

## **ABSTRACT**

Beverly L. Sheaffer. SOCIAL RELATEDNESS DISTURBANCES AND FACIAL EXPRESSION RECOGNITION DEFICITS IN CHILDREN WITH REACTIVE ATTACHMENT DISORDER (Under the direction of Dr. Paul Toriello). Department of Rehabilitation Studies, January, 2010.

The purpose of this study was to explore and examine the relationship between social relatedness disturbances and facial expression recognition among an outpatient clinic sample (N = 34) of children (aged 6 – 19 years) with Reactive Attachment Disorder of Childhood and Infancy (RAD). Specifically, this study investigated whether, and to what extent, facial expression recognition was associated with the two dimensions of social relatedness disturbances in RAD (i.e., indiscriminate/disinhibited behaviors and withdrawn/inhibited behaviors). Numeric scores for social relatedness dimensions, indiscriminate/disinhibited (DIS) and withdrawn/inhibited (INH) were explanatory variables and facial expression recognition error and attribution bias scores were response variables in multiple regressions analyses. Analyses results revealed partial support for two hypotheses and no support for a third hypothesis.

Based on attachment theory, attachment studies, and facial expression recognition studies, the following hypotheses were generated: (1) DIS dimension scores would be positively associated with recognition errors for sad, angry, and fearful facial expressions, (2) INH dimension scores would be associated with attribution bias scores for the recognition of sad and fearful in other facial expressions, (3) Associations found for Hypotheses 1 and 2 would be stronger for facial expressions displayed with low intensity than for those displayed with high intensity. Partial support for hypotheses was found in statistically significant linear regression models for a positive association between DIS

dimension scores and recognition errors for sad in child facial expressions, and for a positive association between age and INH dimensions scores and attribution bias scores for the recognition of sad in other facial expressions. No support was found for Hypothesis 3. An unexpected finding was a positive association between INH dimension scores and attribution bias scores for the recognition of happy in other facial expressions. The current study also found evidence that adds to the previous research findings that RAD subtypes do not appear to be mutually exclusive or independently distinct subtypes. Results of this study add to the small body of empirical findings that will enable researchers and clinicians to understand more about individual differences within RAD.

SOCIAL RELATEDNESS DISTURBANCES AND FACIAL EXPRESSION  
RECOGNITION DEFICITS IN CHILDREN WITH  
REACTIVE ATTACHMENT DISORDER

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RECOGNITION DEFICITS IN CHILDREN WITH  
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## TABLE OF CONTENTS

LIST OF TABLES.....	x
CHAPTER 1: INTRODUCTION.....	1
Introduction to the Study.....	1
Background of the Study.....	5
Statement of the Problem.....	7
Purpose of the Study.....	8
Hypotheses.....	9
Justification of the Study.....	10
Significance of the Study.....	13
CHAPTER 2: REVIEW OF LITERATURE.....	16
Introduction to Literature Review.....	16
Attachment Theory.....	16
Reactive Attachment Disorder.....	23
History.....	23
Current Diagnostic Criteria.....	25
Diagnostic Complexities and Social Relatedness.....	26
Facial Expression Recognition and Social Relatedness.....	28
Facial Expression Recognition Studies.....	30
History of Facial Expression Recognition.....	30
Assessment of Facial Expression Recognition.....	32
Facial Expression Recognition and Demographic Variables.....	33

Facial Expression Recognition and Behavioral or Psychological Problems.....	35
Facial Expression Recognition and Psychopathy.....	36
Facial Expression Recognition and Adoption or Foster Care and Maltreatment.....	38
Facial Expression Recognition and Attachment.....	40
Facial Expression Recognition Deficits and Social Relatedness in RAD....	43
DIS Dimension in RAD.....	44
INH Dimension in RAD.....	47
CHAPTER 3: METHODOLOGY.....	49
Introduction and Purpose Statement.....	49
Research Design.....	49
Archival Data.....	50
Target Population and Sampling Procedure.....	50
Measures.....	52
Diagnostic Analysis of Nonverbal Accuracy-Second Edition (DANVA 2).....	52
Construction of the DANVA 2-Child Faces and DANVA 2-Adult Faces.....	52
Relationship Problems Questionnaire.....	55
Construction of Relationship Problems Questionnaire.....	56
Procedures.....	59
Hypotheses and Variables.....	59
Statistical Analysis Procedures.....	62

Ethical Considerations.....	63
CHAPTER 4: RESULTS.....	65
Introduction to the Chapter.....	65
Response Rate.....	65
Sample Demographics.....	66
Descriptive Statistics.....	69
Social Relatedness Dimensions, Sample Distributions.....	69
Social Relatedness Dimensions and Demographic Variables.....	71
Facial Expression Recognition.....	75
Total sample scores.....	75
Total recognition error scores by emotion.....	76
Total attribution bias scores by emotion.....	76
Child and adult facial expression scores.....	77
Intensity of displayed emotion in facial expressions scores....	77
Facial Expression Recognition and Social Relatedness Dimensions	80
Data Analyses Results for Hypotheses Testing.....	81
Hypothesis 1 Data Analyses.....	83
Sad facial expressions.....	83
Angry facial expressions.....	84
Fearful facial expressions.....	84
Sad, angry, and fearful expressions: Combined total recognition errors.....	84

Summary of Hypothesis 1 analyses.....	84
Hypothesis 2 Data Analyses.....	84
Attribution bias for sad facial expressions.....	85
Attribution bias for fearful facial expressions .....	86
Attribution bias for sad and fearful facial expressions.....	87
Summary of Hypothesis 2 results.....	87
Hypothesis 3 Data Analyses.....	87
Effect of intensity of displayed expressions for Hypothesis 1	87
Effect of intensity of displayed expressions for Hypothesis 2	88
Summary of Hypothesis 3 results.....	89
Summary of Hypotheses results.....	90
Summary of Results.....	90
CHAPTER 5: DISCUSSION.....	94
Introduction to the Chapter.....	94
Summary of the Study.....	94
Interpretation of Results.....	97
Response Rate.....	97
Sample Demographics.....	97
Descriptive Statistics.....	100
Social relatedness dimensions.....	100
Social relatedness dimensions and demographic variables.....	101
DIS social related dimension.....	101

INH social relatedness dimension.....	101
Facial expression recognition, gender, and age.....	102
Facial expression recognition, total recognition errors by emotion.....	102
Facial expression recognition, total attribution bias by emotion.....	104
Facial expression recognition, child and adult faces.....	105
Facial expression recognition, intensity of displayed emotion	105
Facial expression recognition and social relatedness dimensions.....	106
Results of Hypotheses Testing.....	107
Summary of Hypotheses Results.....	117
Study Limitations.....	117
Research Design.....	118
Instrumentation.....	118
Data collector characteristics.....	120
Sampling and external validity.....	120
Implications of the Study.....	121
Implications for Rehabilitation Counselor Education.....	121
Implications for Treatment Providers.....	123
Instructional methods.....	124
Modeling, mirroring, and imitation.....	125
Example of methods with RAD.....	126

Recommendations for Future Research.....	128
Conclusion.....	130
REFERENCES.....	133
APPENDIX A: ANSWER SHEET FOR DANVA 2 RESPONSES.....	156
APPENDIX B: RELATIONSHIP PROBLEMS QUESTIONNAIRE.....	157
APPENDIX C: INFORMED CONSENT - IRB APPROVED.....	158
APPENDIX D: INFORMED MINOR ASSENT - IRB APPROVED.....	162
APPENDIX E: DEMOGRAPHIC AND TREATMENT HISTORY FORM.....	163
APPENDIX F: IRB APPROVAL LETTER.....	166

## LIST OF TABLES

1. Historical Demographic Sample Data.....	68
2. Social Relatedness Distributions.....	70
3. Correlations Among Social Relatedness and Numeric Historical Variables	72
4. DIS and INH Mean Scores by Gender and Permanency Status.....	73
5. Social Relatedness Scores by Ethnicity.....	74
6. Recognition Error and Attribution Bias Scores by Displayed Emotion and Child/Adult Faces.....	78
7. Recognition Error and Attribution Bias Scores by Displayed Emotion and Intensity.....	79
8. Comparison of Participant Demographics Among RAD Studies.....	99

## **CHAPTER 1: INTRODUCTION**

### **Introduction to the Study**

Facial expressions are an important source of emotional information (Adolphs, 2002; Darwin, 1872; Ekman, 1992, 1994, 2003; Russell, 2003). They facilitate the exchange of nonverbal emotional information during social interactions (Ekman, 1992; Hess, Kappas, & Scherer, 1988; Noller, 2005). Fundamental to successful social interactions, the ability to recognize the correct emotions in facial expressions is a necessary step in the evaluation of interpersonal interactions and for the subsequent application of appropriate social skills (Hampson, van Anders, & Mullin, 2006; Philippot, & Feldman, 1990). Research findings have supported the association between facial expression recognition abilities and social competency (Custrini & Feldman, 1989; Lancelot & Nowicki, 1997; Nowicki & Duke, 1994), and links between facial expression recognition deficits and childhood abuse and neglect (Pollak, Cicchetti, Hornung, & Reed, 2000), as well as various relational difficulties and disorders (Easter et al., 2005; Plesa-Skwerer, Faja, Schofield, Verbalis, & Tager-Flusberg, 2006). Since Charles Darwin's study of facial expressions, scientific study of facial expression recognition in social interactions has produced theoretical models. Of particular clinical significance are the theory and research exploring the etiologies of individual differences in facial expression recognition abilities, and evidence for the importance of early childhood experiences in the development of facial expression recognition abilities (Gibb, Schofield, & Coles, 2009; Pollak & Sinha, 2002).

For example, upon finding significant associations between childhood physical abuse and facial recognition biases for anger (i.e., seeing anger in non-angry facial expressions), researchers theorized that sensitivity for facial expressions of anger may have been an adaptive strategy to avoid abuse (Pollak, Cicchetti, Hornung, & Reed, 2000). However, what began as an adaptive strategy developed into fixed and consistent patterns that were subsequently applied to interpersonal contexts, resulting in consistent distortions in facial expression recognition. Other researchers have theorized that this deficit in ability to recognize facial expressions of emotions may have been elicited through inadequate interaction with caretakers in early childhood (During & McMahon, 1991; Hodgins & Belch, 2000). In addition, attachment researchers who found associations between attachment styles and facial expression recognition suggested that facial recognition abilities were adaptive strategies learned during early attachment relationships. For example, in a recent study, researchers found significant differences in the facial expression recognition abilities of children with secure versus insecure attachment (Steele, Steele, & Croft, 2008). Attachment (secure vs. insecure) was assessed in infancy, then facial expression recognition was assessed five years later. Children with insecure attachments were more likely to misidentify facial expressions of emotion than were children with secure attachments. The researchers theorized that facial expressions seen and experienced by infants in the first year of life were included in the organization of infants' working models of attachment. Thus, facial expression recognition deficits may persist, and continue to influence interactions and relationships.

Based on the above, Schachner, Shaver, and Mikulincer (2005) concluded that assessment of emotion recognition abilities should be a primary focus of attachment research. For example, a severe form of inadequate attachment, reactive attachment disorder (RAD), is characterized by profoundly disturbed social relatedness among children who experienced early, severe, and pathological caretaking. These persistent social relatedness disturbances are consistent across social contexts. The sine quo non of RAD, indiscriminate social relatedness, refers to behaviors that reflect the lack of a discriminated (or preferred) attachment figure, including shallow or superficial interpersonal relations, going off with or seeking comfort from strangers, and failure to select or discriminate attachment figures in times of distress (Boris et al., 2004; Golden, 2007; Millward, Kennedy, Towlson, & Minnis, 2006). Recent research has suggested that indiscriminate social relatedness may co-occur with the withdrawn/inhibited form of RAD (Minnis et al., 2007; Zeanah et al., 2004). However, an attempt to replicate this finding with older children and adolescents with RAD had not been conducted.

Of particular concern are the lack of understanding and a lack of consensus, regarding the diagnostic nosology of RAD. Although studies have provided valuable preliminary diagnostic information, researchers, as well as professional organizations, have called for empirical studies to add to the knowledge of RAD and the social relatedness disturbances manifested with this disorder (e.g., American Academy of Child and Adolescent Psychiatry [AACAP], 2005). Thus, the purpose of this study was to explore and examine the relationship between social relatedness disturbances and facial expression recognition among children with RAD. Specifically, this study investigated

whether, and to what extent, facial expression recognition was associated with the two dimensions of social relatedness disturbances in RAD (i.e., indiscriminate/disinhibited behaviors and withdrawn/inhibited behaviors).

