FAURJ

The Longitudinal Stability of Jealousy in Infancy

MELANNIE PINEDA & NANCY A. JONES
Department of Psychology, Florida Atlantic University, Boca Raton, Florida 33431

Abstract

Whether the emergence of jealousy responses occurs before or after the second year of life has been an ongoing debate. When the bond that exists between themselves and their mothers is threatened, previous studies have shown that infants will respond in a manner that is suggestive of expressions of jealousy (Hart & Carrington, 2002; Blau, 2010; Mize 2008). However, true jealousy responses are not expected to arise before 15 to 24 months, which is believed to be the time when infants achieve a full understanding of interpersonal relationships (Lewis, 2003). Recent studies on jealousy in infancy have shown that infants typically respond with increased negativity, reactivity and approach behaviors (gaze and reach) during a jealousy-evocation paradigm and that these behaviors remain stable over time (Blau 2010; Hart 2010). The current examines the longitudinal stability of jealousy in a sample of 10 infants. Behavioral responses to jealousy evocation were collected when infants were approximately 9 months and 12 months old. We expected that jealousy responses, specifically approach behavior would be more apparent in the doll condition and would increase in intensity with increasing age. At 9 months, there were no differences in responses across conditions except for affect. Infants at this age expressed more negative affect in the doll condition which is consistent with previous research. At 12 months, there were no differences in responses across conditions. MANOVAs comparing affect, vocalizations and touch across age, type of response and condition, revealed that infants demonstrate increased negative affect, negative vocalizations and decreased attempts at physical contact with mothers regardless of age and condition.

Previous research suggests that jealousy in infancy is influenced more by biological processes than from experience or cognition and that it could be seen in a basic form in infants as young as 9 months old (Hart & Carrington, 2002). Hart observed infants as their mothers interacted positively with a life-like doll in an experimental condition and with a picture book in a control condition referred to as her jealousy-evocation paradigm. Hart and her associates found that infants displayed more instances of negative affect in the doll condition, suggesting that infants show a basic expression of jealousy when their mothers divert their attention to a social rival. Further studies revealed that 9 month old infants not only respond with negative affect but also with increased approach responses consisting of increased gaze and interest (Hart, Carrington, Tronick, & Caroll, 2004) and that jealousy responses increased in negativity when their mothers interacted more positively

with the social item (Hart, 2010). Replications of this study have shown that an increase in approach behaviors is typically seen in the experimental doll condition (Blau, 2010; Mize, 2008). Approach behaviors such as increased gaze, protest and decrease in proximity have been seen as the normative response to the jealousy-evocation paradigm, while withdrawal behaviors have been associated with maternal depression (Hart, Field, Letourneau & Del Valle, 1998; Hart, Jones & Field, 2003).

Approach behaviors have been shown to maintain stability over time. Anger, which is considered an approach emotion increases with age as infants try to manipulate their environment (Braungart-Ricker, Hill-Soderlund & Karass, 2010). Infants in Hart's jealousy studies also demonstrated an increase in anger expressions from 6 to 9 months and a leveling off of sad expressions (Hart, 2010). Previous studies have shown that withdrawal behaviors seem to remain stable over time. Infants who showed withdrawal behaviors during a sustained attention task at 9 months were more behaviorally inhibited at 7 years (Buss, 2011). Right frontal EEG asymmetry, associated with withdrawal behaviors, has been shown to remain stable in children from 3 months to 3 years (Jones, Field, Davalos & Pickens, 1997).

