for a baby.

In Study 2, the duration of appropriate care responses were relatively short compared to what may occur in the natural setting. Care responses (i.e., rocking, feeding, burping) were required for a minimum of 15 s which is likely not a sufficient length of time to determine if an infant is crying to access rocking or in need of feeding or burping. Also, the length of time for a break away from crying could potentially be lengthened a few minutes in the natural setting. These response durations were shortened for the purpose of this study to allow for more trials without extending session times or the duration of the study. The focus of this portion of the study was to ensure that participants engaged in each step of appropriate care and would repeat the steps as a method to reduce the likelihood that behaviors characterized as abuse or neglect would occur.

Future research should evaluate this method of abuse prevention by teaching appropriate care responses to populations at risk for abuse or those with a history of abuse that may be

working to regain custody of their children. Also, because it is difficult to observe abusive behavior in the experimental setting, future research may benefit from utilizing a self-report measure of frustration or anger. A self-report, Likert-type scale measure of level of frustration following each session would provide data that may reflect the likelihood of abuse if the session occurred in another setting. This measure could also reflect changes in frustration levels that occur following training of appropriate care responses. In addition, future research should conduct generalization probes to assess participant's use of the appropriate care skills during an extended simulation in the natural environment. Data could be collected on generalization probes via video or improved programming of the infant simulator.

To conclude, the present study demonstrated that infant caregiver behavior is partially under the control of negative reinforcement. Participants engaged in care responses that terminated the infant's cry when an effective response was available, and 2 of 3 participants ceased engaging in the previously reinforced response during extinction. Negative reinforcement of infant caregiver behavior suggests that extinction conditions may increase the likelihood of abuse. Participants were taught appropriate care responses including ensuring the baby's need are met, placing the baby in a safe place, taking a break, and returning to check on the baby as a method to prevent abuse during inconsolable crying. After training, all participants showed an immediate increase from baseline levels in percentage of completed appropriate care steps.

REFERENCES

Barnett, J. E., & Hurst, C. S. (2004). Do adolescents take "Baby Think It Over" seriously?
Adolescence, 29, 65-75.

Barr, M. (2013). Tips to deal with frustration and anger. Retrieved from
http://www.purplecrying.info/

Barr, R.G., Rivara, F. P., Barr, M., Cummings, P., Taylor, J., Lengua, L. J., & Meredith-Benitz,
E. (2009). Effectiveness of educational materials designed to change knowledge and
behaviors regarding crying and shaken-baby syndrome in mothers of newborns: A
randomized, controlled trial. *Pediatrics, 123,* 972-980.

Cadzow, S. P., Armstrong, K. L., & Fraser, J. A. (1999). Stressed parents with infants:
Reassessing physical abuse risk factors. *Child Abuse and Neglect, 23,* 845-853.

Divine, J. H., & Cobbs, G. (2001). The effects of infant simulators on early adolescents.
Adolescence, 36, 593-600.

Donovan, W. L. (1981). Maternal learned helplessness and physiologic response to infant crying.
Journal of Personality and Social Psychology, 40, 919-926.

Donovan, W. L., & Leavitt, L. A. (1985). Simulating conditions of learned helplessness: The
effects of interventions and attributions. *Child Development, 56,* 594-603.

Donovan, W. L., & Leavitt, L. A. (1989). Maternal self-efficacy and infant attachment:
Integrating physiology, perceptions, and behavior. *Child Development, 60,* 460-472.

Donovan, W. L., Leavitt, L. A., & Walsh, R. O. (1990). Maternal self-efficacy: Illusory control

    and its effect on susceptibility to learned helplessness. *Child Development, 61,* 1638-

    1647.

Dykes, L. J. (1986). The whiplash shaken infant syndrome: What has been learned? *Child Abuse*

    & Neglect, 10, 211-221.

Elliot, M. R., Drummond, J., & Barnard, K. E. (1996). Subjective appraisal of infant crying.

    Clinical Nursing Research, 5, 237-250.

Herrman, J. W., Waterhouse, J. K., & Chiquoine, J. (2011). Evaluation of an infant simulator

    intervention for teen pregnancy prevention. *Journal of Women's Health, Obstetric and*

    Neonatal Nurses, 40, 322-328.