In summary, facial expressions of emotion are social cues that influence social interaction. Deficits in facial expression recognition may serve to distort the interpretation of these social cues, and thereby negatively affect subsequent responses. Although deficits in facial emotion recognition have been associated with the social relatedness aspects of various disorders, facial expression recognition has not yet been investigated in RAD clinic/outpatient samples. Reactive attachment disorder is a condition of profoundly disturbed social relatedness across contexts. To contribute to the understanding of RAD, the purpose of this study was to explore and examine the relationship between social relatedness disturbances and facial expression recognition among children with RAD. Specifically, this study investigated whether, and to what extent, facial expression recognition was associated with the two dimensions of social relatedness disturbances in RAD (i.e., indiscriminate/disinhibited behaviors and withdrawn/inhibited behaviors).

What follows is a continuation of chapter 1 with sections that discuss the background of the study, the statement of the problem, the purpose of the study and hypotheses, the justification of the study, the significance of the study, and the chapter summary. Chapter 2 consists of four major sections that contain reviews of the following: attachment theory, reactive attachment disorder, facial expression recognition, and facial expression recognition deficits. Chapter 3 then covers the procedures for

conducting this study. Chapter 4 covers the data analyses including descriptive data and hypotheses testing results. Chapter 5 concludes this manuscript with a discussion of the results of the analyses, limitations of this study, and implications for practitioners and rehabilitation counselor education, and recommendations for future research.

### **Background of the Study**

Reactive Attachment Disorder of Infancy and Childhood (RAD), a psychological disorder manifested by marked disturbances in social relatedness across contexts, may develop in young children who experience early pathogenic care preventing the attainment of secure attachment. Children with RAD exhibit impaired social development, an inability to form appropriate relationships, and pathological behaviors due to inadequate attachment formation early in life (Wilson, 2001). Reactive attachment disorder has received increased clinical and research interest due to a greater awareness of the needs of children who have experienced early pathological care, particularly those in the foster care system and those adopted from institutional orphanages abroad (O'Connor & Zeanah, 2003). Presenting extreme difficulties for caretakers, social agencies and rehabilitation counselors, children with RAD are “often aggressive and oppositional, frequently testing the limits of external controls or rules” (Kemph & Voeller, 2007, p. 171). A recent report issued by the American Academy of Child and Adolescent Psychiatry (AACAP) highlighted the need for further diagnostic refinement as well as concerns surrounding current treatment practices. The need for additional empirical study was further illustrated in a report issued by the American Professional Society on the Abuse of Children (APSAC) Task Force on attachment. As noted in this

report, “RAD is one of the least researched and most poorly understood disorders in the DSM” (Chaffin, Hanson, Saunders, Nichols, Barnett, Zeanah et al., 2006, p. 80).

Although researchers have disagreed about whether RAD is under-diagnosed due to comorbidity (Sheperis, Renfro-Michel, & Doggett, 2003) or over-diagnosed due to confusion with other disorders (Hanson & Spratt, 2000), there is general agreement among researchers that RAD entails fairly stable and unique patterns of disturbance not accounted for in other diagnoses (Richters & Volkmar, 1994; Zeanah & Smyke, 2008). A primary issue in RAD nosology has to do with subtypes. Although the two RAD subtypes, Disinhibited/Indiscriminate (RAD-D) and Inhibited/Withdrawn (RAD-I) refer to different manifestations of profound attachment disturbance, research has suggested that the two may not be exclusive (Minnis, Rabe-Hesketh, & Wolkind, 2002; Minnis et al., 2007; Zeanah et al., 2004). Using factor analysis (Minnis et al., 2007) or cluster analysis (Minnis et al., 2007; Zeanah et al., 2004) researchers found that although the two subtypes (corresponding to RAD-D and RAD-I), were evident, there was overlap of the subtypes. Specifically, the subtypes overlapped regarding indiscriminant social behaviors, previously considered the hallmark of RAD-D manifestations. If indiscriminate social relatedness is a stable feature of both subtypes, then current DSM-IV-TR criteria (which require the specification of only one subtype and assigns this feature to RAD-D only), do not account for this recent finding. This diagnostic misclassification may then mitigate the effective treatment for RAD.

Understanding the social relatedness issues of RAD may be facilitated by research from the fields of social information processing and nonverbal information processing.

Findings here suggest the ability to recognize emotion from facial expressions is vital for successful interaction (Adolphs, 2002; Hampson et al., 2006). Facial expression recognition deficits (i.e., errors in recognizing emotions and/or attribution bias for particular emotions) have been associated with several socially related disturbances and disorders (Edwards, Jackson, & Pattison, 2002; Plesa-Skwerer et al., 2006). In addition, facial emotion recognition deficits have been associated with psychopathology (Blair et al., 2004), and with maltreated children (Pears & Fisher, 2005a, 2005b; Pollak et al., 2000). Researchers and theorists have posited that facial emotion recognition deficits arise as early adaptive strategies adopted by infants reared in impoverished or traumatizing environments (During & McMahon, 1991; Hodgins & Belch, 2000). Children with RAD have experienced such environments and may have deficits in the ability to recognize facial expressions of emotion. Therefore, examining the relationship between facial expression recognition deficits and the disturbed social relatedness in children with RAD makes sense.

### **Statement of the Problem**

As noted above, Reactive Attachment Disorder of Infancy and Childhood (RAD; DSM- IV-TR), exhibited by pathological disturbances in social relatedness across contexts, is a poorly understood disorder. For example, attachment theory, as well as attachment studies with infants, informed a limited diagnostic nosology of RAD. Moreover, the few studies of clinical disorders of attachment have only recently appeared, and fewer have included older children and adolescents. The prevalence of RAD is unknown; however, a recent study with toddlers with histories of maltreatment

and foster care found that 38% ( $N = 94$ ) of this high-risk group met criteria for RAD (Zeanah et al., 2004). Although the two RAD subtypes, RAD-D and RAD-I, refer to different manifestations of profound attachment disturbance, recent research has suggested that the two subtypes are not mutually exclusive. Indiscriminate sociability, typically associated with RAD subtype RAD-D, was also exhibited with the RAD subtype RAD-I in several cases.

Children and adolescents in the foster care and adoption systems are particularly at risk for attachment disorder behaviors. Pathological social relatedness disturbances related to early deprivation have been reported in the literature for years (Zeanah, 2000), yet little is known about the specific impairments inherent in the types of social relatedness disturbance in RAD. Findings from the few studies that examined facial expression recognition abilities in relation to attachment styles suggested that examination of the facial expression recognition ability in RAD could increase our knowledge of the social relatedness disturbances in RAD. Therefore, the problem addressed in this study is a lack of knowledge about the relationship between social relatedness disturbances and facial expression recognition abilities in RAD.

### **Purpose of the Study**

The purpose of this study was to explore and examine the relationship between social relatedness disturbances and facial expression recognition among children with RAD. Specifically, this study investigated whether, and to what extent, facial expression recognition was associated with the two dimensions of social relatedness disturbances in RAD (i.e., indiscriminate/disinhibited behaviors and withdrawn/inhibited behaviors).

Thus, numeric scores for two measures, indiscriminate/disinhibited (DIS) and withdrawn/inhibited (INH), were compared with facial recognition scores in order to explore the association between social relatedness disturbance and facial expression recognition.

### **Hypotheses**

Individual differences in social relatedness were predicted to be associated with individual differences in facial expression recognition. The basic premise was that children with RAD have deficits in facial expression recognition abilities. However, rather than expecting an overall deficit in facial emotion recognition, this study examined whether particular patterns of facial expression recognition were associated with the particular dimensions of indiscriminate/disinhibited (DIS) or withdrawn/inhibited (INH) social relatedness behaviors. Specifically this study sought to confirm the following hypotheses.

Hypothesis 1: Within a RAD sample, there will be a positive association between DIS dimension scores and recognition error scores for sad, fearful, and angry facial expressions.

Hypothesis 2: Within a RAD sample, there will be a positive association between INH dimension scores and sad and fearful attribution bias scores (i.e., incorrect attribution of sad and fearful when viewing facial expressions of other emotions).

Hypothesis 3: These associations appearing in Hypotheses 1 and 2 will be stronger for low intensity facial expressions than for high intensity facial expressions.

The importance of examining the social relatedness factors inherent in RAD in terms of facial expression recognition is discussed next.

### **Justification of the Study**

Research studies and clinical accounts focused on attachment disorder behaviors are replete with accounts of the negative, and at times, devastating, consequences of inadequate attachment (Golden, 2007; Hall & Geher, 2003; Howe & Fearnley, 2003; Sheperis et al., 2003; Zegers, Schuengel, Van IJzendoorn, & Janssens, 2008). Both foster and adoptive parents are ill prepared to manage children who have attachment disorders, and traditional clinical treatment has been found to have limited success (Sheperis et al., 2003). An exploration of the relationship between social relatedness disturbance and facial expression recognition abilities and deficits in a sample of children with RAD may help improve care and treatment.

The few RAD studies have mostly focused on attachment disorders with institutionalized or post-institutionalized participants (Zeanah et al., 2004). Findings from these studies have been useful in describing the signs and symptoms of RAD in infants and young children who experienced deprivation in institutional orphanages abroad (O'Connor, Bredenkamp, Rutter, & the English and Romanian Adoptees Study Team, 2000; Zeanah, Smyke, & Dumitrescu, 2002). For example, studies of children in Romania adopted following institutional care in orphanages provided descriptions of RAD, including socially indiscriminant behavior that persisted after adoption in some children (Zeanah, 2000). Researchers also posited that RAD-D was more likely to manifest following this type of deprivation in infancy, and theorized that RAD-I was

more likely to manifest following multiple foster placements. However, another study (Minnis et al., 2007), as well as clinical reports (S. Foreman, personal communication, February 13, 2009), suggested that indiscriminate social behaviors (typically associated with RAD-D) may be more prevalent than withdrawn/inhibited behaviors (typically associated with RAD-I) in children with RAD who have experienced foster care and/or early maltreatment. Thus, studies focused on the social relatedness disturbances in RAD with individuals who experienced early pathological care and foster care are needed to elucidate the type(s) of social relatedness disturbances this population may exhibit.

In the United States, we are likely to encounter RAD in foster care populations. Although prevalence and incidence rates of RAD in the general population are unknown, 38% of toddlers ( $N = 94$ ) in a foster care system in Louisiana met DSM-IV criteria for RAD (Zeanah et al., 2004). While more than half of the participants in this sample (22% of the total) exhibited indiscriminate sociability, some were diagnosed with both inhibited and indiscriminate attachment disorders. Given the incidence of indiscriminate sociability within both RAD subtypes, and the possible overlap of both subtypes within the foster care RAD population, the current study examined the social relatedness disturbances as two dimensions, rather than as two distinct subtypes.

Research findings have suggested that social relatedness may be associated with or influenced by facial emotion recognition abilities (Marsh, Kozak & Ambady, 2007; Philippot & Feldman, 1990). Further, particular facial expression recognition deficits have been associated with various types of relationship difficulties (Barth & Bastiani, 1997; Blair & Coles, 2000; Easter et al., 2005; Lancelot & Nowicki, 1997; Silver &

Oakes, 2001). Although a few attachment studies have focused on facial expression recognition within the attachment styles framework (Consedine & Magai, 2003; Magai, Hunziker, Mesias, & Culver, 2000), or with children (Barth & Bastiani, 1997; Steele et al., 2008), none have yet focused on facial expression recognition in RAD.

Of particular interest are the individual differences in facial expression recognition in relation to the dimensions of social relatedness disturbances within RAD. This study extends findings from studies that have shown significant associations between particular facial expression recognition deficits and various types of social relatedness problems to a RAD sample. The few studies that have examined facial expression recognition in relation to attachment suggest that exploring facial expression recognition in relation to the social relatedness disturbances in RAD would be informative. The current study explored facial expression recognition abilities and deficits to determine whether, and to what extent, deficits in the ability to recognize facial expressions of emotion were associated with the two dimensions of social relatedness disturbances in RAD.