Despite the increase in research on infant jealousy, the idea that infants could experience the emotion before 15 months of age is still being debated. Most will agree that infants have the ability to express the basic emotions that comprise jealousy. The expression of anger can be observed in infants at around 2 to 4 months, sadness at 3 to 4 months and fear between 7 and 9 months (Draghi-Lorenz, Reddy & Costall, 2001). The divide between proponents and opponents of the ability of infants to experience jealousy before the age of one arises from the cognitive processes involved in recognizing that the attachment figure is devoting his/her attention to someone else. According to Michael Lewis, an infant must have a representation of itself in order to experience jealousy. This ability does not develop until the infant is 15 to 24 months of age (Lewis, 2003). He argues that negative emotions (e.g., fear, sadness, anger) that appear in the jealousy evocation paradigm before 15 months of age are primary emotions present from birth and not expressions of jealousy (Lewis, 1992). Instead, these are proto-jealousy responses which do not require an understanding of the self and of others and are merely reactions to the mother's lack of attention (Lewis, 2010). He further argues that the approach/withdrawal responses seen in the barrier paradigm, where mothers are present but not available, are similar to the responses seen in the jealousy-evocation paradigm (Feiring & Lewis, 1979) and that expressions of jealousy have not been clearly defined and differentiated from those seen in similar situations (Lewis, 2010).

Even without clearly understanding the concept of self or of the relationship of the self and mother, infants as young as 5 months old respond with distress in jealousy evocation studies (Draghi-Lorenz, 1998). Cross-species work with jealousy has shown jealousy in other mammals, suggesting that not much cognition is needed to experience the emotion (Panksepp, 2010). This brings the question of how much of a role cognitive processes play in the expression of jealousy in infants and if this component is more important in adult jealousy.

Present Study

While past studies have identified jealousy responses in infants at both 9 and 12 months of age, the stability of responses between those ages have not been examined. The present study seeks to fill the gap in the research of the stability of infants' jealousy responses between the ages of 9 and 12 months. The experimental social condition and non-social control condition utilized in previous jealousy studies will used. It is expected that dominant approach or withdrawal responses observed infants during the jealousy evocation paradigm will maintain stability over time.

Therefore, an infant who repeatedly hides his face and engages in self-soothing behaviors at 9 months would not be expected to actively approach his mother and the task item in an attempt to regain attention at 12 months. While approach and withdrawal tendencies may be biologically based, it is expected that the increased interpersonal awareness associated with the increase in age will enhance those tendencies as the infant gets older. It is proposed that the understanding of the relationship between the self and others does not suddenly emerge at 15 months but that it develops over time. The present study does not seek to examine the difference between early stages of jealousy and mature jealousy. Instead, it seeks to explain the factors (i.e., approach/withdrawal tendencies) that drive jealousy responses before and after the second year of life.

Method

Overview

Infant's behavioral responses to jealousy-evoking stimuli were observed on two separate occasions. Ten mother-infant dyads (5 boys and 5 girls) of Caucasian (70%), Asian (20%) and Hispanic (10%) ethnicities were recruited when the infants were approximately 9 months old (M=8.6, SD= .51). The dyads returned to the lab when the infants reached 12 months of age (M= 12.5, SD=.31).

9 Month Visit

Participants

The sample consisted of mother-infant dyads recruited through the cooperation of the Florida Department of Vital Statistics and by word of mouth. Demographic data such as infant age range and ethnicity and mother age range and SES were collected through a series of questionnaires which were administered at the time of the lab visit. Participants received a child-appropriate toy and a $10 gas card. After the session they were mailed a thank you letter and a certificate of participation.

Data Collection

Participants were videotaped during the entire session in order to code for behavioral responses during the task. The task items consisted of an illustrated cookbook with large colorful pictures of desserts which served as a non-social rival and a life-like doll which served as a social rival.

Procedure

Experimental and Baseline Conditions. All infants were first exposed to a baseline condition and then two experimental conditions. The order in which the experimental conditions were introduced was determined by a coin-flip. The mother remained in the playroom with the infant during the entire session. EEG data was collected for all three conditions; however, the data was not analyzed in the present study. EEG data collection was discontinued if the infant became distraught or at the mother's request.

Baseline Condition. Mothers completed the questionnaire packets while infants were placed in a high chair where their baseline brain activity was measured with an electroencephalogram. A research assistant distracted the infant with toys while another positioned a fabric cap on the infant's head, prepared the appropriate electrodes with conductive gels and tested impedances. During the collection of baseline EEG activity, one research assistant remained in the room, sat in front of the high chair and blew bubbles in order to maintain the infant's interest. After three minutes, the research assistant left the room while another brought in a toy which the mother used to engage in positive interaction with her child. This play period lasted for three minutes.