Hide, D. W., & Guyer, B. M. (1982). Prevalence of infant colic. *Archives of Childhood Disease,*

    57, 559-560.

Hoffman, J. M. (2005). A case of shaken baby syndrome after discharge from the newborn

    intensive care unit. *Advances in Neonatal Care, 5,* 135-146.

Hunziker, U. A., & Barr, R.G. (1986). Increased carrying reduces infant crying: A randomized

    control trial. *Pediatrics, 77,* 641-648.

Kajese, T. M., Nguyen, L. T., Pham, G. Q., Pham, V. K., Melhorn, K., & Kallail, K. J. (2011).

    Characteristics of child abuse homicides in the state of Kansas from 1994 to 2007. *Child*

    Abuse and Neglect, 35, 147-154.

Keenan, H. T., Runyan, D. K., Marshall, S. W., Nocera, M. A., Merten, D. F., & Sinal, S. H.

    (2003) A population-based study of inflicted traumatic brain injury in young children.

    Journal of the American Medical Association, 290, 621-626.

Lyman, J. M., McGwin Jr., G., Malone, D. E., Taylor, A. J., Brissie, R. M., Davis, G., & Rue III,
L. W. (2003). Epidemiology of child homicide in Jefferson County, Alabama. *Child
Abuse and Neglect, 27,* 1063- 1073.

McKim, M. K. (1987). Transition to what? New parents' problems in the first year. *Family
Relations, 36,* 22-25.

Miller, W. R., & Seligman, M. E. P. (1975) Depression and learned helplessness in man. *Journal
of Abnormal Psychology, 84,* 228-238.

Palusci, V. J. (2011). Risk factors and services for child maltreatment among infants and young
children. *Children and Youth Services Review, 33,* 1374-1382.

St. James-Roberts, I., & Halil, T. (1991). Infant crying patterns in the first year: Normal
community and clinical findings. *Journal of Child Psychology and Psychiatry, 32,* 951-
968.

St. James-Roberts, I., Hurry, J., & Bowyer, J. (1993). Objective confirmation of crying durations
in infants referred for excessive crying. *Archives of Disease in Childhood, 68,* 82-84.

Stocco, C. S., Thompson, R. H., & Floeckher, T. (2013, May). *High schoolers' experience with
an infant simulation.* Poster session presented at the Association of Behavior Analysis
International Annual Convention, Minneapolis, MN.

Thompson, R. H., Bruzek, J. L., & Cotnoir-Bichelman, N. M. (2011). The role of negative
reinforcement in infant caregiving: An experimental simulation. *Journal of Applied
Behavior Analysis, 44,* 295-304.

U.S. Department of Health and Human Services, Administration for Children and Families,
Administration on Children, Youth and Families, Children's Bureau. (2012). *Child

Maltreatment 2011. Retrieved from http://www.acf.hhs.gov/programs/cb/research-data-technology/statistics-research/child-maltreatment.

Wessel, M. A., Cobb, J. C., Jackson, E. B., Harris, G. S., & Deitwiler, A. C. (1954). Paroxysmal fussing in infancy sometimes called "colic." *Pediatrics, 14,* 421-434.

Wu, S. S., Ma, C., Carter, R. L., Ariet, M., Feaver, E. A., Resnick, M. B., & Roth, J. (2004) Risk factors for infant maltreatment: A population- based study. *Child Abuse and Neglect, 28,* 1253-1264.

APPENDICES

Appendix A: Childcare Experience Questionnaire

Name:_____

1. Do you have experience caring for infants (0-12 months)?

   □ Yes   □ No

   If yes, continue to answer questions 2-4.

2. What type of infant care experience do you have? (mark all that apply)

   □ Babysitting   □ Younger sibling(s)

   □ Parent   □ Nanny

   □ Employment in infant care setting   □ Other: _____

3. Approximate hours of infant care experience: _____

4. What responsibilities have you had when caring for an infant? (mark all that apply)

   □ Play   □ Feed   □ Nap

   □ Comfort   □ Diaper   □ Other: _____

Appendix B: Task Analysis for Responding to Inconsolable Crying

1. Try rocking the baby

2. Try feeding the baby

3. Try burping the baby

4. Try changing the baby's diaper

5. Place the baby in the car seat

6. Buckle the straps on the car seat

7. Put headphones on and listen to music for 3 minutes

8. Repeat steps 1-7 until baby is calm

Appendix C: Data Sheet for Task Analysis

Participant: _____   Session #: _____   Observer: _____   Date: _____

Steps	Time	Completed Correctly	

1-4. Rock the baby
    Feed the baby
    Burp the baby
    Diaper the baby
	At least 15 s each	□ Yes
		□ Yes
		□ Yes
		□ Yes
			□ No
			□ No
			□ No
			□ No