The current proposed study is unique, in that the targeted population has been the subject of little research. Specifically, the age group (i.e., children aged 6 – 19 years) as well as caretaking history (i.e., foster care/out-of-home placement or adoption that does not necessarily follow institutionalization in orphanages) of these participants referred by clinicians make this a clearly defined population much in need of study. Little is known about the particular social relatedness disturbances in exhibited by children with RAD, with varied histories of out-of-home placements.

### **Significance of the Study**

This study contributes to the knowledge of RAD in older children (i.e., aged 6 – 19 years), who present in clinical settings with histories of foster care/out-of-home placements. Most directly, findings from this study may contribute to the limited knowledge of the social relatedness disturbances manifest by children with RAD. In addition, this study potentially makes indirect, yet important, contributions to children with RAD and their caretakers, as well as to the many social and private agencies that serve children with RAD. Finally, findings from this study may contribute to rehabilitation/counselor education.

Current information about the social relatedness disturbances in RAD suggested that additional research is necessary to refine diagnostic nosology. Specifically, the two major manifestations of social relatedness disturbances in RAD are conceptualized as separate and rather distinct subtypes. According to DSM criteria, professionals must specify one of the two subtypes, RAD-D or RAD-I. However, recent studies found that these subtypes appear to lack exclusivity. Children with RAD may exhibit both types of social relatedness disturbance, thus complicating diagnosis and treatment. Specifically, Zeanah et al. (2004) suggested that indiscriminate social relatedness may be “more appropriately considered an associated feature of disordered attachment” rather than a type of disordered attachment (p. 885). If indiscriminate social relatedness is a general feature of RAD, then differentiating how this feature manifests is important. Examination of the relationship between two social relatedness variables DIS and INH and facial emotion recognition contributes knowledge about the particular appraisal

deficits that may interfere with social relatedness in RAD. With improved understanding, comes improved nosology and treatment.

Understandably, many caretakers of children with RAD are seeking help, and have not found standard treatment to be effective (Hanson & Spratt, 2000; S. Foreman, personal communication, February 13, 2009). The results of this study potentially inform clinical treatment in non-direct, yet important ways. For example, findings suggesting that children with RAD do indeed have particular facial expression recognition deficits, clinicians may use this awareness to develop more effective social skills and emotion regulation treatment strategies. In addition, rehabilitation and counselor educators may use this information in counselor training by incorporating the assessment of facial expression recognition and the importance of facial expression recognition to the social relatedness disturbances in RAD in their curricula. Numerous research studies have found evidence of the positive relationship between social relatedness problems in various disorders and facial emotion recognition deficits. The investigation of the relationship between RAD social relatedness problems and facial emotion recognition could contribute to our understanding of the profound social relatedness disturbances exhibited by children with RAD in similar ways. For example, examining particular and systematic facial expression recognition deficits in the DIS dimension may help to explain how disinhibited or indiscriminate behaviors persist. If individuals high in the DIS dimension do not accurately perceive particular facial expressions (e.g., anger or fearful), they may not receive emotional information (e.g., that a teacher or parent is angry) that is important in determining subsequent actions.

In summary, RAD is a psychological disorder that is poorly understood, appears to have long-term effects, and requires further study to improve diagnostic nosology and treatment effectiveness. Reactive attachment disorder is characterized by profoundly disturbed social relatedness across contexts, and as such, affects the individual with RAD, as well as the families and agencies involved with the individual with RAD. The purpose of this study was to explore and examine the relationship between social relatedness disturbances and facial expression recognition among children with RAD. Specifically, this study investigated whether, and to what extent, facial expression recognition may be associated with the two dimensions of social relatedness disturbances (i.e., DIS and INH) in RAD. Research findings have suggested that the ability to accurately perceive nonverbal expressions of emotion is necessary for selection of appropriate behaviors/social interaction. This appears to be the first research study to examine facial expression recognition ability in an outpatient clinic sample of children with RAD. By identifying specific areas of emotion recognition dysfunction that may influence the two dimensions of social relatedness disturbances exhibited by individuals with RAD, this study began to fill a gap in our current knowledge.

The following chapter contains a review of the literature relevant to this study. The chapter begins with a review of attachment theory, followed by a review of RAD. Facial expression recognition is then be discussed, followed by a review of facial expression recognition deficits, with a focus on findings related to patterns of deficits in the recognition of particular emotions, and the relationship of these studies to RAD.

## **CHAPTER 2: LITERATURE REVIEW**

### **Introduction to Literature Review**

This literature review covers research study findings and conceptual writings from attachment literature and nonverbal processing literature relevant to the current study of the facial recognition abilities in children with RAD. Beginning with an overview of the complexity inherent in the study of attachment, this review then discusses the history and description of RAD as a clinical disorder of social relatedness disturbance. This discussion includes the rationale for a shift in the conceptualization of RAD subtypes as two distinct and separate subtypes (based on social relatedness manifestations) to social relatedness dimensions (similarly corresponding to known manifestations).

Next is a discussion of the facial expression recognition literature relevant to the study of social relatedness. Review of the facial expression recognition literature covers the history of facial expression recognition, as well as the measurement and empirical evidence for its link with social relatedness variables. This review then discusses the relationship between deficits in facial expression recognition and particular social relatedness disturbances. Next, this review discusses findings from these studies within attachment theory framework to conceptualize the relationship between deficits in facial expression recognition and RAD social relatedness dimensions.

### **Attachment Theory**

In the decades since Bowlby (1969; 1982) introduced attachment theory as a promulgation of the importance of the early mother-infant relationship and interactions on personality development and affect regulation, theoretical constructions of attachment

have expanded and broadened (Thompson, 2008). Theorists and researchers have utilized attachment theory to explore concepts, dynamics, and behaviors within fields as diverse as behavioral psychology (Golden, 2007), social information processing (Schachner et al., 2005), psychodynamic theory (Lay, Waters, Posada, & Ridgeway, 1995; Steele & Steele, 1998), developmental theory (Guttman-Steinmetz, & Crowell, 2006; Main, 1996), theory of mind (Ontai & Thompson, 2008), and affect regulation (Schore & Schore, 2008). This is not surprising, as Bowlby integrated knowledge and concepts from various fields in developing attachment theory. However, broadening attachment theory application has also resulted in a rather complex theory of personality development. Adding to the complexity of attachment theory is a lack of consensus among clinicians, theorists, and researchers, particularly in regard to defining attachment concepts as well as to the relative importance of particular attachment constructs. This lack of consensus extends to the identification, assessment, and treatment of children and adolescents with clinical disorders of attachment (Hanson & Spratt, 2000; Swain, Leckman, & Volkmar, 2005).

Attachment research has included studies with various populations, including infants and caregivers (Ainsworth, Blehar, Waters, & Wall, 1978), and more recently, adults (Consedine & Magai, 2003; Magai, Distel, & Liker, 1995), children (Barth & Bastiani, 1997; Kerns, Abraham, Schlegelmilch, & Morgan, 2007) and adolescents (Kobak, Cole, Ferenz-Gillies, Fleming & Gamble, 1993; Laible, 2007; Zegers et al., 2008). Within these various samples, researchers have investigated attachment theory constructs in relation to childhood abuse or maltreatment (Parish-Plass, 2008; Venet,

Bureau, Gosselin, & Capuano, 2007), foster care and/or adoption (Kools, 1997; Milan & Pinderhughes, 2000; Sheperis et al., 2003), behavior and affect regulation (Cassidy, 1994; Weinfield, Sroufe, Egeland, & Carlson, 1999), emotion understanding (Fonagy & Target, 1997), cognitive-linguistic functioning (Meins, Fernyhough, Fradley, & Tuckey, 2001), internal working models (Alford, Lyddon, & Schreiber, 2006), theory of mind (Ontai, & Thompson, 2008), and romantic relationships (Fraley & Shaver, 1998, Schachner et al., 2005).

A highlight of attachment theory was Ainsworth's (Ainsworth et al., 1978) systematic observational studies of infant-caregiver interactions. In addition to contributing empirical support for Bowlby's (1969; 1982) theoretical formulations, Ainsworth's development of the Strange Situation lab procedure provided a structured method for assessing infant-caregiver attachment. She developed three classifications, *secure*, *insecure-avoidant*, and *insecure resistant-ambivalent*, that represented infants' patterns of managing attachment processes in relation to their caregivers' availability and sensitivity. Subsequent researchers have replicated many of Ainsworth's findings (Main, 1996). Main, one of Ainsworth's students, expanded on Ainsworth's work, and developed a fourth classification, *insecure/disorganized-disoriented* (Main & Solomon, 1990).

As attachment classifications provide information regarding infants' social relatedness with caregivers/attachment figures, familiarity with these attachment classifications is relevant to the study of RAD social relatedness dimensions. Infants with secure attachments displayed behaviors suggesting distress (e.g., crying) upon

separation from caregivers, and active greeting (e.g., smiling, reaching, approaching) upon their return. These proximity-seeking behaviors received positive responses (e.g., smiling, holding) from caregivers. Following brief contact with caregivers, infants' returned to play (Ainsworth et al., 1978).

In contrast, infants with avoidant attachment did not display signs of distress upon separation from caregivers. Instead, they attended to the environment (e.g., played with toys). Infants with avoidant attachment displayed active avoidance or ignoring (e.g., turning away from caregiver, moving body away from caregiver when picked up) upon caregivers' return, and generally displayed little affect throughout the assessment. Infants with resistant-ambivalent attachment displayed various forms of preoccupation (both clinging and resisting behavior) toward caregivers throughout the assessment, and inability to settle (i.e., become calm) or explore upon caregivers' return. Rather than being reassured by the caregivers' presence, infants with resistant-ambivalent attachment continued to display distress (e.g., crying) and to focus on the caregiver. Infants with disorganized-disoriented attachment were often similar to one of the first three classifications, but exhibited unusual and contradictory behaviors (e.g., movement away from parent to lean head on wall when frightened, freezing and staring with a trance-like expression) when in the caregivers' presence (Main, 1996).

Attachment theory posits that infants' attachment interactions and the development of self-regulating strategies to manage affect and needs within the attachment relationship influence social and emotional development (Ainsworth et al., 1978; Bowlby, 1969, 1982; Main, 1981, 1996). For example, avoidant attachment styles

have been associated with affect regulation strategies that limit affective experience, such as *minimization* (Main, 1981), and *deactivation* of the attachment system (Cassidy, 1994). Bowlby (1982) explained that *defensive exclusion* (the distorting of new information to prevent the awareness of overwhelming perceptions) may be learned as an adaptive strategy in infancy to manage distress related to the unavailability of the attachment figure. As noted previously, infants with avoidant attachment tended to ignore their caregivers upon reunion, averting their eyes and focusing elsewhere. The consistent use of avoidant defensive strategies (i.e., defensive exclusion, minimization) limits the information the infant receives. These strategies may affect the acquisition of facial recognition abilities as they interfere with dyadic learning (i.e., reciprocal nonverbal communication via facial expressions).

Subsequent research studies have applied these classifications to older children and adults (Consedine & Magai, 2003; Laible, 2007). Examination of attachment in older children and adults has found associations between attachment or styles (e.g., secure, avoidant, anxious) and various social relatedness variables (Cassidy, 1994; Laible, 2007; Main, 1991). For example, studies have found support for the relationship between attachment style and social and emotional competence (Laible, 2007; Simons, Paternite, & Shore, 2001), affect regulation (Cassidy, 1994; Consedine & Magai, 2003; Kobak et al., 1993; Zimmermann, 1999) and empathy (Kestenbaum, Farber, & Sroufe, 1989). Theoretical formulations of the associations between attachment styles and social relatedness variables often include the constructs of *internal working models of attachment* or *mental representations*. Infants' internal models or mental representations

of attachment develop as organized templates of experiences and expectations about the self, others and relationships. Patterns of emotion regulation that develop within attachment processes are thought to become internalized by children, and persist in relationships outside of the attachment figures' presence (Contreras & Kerns, 2000). These concepts, as well as research findings related to attachment styles and infant development of facial expression recognition are pertinent to the current study of the social relatedness disturbances inherent in RAD.