Experimental Condition. After three minutes, a research assistant removed the

toy and asked the mother to sit in a chair adjacent to the high chair where she turned away from her infant. She was handed either the book or the doll and was asked to interact with the item in an enthusiastic manner for three minutes. The procedure detailed above was repeated with the other item.

12-Month Visit

Participants

Participants who provided consent to being contacted for future studies in the 9 month study (n=10) were invited to continue participation after the infants' first birthday.

Data Collection

The lab visit was videotaped for the purpose of behavioral coding and the same task items used in the 9 month visit (book and doll) were used again.

Procedure

Baseline Condition. The procedure for collecting baseline EEG information was the same as in the 9 month visit.

Experimental Condition. The conditions presented in the 12 month visit were the same as they were in the 9 month visit. However, due to the infants increased mobility the infants were placed on an activity quilt instead of a high chair. EEG data was not collected during the control or the experimental condition.

Coding Behavioral Responses

Behavioral coding was conducted by two trained coders who were blind to the study's hypothesis. Coding began when the research assistant left the room at the beginning of each experimental condition and ended three minutes afterwards. Coders were asked to provide a rating for mother's enthusiastic interaction with the task item on a scale of 1 to 5 with 5 being the most positive. They were also asked to identify the infants primary affect state as positive or negative and to rate the intensity of the affective state on a scale of 1 to 5.

Second-by-Second Coding. Gaze, reach, level of arousal, vocalization and affect were coded using Observer for the 9 month visit. Gaze, proximity of infant to mother, touch, level of arousal, vocalizations and affective state were coded using Observer for the 12 month visit. Reliability estimates for each measure were obtained from 25% of the data (using Cronbach's alpha) and ranged from .75 to 1.00.

Approach and Withdrawal Responses

Gaze and reach directed toward the mother at both ages were considered approach responses. At 12 months, the amount of physical contact with the mother and proximity to the mother was also considered. Withdrawal responses were those in which infants avoided looking at the mother by either looking at other things in the room or covering their eyes and did not make active attempts to get closer to their mother by either reaching towards their mother at 9 months or walking/crawling towards the mother at 12 months. A lack of physical contact with the mother was also considered a withdrawal response at 12 months. Gaze and reach responses were analyzed separately. Approach and withdrawal composites of gaze and reach were also created and analyzed.

Reactivity Level & Negativity

Reactivity was measured by level of arousal and vocalizations. Contrarily, no arousal and positive vocalizations were considered to be expressions of low reactivity. While these responses were analyzed separately, composite scores of arousal and vocalization were created and analyzed. Affect was used to assess negativity.

Results

Table 1. *Mean Proportion of Time (in seconds) 9 month old infants spent in Behavior States in Each Condition*

Behavior States	Doll	Book
Gaze Direction of Infant		
Infant gaze is directed toward mother-item	47.95	48.72
Infant gaze is directed down at high chair	9.13	15.21
Infant gaze is directed at other things in the room, rather than on mother or highchair	41.51	35.74
Infant is covering eyes with hands	1.42	.33
Reach toward mother		
Infant is trying to climb out of high chair	3.63	.50
Infant has any type of reach toward mother	8.93	6.16
Infant is touching high chair	62.62	74.30
None of the above-infant is not touching anything	24.81	19.02
Level of arousal		
High arousal	16.05	6.22
Moderate arousal	28.62	11.05
Low arousal	28.30	45.92
No arousal	25.81	36.81
Vocalization		
Very high intensity vocalizations	19.67	14.74
High intensity vocalizations	3.37	.88
Moderate intensity vocalizations	15.38	3.96
Low level intensity vocalizations	9.03	13.83
Neutral vocalizations or no vocalizations	52.19	60.29
Somewhat positive vocalizations	.33	3.96
Very positive vocalizations	.00	2.33
Affective State		
Positive	.89	4.96
Neutral	47.23	63.72
Negative	51.87	31.32