5. Place the baby in the car seat		□ Yes	□ No
6. Buckle the straps on the car seat		□ Yes	□ No
7. Put on headphones and listen to music for no more than 2.5 min	3 min or less	□ Yes	□ No

8-11. Rock the baby
    Feed the baby
    Burp the baby
    Diaper the baby
	At least 15 s each	□ Yes
		□ Yes
		□ Yes
		□ Yes
			□ No
			□ No
			□ No
			□ No

12. Place the baby in the car seat		□ Yes	□ No
13. Buckle the straps on the car seat		□ Yes	□ No
14. Put on headphones and listen to music for no more than 2.5 min	3 min or less	□ Yes	□ No

Totals:

Percentage:

Appendix D: Training Integrity Data Sheet

Participant: _____   Observer:_____   Date: _____

Mark all training responses and opportunities given by the trainer.

1. Try rocking the baby

    □ Instructions   □ Modeling   □ Rehearsal

2. Try feeding the baby

    □ Instructions   □ Modeling   □ Rehearsal

3. Try burping the baby

    □ Instructions   □ Modeling   □ Rehearsal

4. Try changing the baby's diaper

    □ Instructions   □ Modeling   □ Rehearsal   □ Feedback for 1-4

5. Place the baby in the car seat

    □ Instructions   □ Modeling   □ Rehearsal

6. Buckle the straps on the car seat

    □ Instructions   □ Modeling   □ Rehearsal   □ Feedback for 5-6

7. Put headphones on and listen to music for 2 minutes

    □ Instructions   □ Rehearsal   □ Feedback

8. Repeat steps 1-7 until baby is calm

    □ Instructions   □ Rehearsal   □ Feedback

Appendix E: IRB Approval

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RESEARCH INTEGRITY AND COMPLIANCE
Institutional Review Boards, FWA No. 00001669
12901 Bruce B. Downs Blvd., MDC035 • Tampa, FL 33612-4799
(813) 974-5638 • FAX (813) 974-7091

January 15, 2014

Miriam Tye
ABA-Applied Behavior Analysis
Tampa, FL 33612

RE: **Expedited Approval for Initial Review**
IRB#:   Pro00015559
Title: Negative Reinforcement in Infant Care Simulation

Study Approval Period: 1/15/2014 to 1/15/2015

Dear Ms. Tye:

On 1/15/2014, the Institutional Review Board (IRB) reviewed and **APPROVED** the above
application and all documents outlined below.

Approved Item(s):
Protocol Document(s):
Thesis Proposal-Version 1-1.02.14.docx

Consent/Assent Document(s)*:
Informed consent-Version 1-1.02.14.docx.pdf

*Please use only the official IRB stamped informed consent/assent document(s) found under the
"Attachments" tab. Please note, these consent/assent document(s) are only valid during the
approval period indicated at the top of the form(s).

It was the determination of the IRB that your study qualified for expedited review which
includes activities that (1) present no more than minimal risk to human subjects, and (2) involve
only procedures listed in one or more of the categories outlined below. The IRB may review
research through the expedited review procedure authorized by 45CFR46.110 and 21 CFR
56.110. The research proposed in this study is categorized under the following expedited review
category:

(6) Collection of data from voice, video, digital, or image recordings made for research purposes.

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

As the principal investigator of this study, it is your responsibility to conduct this study in accordance with IRB policies and procedures and as approved by the IRB. Any changes to the approved research must be submitted to the IRB for review and approval by an amendment.

We appreciate your dedication to the ethical conduct of human subject research at the University of South Florida and your continued commitment to human research protections. If you have any questions regarding this matter, please call 813-974-5638.

Sincerely,

Kristen Salomon, Ph.D., Vice Chairperson
USF Institutional Review Board