Main's (1991) work with attachment styles in adults provides a particularly useful conceptualization of regulation strategies (developed in infancy) that are apparent in relation to attachment styles in adulthood. Main suggested that there are both primary and secondary attachment-related regulation strategies. According to Main, and consistent with Bowlby's (1969) original theory, infants' primary attachment strategy consists of proximity seeking behaviors to promote felt security. When attachment figures do not respond (or respond inappropriately) to these direct attempts to gain or maintain contact, infants may develop secondary strategies of *minimizing* and *maximizing*. Of particular interest for this study of children with RAD, each secondary strategy relates to a specific attachment style. Adults with *dismissing* attachment styles (parallel to infant avoidant attachment) minimize expressions of need for the attachment figures to decrease the chance of rejection. Rather than experience activation of the attachment system, individuals with dismissing styles may use various methods to distract themselves and limit emotional expression and input. Adults with preoccupied

attachment styles (parallel to infant resistant-ambivalent attachment) maximize the expression of attachment needs by methods such as clinging or neediness.

Most attachment literature has been theoretical rather than empirical (O'Connor & Zeanah, 2003). Theorists have explored attachment theory from various perspectives. For example, Cummings (2003) discussed the “possible virtues of assessing attachments on continua” rather than categorically (p. 405). Additionally, Schore and Schore (2008) proposed that attachment theory has shifted to a promising theory of affect regulation, and other theorists have discussed the usefulness of attachment theory in understanding the effects of trauma (Bolen, 2000). Many published research studies have focused on attachment styles rather than on clinical attachment disorders. These findings contribute to our understanding of the possible trajectories of infant attachment development and to our knowledge of how internal working models and emotion regulation strategies (e.g., defensive exclusion, minimizing, maximizing) appear to influence facial recognition abilities and subsequent social relatedness abilities in RAD. These attachment styles with related secondary attachment strategies appear similar to the two social relatedness dimensions to be explored in this study. Specifically, the DIS dimension corresponds to dismissing attachment and minimizing strategies, while the INH corresponds to preoccupied attachment and maximizing strategies. How these strategies relate to specific deficits in the ability to recognize emotions via facial expressions is discussed as part of the literature review conclusion. The following section discusses RAD in more detail: the history of the study of social relatedness disturbances in RAD, the assessment of RAD diagnosis, and the social relatedness dimensions associated with RAD.

## **Reactive Attachment Disorder**

### **History**

Although clinical descriptions of disturbed attachment and research studies focused on attachment behaviors have been published for over 50 years (Ainsworth et al., 1978; Bowlby, 1958, 1969), formal diagnostic criteria for reactive attachment disorder was first included in the DSM III in 1980, and two subtypes were introduced in the DSM III-R in 1987. Surprisingly, there were no published studies utilizing or evaluating the criteria between 1980 and 1994. In 1994, Richters and Volkmar presented their seminal case studies of children with RAD that provided clinical evidence for atypical development and a constellation of symptoms that were not captured by other diagnostic categories. There has been limited research in the examination of the criteria and constructs of RAD since this time (Boris, 2005).

A few studies have focused on RAD diagnostic criteria (Hall & Geher, 2003; McLaughlin, Espie, & Minnis, 2009; O'Connor & Zeanah, 2003). For example, Hall and Geher (2003) compiled a constellation of behavioral characteristics for children with RAD. They compared 21 children and adolescents (aged 4-19 years) with RAD to a group (aged 4-25 years) without RAD. Using data from several behavior checklist measures, they found that participants in the RAD group were significantly more likely to have behavior problems (i.e., social problems, withdrawal, attention problems, and delinquent behavior). The children with RAD also had higher scores on self-monitoring, and lower scores on empathy, which suggested the possibility that they put effortful control into attempting to present themselves in a more socially acceptable manner.

Children with RAD have been described as manipulative and indiscriminately friendly (Sheperis et al., 2003), grandiose in self-perception and as having difficulty regulating their emotions and behaviors (Hall & Geher, 2003). By adolescence, children with RAD often have additional pathology (e.g., attention deficit hyperactivity disorder, oppositional defiant disorder, mood disorders, anxiety disorders), which adds to diagnostic and treatment complexity (Kemph & Voeller, 2007). Reactive attachment disorder is considered by some to be a precursor of adult personality disorders, such as borderline personality disorder (Fonagy, 2000). Connecting back to attachment theory, the etiology of RAD is based in early childhood attachment processes; children with histories of maltreatment and/or out of home placement(s) appear to be most at-risk (Minnis, Pelosi, Knapp, & Dunn, 2001; Richters & Volkmar, 1994; Zeanah, Smyke, & Dumitrescu, 2002).

Prevalence rates of RAD are unknown (Buckner, Lopez, Dunkel, & Joiner, 2008; DSM-IV-TR). However, Richters and Volkmar (1994) estimated prevalence of RAD to be 1%. Although RAD appears to be uncommon in the general population, in studies using at-risk populations, 38% of children in foster care before age 4 years due to abuse or neglect had signs of RAD (Zeanah et al., 2002); 40% of young children in Romanian institutional orphanages had RAD and an additional 33% had some of the signs of RAD (Smyke, Dumitrescu, & Zeanah, 2002; Zeanah et al., 2002). Reactive attachment disorder is widely accepted as a diagnostic category. However, debate in the literature suggests that some clinicians and researchers find the DSM too restrictive and others find it not specific enough; while some researchers are attempting to reconceptualize the

disorder (Hanson & Spratt, 2000). The considerable overlap or comorbidity of disorders (i.e., attention deficit disorder, conduct disorder, post traumatic stress disorder) in children who experienced grossly pathogenic care as infants has made differential diagnosis difficult.

Fundamentally, RAD results from a failure to form an attachment with a primary caregiver or severe disruption of this relationship, and the diagnosis entails ongoing disturbances in social abilities in other relationships as well (Hanson & Spratt, 2000; Zeanah et al., 2004). Thus, children with histories of early maltreatment and/or changes in home placement (e.g., foster care placements) are particularly at risk. Current diagnostic criteria are reviewed next.

### **Current Diagnostic Criteria**

The Diagnostic Statistical Manual (*DSM-IV-TR*) (American Psychiatric Association, 2000) criteria for Reactive Attachment Disorder (RAD) of Infancy or Early Childhood require a history of “gross pathological care” and the presence of “markedly disturbed and developmentally inappropriate social relatedness in most contexts” that begins before age five years (*DSM-IV-TR*) (p. 130). One of two subtypes that refer to differences in the manifestation of inadequate attachment in social relatedness must be specified. The Disinhibited Type (RAD-D) is specified when the clinical presentation is predominated by “diffuse attachments as manifest by indiscriminate sociability with marked inability to exhibit appropriate selected attachments (e.g., excessive familiarity with relative strangers or lack of selectivity and choice of attachment figures)” (*DSM-IV-TR*) (p. 130). In contrast, the Inhibited Type (RAD-I) is specified when the clinical

presentation is predominated by “failure to initiate or respond in a developmentally appropriate fashion to most social interactions as manifest by excessively inhibited, hypervigilant, or highly ambivalent and contradictory responses (e.g., the child may respond to caregivers with a mixture of approach, avoidance, and resistance to comforting or may exhibit frozen watchfulness)” (DSM-IV-TR) (p. 130). The disturbed relatedness described within these subtypes is presumed to have been caused by one of the following kinds of pathogenic care: “(1) persistent disregard of the child’s basic emotional needs for comfort, stimulation, and affection, (2) persistent disregard of the child’s basic physical needs, (3) repeated changes of primary caregiver that present formulation of stable attachment (e.g., frequent changes in foster care)” (DSM-IV-TR) (p. 130).

The RAD diagnosis entails early symptom onset, pathogenic experience, and disturbed social relatedness due to inadequate formation of attachment. In addition, DSM criteria require that the attachment-related disturbance “be evident across situations and across relationships” (O’Connor & Zeanah, 2003, p. 226), and that the disturbance is not due solely to a developmental delay or pervasive developmental disorder.

### **Diagnostic Complexities and Social Relatedness**

Compounding the complexity of RAD is the diagnostic categorization of two RAD subtypes. Researchers have recently challenged the RAD nosology, questioning whether there are indeed two exclusive manifestations of RAD (Minnis et al., 2007; Zeanah et al., 2004). Although the two RAD subtypes, RAD-D and RAD-I, refer to different manifestations of profound attachment disturbance, recent research has

suggested that the two may not be mutually exclusive (Minnis et al., 2007; Smyke et al., 2002; Zeanah et al., 2002; Zeanah et al., 2004). Smyke et al. (2002) found that some children in institutionalized orphanages who experienced severe deprivation exhibited both indiscriminate sociability and inhibited behaviors. Support for this finding was reported in O'Connor and Zeanah's (2003) study, which suggested that behaviors associated with subtype RAD-D (i.e., indiscriminate behaviors) were more consistent than behaviors associated with subtype RAD I (i.e., inhibited behaviors) among previously institutionalized children with RAD. According to Minnis et al. (2007), their findings suggest there is some validity in both RAD subtypes (RAD-D and RAD-I), but that the two types may not be symptomatically distinct. Findings from their study further supported both the lack of exclusivity between RAD subtypes, and the prominence of indiscriminate social relatedness in both types of RAD.

Importantly, studies also suggest that indiscriminate social relatedness, the hallmark of RAD-D behavioral manifestations, may be a particularly stable feature of RAD (Smyke et al., 2002; Zeanah et al., 2002; Zeanah, Boris, & Lieberman, 2000). This is not surprising, as infant/caregiver attachment relationships impact the acquisition and maintenance of social information processing skills (Ziv, Oppenheim, & Sagi-Schwartz, 2004). Richters and Volkmar (1994), in their seminal RAD case study report, suggested that the social relatedness difficulties in children with RAD "are best explained by deficits in social-emotional development" (p. 331). However, research to identify the particular social processing deficits exhibited in children with RAD has only recently begun. Increasing evidence of the relationship between attachment and facial expression

recognition suggests that research in this area could promote understanding of RAD and the social relatedness dimensions in RAD.

### **Facial Expression Recognition and Social Relatedness**

The following sections will review the literature regarding the relationship between facial expression recognition and social relatedness, the utility of examining specific deficits in facial expression recognition and the theoretical link between facial expression recognition deficits and the two dimensions of social relatedness disturbances in RAD.

Accurate facial expression recognition enables us to understand the affective experiences of others, and is integral to social competence and the formation of reciprocal relationships. Specifically, facial expression recognition depends on the ability to accurately appraise others' nonverbal expressions of emotion, and is necessary for evaluating interpersonal situations for the subsequent application of appropriate social skills (Collins & Nowicki, 2001). How individuals process nonverbal emotion expressions and how this processing may affect social interaction and behavior has been of increasing research interest since the 1990s (Barth & Bastiani, 1997; Crick & Dodge, 1994; Maxim & Nowicki, 2003; Nowicki & Carton, 1997; Plesa-Skwerer et al., 2006; Pollak & Sinha, 2002). Recognition of emotion in facial expressions "is tied to appraisal processes linked to anticipated behavior of the other based on memories of how the other behaved when looking this way or that" (Steele et al., 2008, p. 380). These early pre-verbal memories of infant-caregiver interactions are integral to the formation of internal working models that continue to influence facial expression recognition. Research from

the information processing perspective has focused on the importance of accurate perception appraisal of nonverbal behavior, such as facial expressions and voice intonations, in social interactions and relationships.

Understanding the importance of emotion recognition to social interactions led researchers to study the relationship of facial expression recognition and social competence in children (Custrini & Feldman, 1989; Lancelot & Nowicki, 1997; Nowicki & Duke, 1994), and behavior/conduct problems (Blair & Coles, 2000). In addition, researchers have found associations between emotion recognition attribution biases and social relatedness in children with histories of early abuse and/or maltreatment (Camras, Grow, & Ribordy, 1988; Masten et al., 2008; Pears & Fisher, 2005a; Pollak et al., 2000). Findings from these studies, as well as those from studies reporting associations between emotion recognition and social relatedness in psychopathy/antisocial traits or behaviors (Hastings, Tangney, & Stuewig, 2008), support a strong relationship between facial expression recognition and social relatedness variables. Research also suggests that facial expression recognition attribution biases may be associated with particular attachment patterns (Cooley, 2005; Magai et al., 2000). The inability to recognize nonverbal forms of emotion expression can have long-term detrimental effects on intra- and interpersonal behavior, and may serve as a risk factor for poor adjustment and future adverse outcomes (Izard, 2002).