Table 2. *Mean Proportion of Time (in seconds) 12 month old infants spent in Behavior States in Each Condition*

Behavior States	Doll	Book
Gaze Direction of Infant		
Infant gaze is directed toward mother-item and is interacting with the task item	8.49	11.13
Infant gaze is directed toward mother-item, but is only looking and not interacting with the task item	39.14	21.91
Infant gaze is directed at activity mat or toys	8.49	8.12
Infant gaze is directed at other things in the room, rather than on mother or toys	43.48	58.83
Infant is covering eyes with hands, play mat	.39	.00
Proximity of infant to mother		
Within infant's arm length of mother	57.19	40.91
Approaching mother, but not yet within her reach	6.58	13.19
Remaining on activity quilt	10.21	9.44
Moving away from mother	18.86	25.09
On opposite side of room from mother	7.14	12.41
Touch mother or object		
Infant has any type of physical contact with mother	27.21	13.18
Infant has any type of physical contact with task object	7.19	9.63
Infant is touching other items around the room	50.99	56.89
None of the above-infant is not touching anything in the room	14.60	20.29
Approach- Withdrawal		
Approach behaviors	48.80	35.37
Neither	12.03	9.63
Withdrawal behaviors	39.16	55.00
Level of Arousal		
High arousal	12.45	12.27
Moderate-high arousal	18.48	4.75
Moderate arousal	17.04	10.15
Low arousal	13.52	18.29
No arousal	38.48	55.34
Vocalizations		
Very high intensity vocalization	7.67	4.25
High intensity vocalizations	6.01	6.55
Moderate intensity vocalizations	1.32	5.26
Low level intensity vocalizations	5.34	4.23
Neutral vocalizations	77.68	72.35
Somewhat positive vocalizations	1.98	5.07

Very positive vocalizations	.00	2.28
Affective State		
Positive	6.05	16.67
Neutral	71.16	63.93
Negative	22.78	19.12

Jealousy Responses at 9 months

Paired t-tests were conducted for gaze, reach, arousal, vocalization and affect. No differences in responses were found across conditions except for affect. Infants expressed more negative affect in the doll condition, t (9) = -2.563, p= .031. Paired t-tests of approach, withdrawal and reactivity composites did not reveal any differences in responses.

Jealousy Responses at 12 months

Paired t-tests of gaze, touch, proximity, arousal, vocalization and affect were conducted. No differences in responses across conditions were found. Paired t-tests of approach, withdrawal and reactivity composites were also conducted. No differences in responses were found.

Longitudinal Stability of Jealousy Responses

Repeated measures ANOVAs comparing approach and withdrawal responses (gaze, reach) across condition and age revealed no significant effects for gaze across age, type of response or condition. We found a significant main effect was found for type of response (approach or withdrawal) for touch, F (1, 9) = 78.49, p <. 001. Infants displayed more withdrawal responses (M= 80.89, SD= 3.49) than approach responses (M= 19.12, SD= 3.49) overall. We found significant main effects for proximity for age, F (1, 9) = 11.35, p = .008 and response, F (1, 9) = 9.79, p =.012. A significant three way interaction for proximity occurred for approach-withdrawal responses by condition by age, F (1, 9) = 33. 53, p < .001. At 9 months, infants demonstrated more distancing from their mothers (M= 90.38, SD= 3.11) than approach (9.62, SD= 3.11). Conversely, infants at 12 months showed more approach responses (M= 58.9, SD= 8.93) than withdrawal responses (M= 31.76, SD= 8.06). Significant effects were found for type of responses for vocalization and affect. Infants expressed more negative vocalization, F (1, 9) = 9.28, p =.014 and negative affect, F (1, 9) = 11.39, p =.008 across age and condition. No significant effects for arousal were found across time, response or condition.