According to Schachner et al. (2005), emotion recognition abilities should be a primary focus of attachment research. Reflecting early attachment dysfunction, the social relatedness problems found in children with RAD may manifest as DIS dimension

behaviors, or as INH dimension behaviors or as varying degrees of both The DIS dimension behaviors, reflecting a lack of social discrimination (e.g., a lack of fear of strangers), appears to be particularly problematic, in that it appears to be fairly stable, in spite of improved home life or therapeutic intervention (O'Connor & Zeanah, 2003). Facial expression recognition may significantly influence these two manifestations of social relatedness disturbance found in children with RAD. The remainder of this section discusses facial expression recognition in detail, beginning with a review of the history of facial expression recognition research.

## **Facial Expression Recognition Studies**

### **History of Facial Expression Recognition Studies**

Scientific study and understanding of emotion is thought to have begun in the 19<sup>th</sup> century with Charles Darwin's *The Expression of the Emotions in Man and Animals* (originally published in 1872) and G.G. Duchenne de Bologne's *The Mechanism of Human Facial Expression*, originally published in 1862 (Mayne & Bonanno, 2001). These early works focused on the important role of facial displays in emotional life and introduced the theory that emotions may be understood as biologically based reflex behaviors serving adaptive functions. The Darwinian theory that emotions aid in survival and that facial expressions and other physiological responses serve to communicate intentions was firmly grounded in the view of emotions as catalysts for physiological action. For approximately 100 years, the major theories of emotion focused on the temporal relationship of physiological arousal and the experience of emotion. Contemporary theorists "have begun to systematically link specific emotions to social

functions” (Keltner & Haidt, 2001, p. 193). For example, Lazarus (1991) developed a theory of emotion that emphasized the role of individual appraisal in the experience of emotion. How emotions are differentiated has been a “prominent recurrent question” (Frijda, 2004, p. 64), and there is “compelling evidence for emotion-specific autonomic activity concordant with anger, fear, sadness, and disgust” (Bonanno & Mayne, 2001, p. 399). In line with Lazarus’ theory, Ekman (1992), known for decades of emotion research, has made a case for the existence of *basic* emotions, which are discrete, specific, and recognizable.

In recent years, the ability to recognize, or decode, emotions displayed in facial expressions has been studied as an aspect of nonverbal processing. Nonverbal processing refers to the understanding of behavior that is expressed nonverbally, such as by facial expressions, tone of voice cues, body movements, orientations, postures, touching and other ways of regulating interpersonal distances (DePaulo, 1991). Facial expressions are a particularly important source of emotional cues (Adolphs, 2002, 2003; Darwin, 1872; Ekman, 1992, 1994). As such, the study of individuals’ deficits in facial expression recognition has been helpful in understanding their social interaction difficulties.

For most individuals, facial expression recognition ability tends to follow a developmental path, increasing in accuracy through experiences with others and cognitive development. The ability to identify emotions from facial expressions begins in infancy, and the ability to attach labels to basic emotions begins for most children by age 18 months (Bretherton, McNew, & Beeghly-Smith, 1981). Findings from cross-sectional studies have suggested that the recognition of certain emotions (happy, sad, and

angry) improves to near-adult level by age 5 years. Although the ability to distinguish more sophisticated expressions, such as disgust and surprise, appears to develop later, most children are able to identify and label the basic emotions of happy and angry by approximately 3 years of age (Izard & Harris, 1995).

### **Assessment of Facial Expression Recognition**

To assess individuals' ability to recognize the emotions displayed in facial expressions, researchers have often used standardized performance measures. Standardized instruments typically consist of a set of emotion cues, such as a series of facial expressions, and a rating function, such as a forced choice list of emotions. Some measures do not include a forced choice format, and instead ask participants to state or write the expressed emotion. Recent interest in emotion recognition as a function of *intensity* of expression has resulted in the addition of cues that are subtle as well as intense. The ability to recognize subtle cues appears to have an important function in interactions (Burgoon & Bacue, 2003). Subtle nonverbal emotion cues “signal awareness of the presence of others and a willingness (or unwillingness) to become involved in an interaction” (p. 92). For example, subtle changes in facial expression may signal discomfort, or the wish to change conversation topics. Deficits in the recognition of such subtle cues may negatively influence the smoothness of interactions (Burgoon & Bacue, 2003).

Standardized facial expression recognition assessments often used in published research include the Diagnostic Analysis of Nonverbal Accuracy-Second Edition (DANVA 2) (Nowicki, 2010), the Diagnostic Analysis of Nonverbal Accuracy

(DANVA) (Baum & Nowicki, 1998; Nowicki & Duke, 1994), the Interpersonal Perception Task (IPT) (Archer & Costanzo, 1988; Costanzo & Archer, 1989), the Profile of Nonverbal Sensitivity (PONS) (Rosenthal, Hall, DiMatteo, Rogers, & Archer, 1979), the Facial Affect Scoring Technique (FAST) (Ekman, Friesen, & Tomkins, 1971), and the Nonverbal Discrepancy Test (DePaulo, Rosenthal, Eisenstat, Rogers, & Finkelstein, 1978). The current study used the DANVA 2, because this measure has been shown to be a standardized, validated instrument that includes both child and adult faces, as well as subtle (i.e., low intensity) and intense (i.e., high intensity) expressions (J. A. Golden, personal communication, October 10, 2008).

To understand the relationship between individuals' facial expression recognition and social relatedness, researchers have investigated the facial expression recognition abilities and deficits of various populations. By focusing investigations on particular age groups and/or identified populations, researchers have identified patterns of emotion recognition deficits and found associations between these patterns and particular social outcomes. Findings from studies of the relationships between facial expression recognition and demographic variables, behavioral or psychological problems, foster care or adoption, childhood maltreatment, and attachment are discussed in the following sections.

### **Facial Expression Recognition and Demographic Variables**

Accuracy in facial expression recognition has suggested a mild association with gender, with females having a slight advantage over males in some studies, and no advantage in others (Hall, 1984; Lancelot & Nowicki, 1997; Steele et al., 2008).

Research findings have suggested that gender may moderate the association between emotion recognition abilities and social adjustment. For example, in a sample of 39 children in residential care for psychological problems (aged 9-14 years), lower facial expression recognition was significantly correlated with greater externalizing problems (as rated by teachers) in girls, but not in boys (Lancelot & Nowicki, 1997). These researchers suggested that females, typically more interested in social stimuli than males, placed greater value on social skills. Thus, social deficits, resulting in externalizing behavior problems, posed greater problems for females, than for males (Lancelot & Nowicki, 1997). Findings from a recent study focusing on processing speed as well as accuracy found that adult females exhibited faster processing speed in identifying facial emotion expressions, and that this difference was particularly apparent when identifying the negative emotions of sadness, fear, anger, and disgust (Hampson et al., 2006).

Research studies examining the associations between cultural variables and facial expression recognition have focused on the universality of recognition of facial displays of emotion, as well as cultural differences (Elfenbein & Ambady, 2002). Studies of cultural differences in facial expression recognition that may be relevant to the current study, suggested that children from economically disadvantaged homes may develop emotion recognition abilities later than children from more advantaged homes; such deficits were also related to social adjustment (Fine, Izard, Mostow, Trentacosta, & Ackerman, 2003; Izard, Fine, Schultz, Mostow, Ackerman, & Youngstrom, 2001). For example, Izard et al. (2001) investigated emotion knowledge (i.e., combined scores for two facial expression recognition tasks) as a predictor of social behavior and academic

competence in a sample of 72 children from economically disadvantaged homes. Emotion knowledge/facial expression recognition, measured at aged 5 years, contributed significantly to the prediction of social and academic behaviors at aged 11 years. Specifically, emotion knowledge/facial expression recognition correlated positively with academic competence and cooperation and negatively with hyperactivity and internalizing. Further, Izard et al. (2001) found that emotion knowledge/facial expression recognition mediated the effects of verbal ability on academic competence, and suggested that preschool deficits in facial expression recognition “contribute to the causal chain from the child’s characteristics, to teachers’ impressions and expectations, to the child’s actual academic performance” (p. 22).

### **Facial Expression Recognition and Behavioral or Psychological Problems**

Several studies have reported associations between facial expression recognition abilities and various behavioral, mental and emotional disorders or problems (Blair & Coles, 2000; Blair et al., 2004; Easter et al., 2005; Lancelot & Nowicki, 1997; Nowicki & Carton, 1997; Stevens, Charman, & Blair, 2001; see Sheaffer, Golden, & Averett, 2009). Specifically, research studies have found associations between facial expression recognition deficits and anxiety disorders (Easter et al., 2005; Melfsen & Florin, 2002), social anxiety and behavioral avoidance in 8-10 year olds (McClure & Nowicki, 2001); attention deficit with hyperactivity disorder (ADHD) in 27 children (aged 5-15 years) when compared with matched controls (Da Fonseca, Segquier, Santon, Poinso, & Deruelle, 2008) and impulsive behavior/conduct problems (Blair & Coles, 2000).

An example of the above includes a study with 252 children and adolescents aged 7-18 years in which the facial expression recognition abilities of various psychiatric disorders were compared (Guyer et al., 2007). Those with bipolar disorder and those with severe mood dysregulation each displayed facial recognition deficits when compared to those with depressive disorders, attention-deficit/hyperactivity and/or conduct disorder, and controls. In another study, facial expression recognition in a non-clinical sample of 84 undergraduates found that self-reported aggression was associated with a bias for seeing anger in non-angry facial expressions (Hall, 2006). Thus, in studies of various types of social tendencies (i.e., anxiety, aggression) as well as disorders, facial expression recognition has been associated with social relatedness.

### **Facial Recognition and Psychopathology**

Findings from several research studies of psychopathy suggested that facial expression recognition deficits are important influences in the social relatedness problems exhibited by individuals high in psychopathy (Blair & Coles, 2000; Stevens et al., 2001). Individuals high in psychopathy, known to lack empathy and exhibit insensitivity to others' experiences and feelings, have displayed facial expression recognition deficits. For example, among a group of 37 participants (aged 9-15 years) with severe behavioral and emotional difficulties, those with high pathology scores demonstrated less accuracy in facial expression recognition than those with low pathology scores; in particular, the group of high pathology scorers was significantly less likely to accurately identify sad and fearful facial expressions (Stevens et al., 2001). Similarly, among a group of 55 adolescents (aged 11-14 years) attending mainstream school in London, Blair and Coles

found that participants with higher levels of affective-interpersonal disturbance and impulsive behavior/conduct problems, as determined by elevated scores on the Psychopathy Screening Device (PSD), were less likely to recognize sad and fearful facial expressions than those with non-elevated PSD scores. Hierarchical regression analysis with PSD score as the dependent variable suggested that only when emotion recognition scores of sad and fearful were added to a model that included mental age and other emotions (happy, surprise, disgust, and anger) did the model reach significance; the final model explained 35% of the variance in PSD scores. According to Blair and Coles (2000), “disruption to a neurocognitive system that processes sad and fearful expressions can lead to antisocial behavioral problems” (p. 431). These individuals, lacking sensitivity for sad and fearful expressions, do not receive the feedback that these expressions display, and thus miss the opportunity for important social learning that such expressions may provide (Blair & Coles, 2000). In a study within a prison population, a high pathology group compared to a lower pathology group exhibited significantly more facial expression recognition difficulty in overall accuracy, with specific deficits in the recognition of sad and happy expressions (Hastings et al., 2008).

Due to some of the characteristics shared by individuals with psychopathic tendencies and some individuals with RAD (i.e., lack of empathy and insensitivity to others’ feelings), the studies of facial expression recognition and psychopathic tendencies are relevant to the current study of the social relatedness disturbances in RAD. In particular, individuals with high indiscriminate sociability (DIS dimension) of social relatedness may have similar facial expression recognition deficits.

### **Facial Expression Recognition and Adoption or Foster Care and Maltreatment**

Other studies have focused on the emotion recognition abilities of children who experienced foster care or adoption (Pears & Fisher, 2005b; Wismer Fries & Pollak, 2004). Children with histories of out-of-home placement(s) (e.g., institutional orphanage, foster care) often have histories of maltreatment (i.e., abuse and/or neglect). Indeed, research studies that focus on maltreatment often access samples through these institutions or foster care systems. When studying maltreatment, information regarding specific types of maltreatment, such as physical, sexual, or emotional abuse or neglect may be unknown. In addition, children may experience a combination of types of maltreatment.

Studies that compared groups of maltreated and nonmaltreated children, found maltreated children to be at risk for psychological problems (Chaffin, Kelleher, & Hollenberg, 1996) and to have lower emotion recognition accuracy (Camras et al., 1988; Camras et al., 1990; During & McMahon, 1991; Pears & Fisher, 2005b; Pollak et al., 2000; Pollak, Klorman, Thatcher, & Cicchetti, 2001; Pollak & Sinha, 2002). For example, Pears and Fisher (2005b) examined facial expression recognition in 60 children (aged 3-5 years) referred by the foster care system (and with histories of maltreatment) and 31 children living with biological parents. They found significant between groups differences; the maltreatment foster group displayed overall deficits in facial expression recognition. This significant finding was maintained, even when age and intelligence were controlled. In a different study, children who had experienced early deprivation in institutional orphanages and were later adopted also had deficits in emotion recognition

(Wisner et al., 2004). As a group, they were inaccurate when attempting to identify happy, sad and fearful expressions, but were as accurate as a control group in the identification of anger (Wisner et al., 2004).

Similarly, Camras et al. (1988) found that abused children were less accurate than nonabused children in the recognition of facial displays of emotions (i.e., happiness, sadness, anger, fear, disgust, and surprise). In addition, the abused children were rated by teachers as less socially competent than their peers, suggesting that the social difficulties exhibited by the abused children may be linked with deficits in facial expression recognition. Theorizing that particular types of childhood maltreatment predisposed individuals to deficits in the recognition of specific emotions, Pollak et al. (2000) found that physically abused children displayed an attribution bias for anger (i.e., seeing anger in non-angry facial expressions). They discussed this finding as an early adaptive strategy developed by children who grew up with violence. Because facial expressions of anger conveyed threat and early recognition of these anger cues could be important, these children may have become sensitized to or vigilant for facial expressions of anger. In this same study, Pollak et al. (2000) found that children with histories of neglect were less able to discriminate emotional expressions than either physically abused children or a control group.

Consideration of these findings from studies of associations between facial expression recognition deficits and maltreatment in children with histories of out-of-home placement(s) was important for the current study. Children with RAD have similar

histories, yet specific facial expression deficits may be associated with particular RAD social relatedness dimensions.

### **Facial Expression Recognition and Attachment**

Few studies have examined the relationship between attachment styles (or disorders) and facial expression recognition. However, a recent study found that previous infant-mother attachment was significantly associated with facial expression recognition abilities for children 5 and 10 years later (Steele et al., 2008). Sixty-three children aged 6 years and 49 children aged 10 years, who had been assessed for infant-mother attachment at age 1 year, were asked to identify facial expressions of emotion. Correlations between infant-security at age 1 year and facial expression recognition 5 and 10 years later were significant. Examination of Bonferroni pair-wise comparisons showed that this significant result was due to greater facial expression recognition accuracy among the children with histories of secure attachment as compared to children with insecure (i.e., insecure-avoidant or insecure-resistant) attachment histories. Further examination of the ability to recognize particular emotions found that the happy facial expression was recognized significantly less frequently by children aged 6 years who had histories of insecure-resistant infant-mother attachments. Thirty-eight percent of the children with insecure-resistant attachment histories recognized happy, whereas 86% of the children with secure infant-mother attachment histories recognized happy and 85% of the children with insecure-avoidant histories recognized happy. Steele et al. theorized that early attachment processes, occurring within the infants' first year of life, include templates of the mother's facial expressions of emotion. These expressions are associated with

learned messages about what these expressions mean for the self and relationships. Thus, this preverbal learning appeared to be in effect years later in facial expression recognition tasks.

A few studies have examined the relationship between facial expression recognition and attachment styles or classifications in adults (Cooley, 2005; Magai et al., 1995; Magai et al., 2000; Neidenthal, Brauer, Robin, & Innes-Ker, 2002). For example, Magai et al. (1995) found associations between adult attachment styles (secure, avoidant, anxious) and facial expression recognition (Magai et al., 1995). Specifically, secure attachment was associated with better overall accuracy, avoidant attachment was associated with deficits in facial expression recognition, and anxious attachment was associated with a particular deficit in the ability to recognize anger. A different study found associations between attachment styles and specific attribution biases for particular emotions (Magai et al., 2000). Findings from Cooley's study with 59 female college students, however, found significant differences in facial expression recognition accuracy between secure and insecure attachment. Differences in attachment classification may explain these seemingly inconsistent findings. Cooley, using Bartholomew and Horowitz's (1991) two-dimensional (anxiety and avoidance) attachment model, combined secure and preoccupied attachment into a single group, and dismissing and fearful attachment into a second group for comparison of facial expression recognition. By doing so, the findings from one group may have counteracted the findings from the other group.

Fraley, Niedenthal, Marks, Brumbaugh, and Vicary (2006) examined the relationship between attachment styles and emotion recognition accuracy in terms of sensitivity. Using computerized facial expressions that gradually morphed from neutral expressions to one of three facial expressions (i.e., happiness, sadness, or angry), participants indicated the point at which they recognized the emotion expression and then labeled the emotion. Fraley et al. (2006) found that anxious attachment, compared to secure attachment and avoidant attachment, was associated with faster recognition times (i.e., sensitivity) and with poorer recognition accuracy. However, facial recognition accuracy increased for this group when participants were instructed to wait longer (i.e., as long as those in the secure group) to identify the emotion. Based on this finding, Fraley et al. (2006) theorized that facial expression recognition deficits in individuals with anxious attachment styles related to heightened vigilance for emotion cues and a tendency to make premature and inaccurate emotion judgments.

The studies examining the relationship between social relatedness and facial expression recognition suggest direct and indirect associations. Research has clearly shown the direct association between facial expression recognition accuracy and several social interaction skills. Research has suggested a more indirect association between facial recognition deficits and the emotion regulation strategies developed in infancy to manage internal distress and attachment needs. The current study explored these possible links by examining the relationship between the social relatedness and facial expression recognition in children with RAD. The following discussion integrates information from the studies noted above with attachment theory to explore these concepts in RAD.

### **Facial Expression Recognition Deficits and Social Relatedness in RAD**

In summarizing this research, consolidating facial expression recognition findings in terms of particular deficits (i.e., errors recognizing emotions, and/or attribution biases for particular emotions) that relate to the current study of RAD may be useful.

Discussion of these findings focuses on facial expression recognition and attachment research, as well as attachment theory.

To review, the purpose of this study was to explore and examine the relationship between social relatedness disturbances and facial expression recognition among children with RAD. Specifically, this study investigated whether, and to what extent, facial expression recognition would be associated with the two dimensions of social relatedness disturbances in RAD (i.e., withdrawn/inhibited behaviors and indiscriminate/disinhibited behaviors).

This review now discusses the two social relatedness dimensions, DIS and INH, in relation to the theoretical formulations and relevant research findings regarding overall and particular deficits in the recognition of facial expressions of emotion. Findings from studies that identified these deficits, early observational studies of infant-caregiver attachment patterns, and attachment theory led to the proposed hypotheses. The next section delineates potential deficits corresponding to each dimension, culminating in the hypothetical profiles of particular deficits associated with each dimension.

The conceptualization of social relatedness disturbances in RAD as categorical, exclusive subtypes has been challenged by recent findings. In the current study, the social relatedness disturbances that typify the two subtypes (RAD-D and RAD-I) were

explored as dimensional constructs (DIS and INH), thus allowing for the exploration of individual differences in social relatedness among a RAD sample. The value in reductionistic criteria for assessment and diagnosis is to promote clarity. However, in the case of RAD, the use of reductionistic criteria has led to a *lack* of clarity. Additionally, dimensional constructs will allow for a more thorough examination of the relationship between social relatedness disturbances and facial expression recognition.

### **DIS Dimension in RAD**

The DIS dimension is characterized by indiscriminate sociability across contexts. Indiscriminate sociability in RAD originates in infancy and is generally associated with a lack of selective attachment. Indiscriminate sociability is exhibited by a lack of (normal) wariness toward strangers (i.e., getting too physically close to or cuddling with strangers, exaggerated friendliness with strangers, and often asking very personal questions). Other behaviors and characteristics associated with indiscriminate relatedness include attention-seeking, shallow or ingenuine emotionality, and risk-taking. Parallels between some of these descriptors (e.g., shallow or ingenuine emotionality, and risk-taking) and individuals with psychopathic tendencies suggest similarities in social relatedness. Perhaps common facial expression recognition deficits explain some of these parallels.

Findings from several studies of individuals with psychopathic/antisocial characteristics or disorders found significant associations between social relatedness and facial expression recognition deficits for the emotions of sad (Blair & Coles, 2000; Blair, Colledge, Murray, & Mitchell, 2001; Hastings et al., 2008; Stevens et al., 2001) and fearful (Blair & Coles, 2000; Blair et al., 2004). Blair and Coles examined the

relationship between facial expression recognition abilities and affective-interpersonal disturbance and behavior/conduct problems (as rated by teachers on the Psychopathy Screening Device/PSD) and found significant associations between deficits in recognizing sad and fearful expressions and both types of social relatedness problems. They measured the facial expression recognition of six emotions (i.e., sadness, fearfulness, surprise, happiness, and, disgust) for 55 mainstream children aged 11-14 years. The hierarchical regression model reached significance only after the scores for sadness and fearfulness were added to the model. The final model accounted for 35% of the variance in PSD scores. Blair and Coles suggested that for normally developing children, seeing sad and fearful expressions functions as deterrents for subsequent negative behaviors. However, missing these emotion cues in facial expressions, individuals with psychopathology may not learn to avoid actions that cause others to be upset.

From an attachment theory framework, infants learn strategies to manage attachment processes and distress. Infants with avoidant attachment learn *compulsive self-reliance* as a strategy to minimize expected aversive (or painful) outcomes by distancing themselves from the source (attachment figure) of the expected pain (Bowlby, 1982). Findings from studies of infant caregiver attachment found that caregivers of infants with avoidant attachment were angrier, less comfortable with physical contact, less tolerate of their infant's vulnerability, and expressed less positive emotion than caregivers of secure or resistant infants (Ainsworth et al., 1978). It was theorized that in response to insensitive and rejecting caregivers, these infants use *deactivating strategies*.

The goal of these strategies is to avoid distress caused by the unavailability of the attachment figure. Ainsworth et al. (1978) explained the use of these strategies by infants with avoidant attachment: “Avoidance short circuits direct expression of anger to the attachment figure, which might be dangerous, and it also protects the baby from re-experiencing the rebuff that he has come to expect when he seeks close contact with his mother” (p. 320).

Theoretically, by deactivating the attachment system, infants were able to avoid the pain of anticipated rejection. To accomplish this, they inhibited experiences of emotion states and excluded them from their awareness (Mikulincer, Shaver, & Pereg, 2003). Thus, avoidant attachment may include a lack of attention for the negative emotions displayed via facial expressions. Support for this was found in a study of infant secure versus avoidant attachment (Koulomzin, Beebe, Anderson, Jaffe, Feldstein, & Crown, 2002). Researchers found that the adaptive style of the avoidant infant “biases her or him somewhat away from the mother’s face” (Koulomzin et al., 2002, p. 17).

The indiscriminate social relatedness exhibited in RAD is viewed as an enduring dimension of relatedness that began as an adaptive strategy in infancy. Inhibiting the perception of negative effect, including facial displays of negative emotions, sets a course of inattention that results in indiscriminate social relatedness. Therefore, this study predicted that individuals high in indiscriminate social relatedness would display errors in the ability to recognize sad, angry, and fearful facial expressions.

### **INH Dimension in RAD**

The INH dimension, typically characterized by withdrawing behaviors and inhibition, also includes unpredictability. Social relatedness is marked by a range of emotional experience, including withdrawn or clingy behavior. Individuals high on the INH dimension are considered to be overly sensitive to the environment.

In contrast to infants with avoidant attachment, infants with INH attachment have learned *hyperactivation strategies* to manage caregiver unavailability and unpredictability. Excluding information from awareness, infants developed vigilance strategies in which they scan the environment for danger cues. For the child living in an unpredictable and/or violent home, being able to anticipate threats (e.g., by subtle changes in facial expressions) may be an adaptive survival strategy. Attachment theory suggests that insecurely attached infants may develop emotional expression that is overregulated or underregulated (Zimmermann, 1999). For the INH individuals, emotion expression may be underregulated, as they are frequently in a heightened physiological state to predict caregiver actions. The infant's system seems organized around two competing needs: the need for attachment (to a caregiver who may harm them) and the need to manage distress. Opting to preserve the possibility of attachment, as well as to self-protect, the infants vacillate between withdrawn, frightened behavior and neediness toward significant others.