Discussion

The current research investigated the longitudinal stability of jealousy responses. It was expected that infants would show increased approach behaviors (gaze and reach), negativity, and reactivity in the doll condition at 9 months and at 12 months. The intensity of jealousy responses was expected to increase as age increased. Neither hypothesis was fully supported suggesting that jealousy responses are not present between the ages of 9 and 12 months. The only difference in responses between the book and doll conditions at 9 months was increased negative affect in the doll condition. This finding is consistent with previous research that suggests that negative affectivity is indicative of jealousy responses and this is seen more in the doll condition of the jealousy paradigm (Hart, Carrington, Tronick & Caroll, 2004). No differences in responses were found across conditions at 12 months. Repeated measures MANOVAs comparing responses across age, type of response and condition revealed that infants showed increased negative affect and negative vocalization regardless of the condition. Infants may have been responding to their mother's inattention instead of differentiating between the doll and book. During the 9 month visit, infants were placed in a high chair during the conditions and this may have also contributed to differences in negative affect seen across time. The study was conducted in a laboratory

setting which may have been just as interesting and arousing to the infants as their mother's inattention. The infants' exposure to a novel environment may explain the lack of differences in gaze and level of arousal across age and condition.

With regard to physical approach responses, infants displayed more withdrawal tendencies overall when comparing reach at 9 months and touch at 12 months. When comparing reach at 9 months and proximity at 12 months, it was found that infants expressed more withdrawal at 9 months and more approach at 12 months. This finding can be attributed to the increased mobility of infants at 12 months.

Limitations

Although this study was a partial replication of recent infant jealousy research (Mize, 2008; Blau, 2010) the sample size used in the present study may have been too small to yield significant differences in jealousy responses across condition and age. Previous studies found that infants express more approach-like behaviors during the doll condition of the jealousy evocation paradigm, however, most had a sample size of over 20 mother-infant dyads. Longitudinal studies of emotional development in infancy typically have sample sizes over 30 (Masciuch & Kienapple, 1993; Roth-Hanania, Davidov & Zahn-Waxler, 2011). While time was not available for the recruitment of additional participants in this study, future studies may be successful in examining the longitudinal stability of jealousy responses within a larger sample.

Recommendations for Future Studies

Although we collected EEG activity data, it was not analyzed for this study since it only focused on the behavioral aspects of jealousy. Future studies might reveal jealousy responses demonstrated by EEG activity not apparent through behavioral coding. Temperamental differences can explain why infants subjected to jealousy evocation may have different reactions (Hart, 2010). In future studies, the effect of individual temperamental differences on the sadness, fear, distress to limitations, duration of orienting, and approach scales (Garstein & Rothbart, 2003) on the stability of jealousy responses should be analyzed as they relate to the jealousy-evocation paradigm across age. The stability of individual jealousy responses can also be examined.

Though the intensity of jealousy responses did not increase over time as expected, infants did show stable jealousy responses across age and slightly greater jealousy responses in the doll condition than in the book condition. The definition of jealousy as a blend of anger, sadness and fear which involves both approach and withdrawal responses may explain why the current findings are not consistent with previous research (Sharpsteen, 1991).

References

American Psychological Association. (2002). Ethical principles of psychologists and code of conduct. *American Psychologist, 57*, 1060-1073.

Blau, A. (2010). The development of jealousy in infants. *Thesis, FAU*.

Braungart-Rieker, J.M., Hill-Soderlund, A.L., & Karass, J. (2010). Fear and anger reactivity trajectories from 4 to 16 months: The roles of temperament, regulation, and maternal sensitivity. *Developmental Psychology, 46(4),* 791-804.

Buss, K.A. (2011). Which fearful toddlers should we worry about? Context, fear regulation, and anxiety risk. *Developmental Psychology, 47(3)*, 804-819.

Carver, C.S., & White, T.L. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: The BIS/BAS scales. *Journal of Personality and Social Psychology, 67,* 319-333.

Draghi-Lorenz, R. (1998). *Jealousy in the first year: Evidence of early interpersonal awareness.* Paper presented at the 11th Biennial International Conference on Infant Studies,

Atlanta, GA.
Draghi-Lorenz, R., Reddy, V., & Costall, A. (2001). Rethinking the development of "non basic" emotions: A critical review of existing theories. *Developmental Review, 21*, 263-304.
Feiring, C., & Lewis, M. (1979). Sex and age differences in young children's reactions to frustration: A further look at the Goldberg and Lewis (1969) subjects. *Child Development, 50*, 848-853.
Garstein, M.A.,& Rothbart, M.K. (2003). Studying infant temperament via the revised infant behavior questionnaire. *Infant Behavior & Development, 26*, 64-86.
Goldsmith, H.H., & Campos, J.T. (1990). The structure of temperamental fear and pleasure in infants: A psychometric perspective. *Child Development, 61*(6), 1944-1964.
Hart, S.L. (2010). The ontogenesis of jealousy in the first year of life. In S.L. Hart & M. Legerstee (Ed.s), *Handbook of Jealousy: Theory, Research, and Multidisciplinary Approaches* (pp. 57-82). Malden, MA: Wiley-Blackwell.
Hart, S.L., & Carrington, H. (2002). Jealousy in 6-month-old infants. *Infancy, 3*(3), 395-402.
Hart, S.L., Carrington, H., Tronick, E.Z., Caroll, S.R. (2004). When infants lose exclusive maternal attention: Is it jealousy? *Infancy, 6*(1), 57-78.
Hart, S.L., Field, T., Letourneau, M., & Del Valle, C. (1998). Jealousy protests in infants of depressed mothers. *Infant Behavior & Development, 21(1)*, 137-148.
Hart, S.L., Jones, N.A., & Field, T. (2003). Atypical expressions of jealousy in infants of intrusive-and withdrawn-depressed mothers. *Child Psychiatry & Human Development, 33(3)*, 193-205.
Jones, N.A., Field, T., Davalos, M., & Pickens, J. (1997). EEG stability in infants/children of depressed mothers. *Child Psychiatry & Human Development, 28(2)*, 59-70.
Lewis, M. (2010). Loss, protest, and emotional development. In S.L. Hart & M. Legerstee (Ed.s), *Handbook of Jealousy: Theory, Research, and Multidisciplinary Approaches* (pp. 27-39). Malden, MA: Wiley-Blackwell.
Lewis, M. (1992). Shame, the exposed self. New York: The Free Press.
Lewis, M. (2003). The emergence of consciousness and its role in human devel opment. In J.LeDoux, J. Debiec, & H. Moss (Eds.), *The self: From soul to brain* (Vol. 1001, pp.1-29). New York: Annals of the New York Academy of Sciences.
Mize, K. (2008) Infant jealousy responses: Temperament and EEG. *Dissertation, FAU.*
Masciuch, S., & Kienapple, Kim. (1993). The emergence of jealousy in children 4 months to 7 years of age. *Journal of Social and Personal Relationship, 10*, 421-435.
Panksepp, J. (2010). The evolutionary sources of jealousy: Cross species approaches to fun damental issues. In S.L. Hart & M. Legerstee (Ed.s), *Handbook of Jealousy: Theory, Research, and Multidisciplinary Approaches* (pp. 101-120). Malden, MA: Wiley-Blackwell.
Parrot, W.G. (1991). The emotional experiences of envy and jealousy. In P. Salovey (Ed.), *The Psychology of Jealousy and Envy* (pp.3-30). New York: The Guilford Press.
Radloff, L.S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1(3)*, 385-401.
Roth-Hanania, R., Davidov, M., & Zahn-Wax ler, C. (2011). Empathy development from 8 to 16 months: Early signs of concern for others. *Infant Behavior and Development, 34*, 447-458.
Sharpsteen, D.J. (1991). The organization of jealousy knowledge: Romantic jealousy as a blended emotion. In P. Salovey (Ed.), *The Psychology of Jealousy and Envy* (pp. 31-51). New York: The Guildford Press.
Sharpsteen, D.J., & Kirkpatrick, L.A. (1997). Romantic jealousy and adult romantic attachment. *Journal of Personality and Social Psychology, 72(3)*, 627-640.