For this study's exploration of social relatedness dimensions in RAD, past research with children who experienced neglect, and with individuals with avoidant attachment led to the prediction that DIS social relatedness would be associated with

particular deficits in the ability to recognize the emotions of sad, fearful, and angry in facial expressions. The facial recognition abilities of children with high INH social relatedness, however, were expected to be associated with hyperactivation strategies; as such, these children were expected to display attribution biases for the emotions of sad and fearful. These biases were expected to be evident in the higher frequencies of identifying sad or fearful in other facial expressions.

In addition, these associations were expected to be stronger for facial expressions displayed with low intensity than for those displayed with high intensity. Integrating biological and cognitive approaches to conceptualize nonverbal behavior in attachment, Bugental (2005) suggested that attachment-related schemas were more likely to be activated in ambiguous situations that include potential threat. Because low intensity facial expressions, compared to high intensity expressions are more ambiguous, the current study's third hypothesis was that associations between social relatedness dimensions and facial expression recognition errors and attribution bias would be stronger for low intensity facial expressions than for high intensity expressions.

## **CHAPTER 3: METHODOLOGY**

### **Introduction and Purpose Statement**

This chapter includes a purpose statement, a description of and rationale for the proposed research design, followed by a description of the data source, including the population of interest and sampling strategies, and the instrumentation and measures used to examine data and test hypotheses. The proposed data analysis strategies and ethical considerations will conclude this chapter.

The purpose of this study was to explore and examine the relationship between social relatedness disturbances and facial expression recognition among children and adolescents with RAD. Specifically, this study investigated whether, and to what extent, facial expression recognition was associated with the two dimensions of social relatedness disturbances (i.e., indiscriminate/disinhibited behaviors and withdrawn/inhibited behaviors) in RAD.

### **Research Design**

This study utilized a correlational design, including backward selection multiple regression analyses, with cross-sectional survey methodology to compare facial expression recognition errors and attribution biases between two types of social relatedness behaviors in a sample of children with RAD. Data analysis included examination of the relationships between facial expression recognition abilities and deficits and the two social relatedness types. Because this was an exploratory study of a

specific population, the focus will be on individual associations within a RAD sample, rather than on comparison of RAD with a control group.

### **Archival Data**

This study utilized data collected in a research study conducted by the East Carolina University Department of Psychology. Data collection occurred over a period of 20 months (September, 2007-March, 2009), and was performed by masters and advanced undergraduate students from the Department of Psychology and a doctoral student from the Department of Rehabilitation Studies at East Carolina University. Data from the original forms and measures were entered in the Statistical Package for the Social Sciences (SPSS) V 16 program by this researcher.

### **Target Population and Sampling Procedure**

The population of interest consisted of individuals, ages 6-19 years, receiving outpatient treatment for RAD within a seven county area in eastern North Carolina. Due to the variations in both research and clinical perspectives on attachment disorders and the unknown frequency of cases, purposeful sampling, a type of nonprobability sampling, was used to identify and recruit participants. A previous study found that children and adolescents in foster care had significantly higher scores for symptoms of attachment difficulties than those without histories of foster care placements (Minnis, Everett, Pelosi, Dunn, & Knapp, 2006). Therefore, recruitment of participants began by contacting the eastern North Carolina Department of Social Services Foster Care (DSS) divisions with requests for involvement in the study. Letters including a brief description of the study were sent to DSS supervisors. Within three weeks, DSS supervisors were contacted by

phone. In addition, licensed mental health professionals (including psychiatrists, pediatricians, counselors, and social workers) with experience working with children and adolescents with RAD were contacted as potential referral agents for the study. These professionals, known to the researchers or suggested by DSS staff or foster parents, received information about the study. Two treatment providers expressed interest in the study, a licensed developmental pediatrician, and a licensed social worker who was also a registered nurse.

Although these efforts were considered necessary to acquire an adequate sample, there were concurrent limitations to this sampling procedure, particularly regarding generalizability of results. In an effort to strengthen the ability to generalize study results, sampling procedures included attempts to increase the representativeness of participants. This was accomplished by the development of a wide referral/recruitment base (i.e., contact with a variety of types of treatment providers: private practice professionals, university medical school providers, and pediatricians). These professionals' clients/patients access both public and private funding, which was intended to strengthen the representativeness of the sample.

The researcher's aim was to identify as many possible participants as possible. To determine the rate of participation, a ratio was computed of the number of clients who were invited to participate to the number of clients who consented and participated. Each professional estimated that 95% of the participants invited to participate followed through and did participate. They also estimated that they had 10-20% additional clients/patients with RAD who were not referred for participation due to age exclusion criteria (i.e.,

children younger than 6 years of age). Inclusion criteria for this clinical RAD sample consisted of the following: a primary diagnosis of RAD, current treatment for RAD, and current age of 6-19 years.

### **Measures**

#### **Diagnostic Analysis of Nonverbal Accuracy - Second Edition (DANVA 2)**

Two subtests from the DANVA2 were used to measure receptive nonverbal emotion processing of facial expressions (Baum & Nowicki, 1998; Nowicki, 2004; Nowicki & Duke, 1994). Each of the two scales, Child Facial Expressions (DANVA 2-CF) and Adult Facial Expressions (DANVA 2-AF) contain high intensity and low intensity expressions of four basic emotions (happy, sad, angry and fearful). There are a total of 48 photos of facial expressions, consisting of an equal number of happy, sad, angry, and fearful expressions (see Appendix A for a DANVA 2 response sheet).

Nowicki and Duke (1994) developed the DANVA to assess children's abilities to accurately receive and express nonverbal emotions and to identify children with nonverbal deficits. The DANVA 2, including revisions such as improved stimuli and an additional component of affect intensity (low and high), was tested with 1,141 individuals ages 4 to 55 years, and found to have acceptable internal consistency and reliability (Nowicki, 2004). Each subtest was also constructed and tested independently; specific information about the two DANVA 2 subtests follows.

#### **Construction of the DANVA 2-Child Faces and DANVA 2-Adult Faces**

Both the DANVA 2-AF (which contains 24 photographs of adults) and the DANVA 2-CF (which contains 24 photographs of children) contain six photographs of

individuals expressing each of the four emotions, with an equal number of high and low intensities and equal gender distribution (Nowicki, 2010; Nowicki & Duke, 1994). To create the adult facial expressions, vignettes designed to elicit particular emotions were read to individuals. Photographs were then taken of these individuals as they posed for each emotion and as they changed from expressing one emotion to another. Children and young adults (54 college students, 43 high school students, 34 seventh grade students, and 54 third grade students) then viewed these photographs and selected the emotion expressed in them. Only photographs with at least 80% agreement were included in the final form of the DANVA2-AF subtest (Nowicki, 2010; Nowicki & Duke, 1994).

For the construction of the DANVA2-CF, similar instructions were given to 36 children between the ages of 6 and 12 years, and a similar process was used to select the photographs for inclusion. One hundred college students and 100 second grade students rated the expressions by indicating whether they thought each photograph conveyed happiness, sadness, fearfulness, or anger and the degree of certainty (1-5) of their rating. Only photographs with certainty ratings of 4 or higher were selected to be included in the DANVA 2 (Nowicki & Duke, 1994).

The internal consistency of the DANVA 2-AF has been satisfactory in children and adolescents of various ages. In a sample of children ages 3.8 to 5.11 years, Verbeek (1996) reported an alpha coefficient of .83, and in samples of first grade students and third grade students, Nowicki and Carton (1997) reported alpha coefficients of .64 and .68 respectively. In a sample of fifth grade students, Nowicki and Carton reported an alpha coefficient of .71. In samples of older adolescents, Nowicki and Carton reported an

alpha coefficient .77. In a sample of college students, McIntire, Danforth, and Schneider (as cited in Nowicki, 2010) reported an alpha coefficient of .90. Test-retest reliabilities for college students have been reported by Nowicki and Carton (1993) as  $r = .84$  ( $N = 45$ ) and by MacIntire, Danforth, and Schneider (as cited in Nowicki, 2010) as  $r = .81$  ( $N = 154$ ).

Comparison of the DANVA2-AF with other measures appears to support the construct validity of the measure. Nowicki and Carton (1993) reported correlations between the original DANVA-AF and the DANVA2-AF as  $r = .54$  (college students),  $r = .48$  (fifth grade students), and  $r = .51$  (third grade students). The correlation between the two measures for the overall mean age of 8 years was  $r = .58$ . McIntire, Danforth, and Schneider's study (as cited in Nowicki, 2010), reported a correlation of  $r = .80$  for the DANVA2-AF and another facial expression recognition measure, the Japanese and Caucasian Facial Expressions of Emotion (JACFEE) (Matsumoto & Ekman, 1988). In addition, Carr & Lutjemeir (2005) reported that scores from the Cartoon Emotion Recognition Test (CERT) and from the DANVA 2-AF were significantly correlated with a validity coefficient of .44 in a sample of middle school, high school, and college students.

Evidence of discriminate validity has been reported in several studies. Scores on the DANVA 2-AF have been found to be unrelated to tests of general cognitive ability or IQ for preschool children (Nowicki & Mitchell, 1998), primary school children (McClanahan as cited in Nowicki, 2010), adolescents and college students (Nowicki, 1995).

The internal consistency of the DANVA2-CF has been satisfactory in children and adolescents to age 16 years. Nowicki's (2010) examination of studies found reported coefficient alpha scores from .69 to .81. Test-retest reliabilities have been reported as  $r = .74$  in third grade students, and  $r = .66$  in preschool children (Verbeek, 1996). Nowicki and Carton (1993) reported correlations between the original DANVA-CF and the DANVA2-CF for the overall mean age of 8 years was  $r = .54$  ( $p < .01$ ). Evidence of discriminate validity in regard to general cognitive ability or IQ scores has been reported for preschool children (Nowicki & Mitchell, 1998), primary school children (McClanahan as cited in Nowicki, 2010), adolescents (Nowicki, 2010), and college students (Nowicki, 1995).

### **Relationship Problems Questionnaire**

To identify the type(s) of disturbed social relatedness behaviors observed across social settings, the Relationship Problems Questionnaire (RPQ; Minnis et al., 2007) was completed by the participants' primary caretaker. The RPQ has 18 items with four Likert-like response categories. Caretakers were instructed to respond to each item by placing a checkmark within one of the following blocks: *Exactly like my child, like my child, a bit like my child, or not at all like my child*. These responses were scored 3, 2, 1, and 0 respectively. Items are behavioral descriptions, considered to be related to attachment difficulties, such as *gets too physically close to strangers, often asks very personal questions even though s/he does not mean to be rude, and there is a false quality to the affection he/she gives* (see Attachment B for a copy of the RPQ).

### **Construction of Relationships Problem Questionnaire**

The RPQ was developed to assist in the assessment of Reactive Attachment Disorder (RAD) and to explore behavioral characteristics of the subtypes thought to exist within the diagnosis (Minnis et al., 2007). The original questionnaire items were the result of applying DSM (including subtypes I and II), and ICD-10 criteria for attachment disorders to findings from a qualitative study of institutionalized children (aged 18 months to 17 years) in a Guatemalan orphanage (Minnis et al., 2002). The questionnaire was then piloted with the parents/guardians of 52 children ages 5 to 16 years who had histories “of either child protection proceedings for abuse or neglect, or of local authority care” and were receiving psychiatric outpatient treatment in one of four London clinics (Minnis et al., 2002, p. 91). Following modifications, the questionnaire was then tested with 67 additional parents/guardians of children within this same population.

After conducting a factor analysis and omitting items with high intercorrelations, the questionnaire was used in a study with 182 children in foster care in central Scotland, and was found to have good internal consistency, Cronbach’s alpha = .70 (Minnis et al., 2002). A recently published study reported strong internal consistency (Cronbach’s alpha = .85) in a sample of 7513 twins (Minnis et al., 2007). Test-retest reliability was strong ( $r = 0.78$ ; three to five weeks apart), and inter-rater reliability between foster care parents/guardians was .81 (Minnis et al., 2002). Minnis et al. (2002) found strong evidence for construct validity ( $r = .43$ ;  $p < 0.0001$ ) in the significant associations and correlations between the attachment questionnaire and the Strengths and Difficulties Questionnaire (SDQ) that has been validated in studies with more than 10,000 children

(Goodman, 2001). Further significant associations were found between the RPQ and each of five subscales of psychopathology measured by the SDQ. Positive associations were found between the RPQ and the subscales of peer relations ( $r = 0.25$ ;  $p < 0.001$ ); emotional problems ( $r = 0.33$ ;  $p < 0.001$ ); conduct problems ( $r = .12$ ;  $p < 0.001$ ) and hyperactivity ( $r = .29$ ;  $p < 0.001$ ) and a negative association was found between the RPQ and the prosocial subscale of the SDQ ( $r = 0.06$ ;  $p < 0.01$ ) (Minnis et al., 2002). The RPQ was also found to be useful in discriminating between attachment disorder behavior and other behavioral and emotional problems in young children (Minnis et al., 2007).

In this same study, factor analysis with Varimax rotation resulted in three factors. Two factors indexed behaviors corresponding to RAD subtypes, and the third factor suggested a temperament of behavioral inhibition that “may not be linked to attachment disorder” (Minnis et al., 2007, p. 492). Ten of the social relatedness items loaded on the two factors corresponding to RAD subtypes. Six items loaded on the first factor (Inhibited): *Can be aggressive towards him/herself (e.g., using bad language about him/herself, headbanging, cutting, etc.)*, *Has no conscience*, *Sometimes looks frozen with fear, without an obvious reason*, *If you approach him/her, he/she often runs away or refuses to be approached*, *There is a false quality to the affection s/he gives*, and *If you approach him/her, you never know whether s/he will be friendly or unfriendly*. Four items loaded on the second factor (Disinhibited): *Gets too physically close to strangers*, *Is too cuddly with people s/he doesn't know well*, *Often asks very personal questions even though s/he does not mean to be rude*, and *Is too friendly with strangers* (Minnis et al., 2007). To investigate the validity of these factors, the data was randomly split in half and

the factor analysis was repeated. The Pearson correlations between factor loadings for each of these two factors was 0.998, suggesting the factors were valid (Minnis et al. 2007). Due to these results, the RPQ has now been revised to a 10-item measure, retaining only the items associated with these two factors (H. Minnis, personal communication, December 16, 2008). As previously noted, the two factors (Inhibited and Disinhibited) were not mutually exclusive. Specifically, individuals with the highest scores on the inhibited factor scale were also in the higher range on the disinhibited factor scale. However, individuals with high scores on the disinhibited scale were not necessarily in the higher range on the inhibited scale. Individuals were likely to have scores from both factors. According to Reekie (2005), “This seems to indicate that the two types of the disorder do not occur independently. Both are likely to be present in the same child (although to different extents)” (p. 59). As these findings suggest the two factors are not independent, they highlight the necessity of conceptualizing the factor scales as dimensions, rather than as separate and distinct subtypes.

The current study incorporated these recent findings, utilizing the 10 items that have been associated with the two factors corresponding to RAD subtypes (RPQ-Revised, H. Minnis, personal communication, December 16, 2008). Items loading on the disinhibited factor composed the variable DIS, and items loading on the inhibited factor composed the variable INH. Each participant had a DIS score and an INH score, which was the sum scores for the items. These variables were numeric and analyzed in relation to facial expression recognition scores.

## **Procedures**

Researchers met with treatment providers, explained the study, and collaborated on the most effective ways to implement the data collection procedures. The researchers and providers agreed to have the testing conducted in the providers' offices, at times convenient for the participants. For participants who participated during a meal time, the research team provided a light meal after the data collection. Participants' caretakers were invited to a presentation given by an expert in behavioral management. The presentation took place after the caretakers completed the study documents.

Participants' primary caretaker first completed the informed consent documents (see Appendix C for informed consent document). A guardian appointed by the North Carolina Department of Social Services gave additional consent for the children in foster care. Then, the assent document was read to participants and participants were asked if they understood the information, if they had any questions, and if they gave permission for the results to be shared with their treatment provider (see Appendix D for minor assent document). Caretakers then completed the demographic documents to provide information regarding the participant's age, gender, age at first out-of-home placement, length of time in current placement, amount of years in therapy, and permanency status (see Appendix E for demographic and treatment history form). The researchers administered the DANVA 2 subtests individually to participants.

## **Hypotheses and Variables**

The purpose of this study was to explore and examine the relationship between social relatedness disturbances and facial expression recognition among children with

RAD. This study investigated whether, and to what extent, facial expression recognition was associated with the two dimensions of social relatedness disturbances in RAD (i.e., DIS and INH).

Specifically this study sought to investigate the following hypotheses.

Hypothesis 1: Within a RAD sample there will be a positive association between DIS dimension scores and recognition error scores for sad, fearful, and angry facial expressions. Specifically, recognition error scores for the following were examined: sad facial expressions, fearful facial expressions, angry facial expressions, and sad, fearful and angry facial expressions combined.

Hypothesis 2: Within a RAD sample, there will be a positive association between INH dimension scores and sad and fearful attribution bias scores (i.e., incorrect attribution of sad and fearful when viewing facial expressions of other emotions). Specifically, the following attribution bias scores were examined: sad, fearful, and the combined attribution bias scores for sad and fearful.

Hypothesis 3: These associations appearing in Hypotheses 1 and 2 will be stronger for low intensity facial expressions than for high intensity facial expressions.

The criterion used to determine support for hypotheses 1 and 2 was an exploratory statistical significance ( $\alpha = .10$ ) of best fitting backward selection regression models (Sheskin, 2007). The strength of associations was determined by effect sizes of the models. The criterion used to determine support or lack of support for hypothesis 3 was statistical significance ( $\alpha = .10$ ) of t-tests used to compare correlations (Sheskin, 2007).

The explanatory variables were the two social relatedness dimensions in RAD, DIS and INH. Individuals' DIS score was the total of ratings for RPQ items 3, 5, 7, and 11 (with a possible range of 0-12). Items for the DIS score were: *Gets too physically close with strangers, Is too cuddly with people s/he doesn't know, Often asks very personal questions even though she does not mean to be rude, and Is too friendly with strangers.* Individuals' INH score was the total of ratings for RPQ items 8, 10, 14, 16, 17, and 18 (with a possible range of 0-20). Items for the INH score were: *Can be aggressive towards him/herself (e.g., using bad language about him/herself, headbanging, cutting, etc.), Has no conscience, Sometimes looks frozen with fear, without an obvious reason, If you approach him/her, he/she often runs away or refuses to be approached, There is a false quality to the affection s/he gives, and If you approach him/her, you never know whether s/he will be friendly or unfriendly.* Each participant had a score for DIS and score for INH; each of these scores was used in the analyses.

Additional explanatory variables of interest included in the analyses were current age and gender. Variables explored for descriptive purposes but not used in the regression analyses due to missing data were: age at time of removal from home, length of time in out-of home placement, number of previous placements, current permanency status (a dichotomous variable), and treatment history. Ethnicity was also explored for descriptive purposes but was not included in regression analyses due to the minimal number of participants in several categories.

### **Statistical Analyses Procedures**

To examine the data, SPSS V 16 was used to obtain descriptive statistics for individual variables, to compute Pearson's correlations, and to carry out multiple regression analyses for investigation of hypotheses 1 and 2. Comparisons of correlations to investigate hypothesis 3 was accomplished by t-test computations (Sheskin, 2007). The descriptive information of interest included age (mean, standard deviation, and range), age at time of removal from home, length of time in out-of home placement, current permanency status (a dichotomous variable), gender, and ethnicity. Correlations were conducted to determine whether these variables were significantly correlated with social relatedness variables (DIS and INH dimension scores) and facial recognition accuracy scores. Accuracy scores for facial expression recognition were then examined in relation to specific stimuli (each of four expressions, high and low intensity). Specifically, total accuracy scores for DANVA 2-CF, for DANVA 2-AF, and for DANVA 2-CF and AF combined, were examined, as well as accuracy scores for each emotion (high and low intensity), and attribution bias scores (i.e., the number of times a particular emotion was incorrectly attributed to facial expressions).

To investigate hypotheses, first correlations were conducted between the social relatedness variable (DIS or INH dimension scores) and facial expression recognition variables relevant to each hypothesis. Then, backward selection multiple regression analyses were computed with attempts to simplify the multiple regression models if possible. According to Vittinghoff, Glidden, Shiboski, and McCulloch (2005), a commonly used guideline for the number of explanatory variables that can be included as

a function of sample size is ten observations per explanatory variable. Thus, the current study's sample size (i.e., 34 participants), was adequate for the number of explanatory variables (i.e., 3 explanatory variables). Explanatory variables included the social relatedness variables (DIS and INH), age and gender. When either age or gender was not found to be a good predictor, the variable was removed to simplify the model. Criteria for the removal of variables was  $P$ -values  $\geq .20$  (i.e., for the  $t$ -test or correlation), or an increase in adjusted  $\hat{R}$  when the variable was removed. The criterion used to determine support for hypotheses 1 and 2 was an exploratory statistical significance level (i.e.,  $\alpha = .10$ ) of best fitting backward selection regression models. The strength of associations was determined by effect sizes of the models. The criterion used to determine support or lack of support for hypothesis 3 was an exploratory statistical significance level (i.e.,  $\alpha = .10$ ) of a  $t$ -test to compare correlations (Sheskin, 2007).

### **Ethical Considerations**

Approval from the East Carolina University Institutional Review Board (IRB) was acquired prior to beginning recruitment (see Appendix F for IRB approval letter). Packets including an informed consent form for participants' caretakers, and an assent form for participants were signed prior to data collection.

Ethical considerations included the protection of participants' safety, privacy, and informed consent. Research with this clinical population required consideration of clinical interests, as well as research goals. Consideration of participants' clinical needs resulted in the design of elements intended to decrease inconvenience for participants and referral sources, and to cause no harm. Thus, data collection procedures took place in the

offices of the referral sources (professional providers) at times that were convenient for both the participants and the providers. In addition, limited amount of information resulting from data collection procedures may have been shared with providers when both caretakers and children provided written permission. Also, the caretakers were provided with a presentation from a professional in the field of behavioral management. To ensure that responses to measures were not influenced by information in the presentation, the presentation took place following the data collection procedures for caretakers.

In summary, the proposed design and methodology supported the purpose of this study to explore and examine the relationship between facial expression recognition and social relatedness disturbances among children with RAD. Specifically, this study investigated whether, and to what extent, facial expression recognition was associated with the two dimensions of social relatedness disturbances in RAD (i.e., indiscriminate/disinhibited behaviors and withdrawn/inhibited behaviors).

## **CHAPTER 4: RESULTS**

### **Introduction to the Chapter**

This chapter begins with a description of the response rate, followed by a description of the sample including the distributions of demographic variables. Then, the results of descriptive statistics are reported, including the distributions of the social relatedness dimensions, indiscriminate/disinhibited (DIS) and withdrawn/inhibited (INH), and the relationships among these variables and the demographic variables within this sample. The chapter continues by reporting facial expression recognition (i.e., DANVA 2) scores for the sample, beginning with accuracy scores and following with total recognition error and attribution bias scores by displayed emotion. Then, recognition error and attribution bias scores by adult and child faces are reported, and are followed by recognition error scores by the intensity of displayed emotions (i.e., high or low intensity). Following, results from analyses examining the relationship between DANVA 2 scores and each of the social relatedness dimensions, DIS and INH are reported. Then, the results of analyses for each of the three hypotheses are reported. The chapter then concludes with a summary.

### **Response Rate**

The sample for this archival study consisted of all participants diagnosed with RAD from an on-going study through the Department of Psychology at East Carolina University. Because participants were clinician-referred, clinicians were asked to provide response estimates. According to one clinician, at the time of the testing, approximately 90% of her clients with RAD participated in the study and those that did not participate

were too young for inclusion. The other clinician was unavailable to provide a response rate. Therefore, determination of a more precise response rate was not possible.

Following is a description of the sample.

### **Sample Demographics**

This section consists of a description of the sample using demographic information, including historical information, for the participants. The sample consisted of children aged 6 - 19 years receiving outpatient treatment for RAD in a university community in eastern North Carolina. Two clinicians (a developmental pediatrician and a clinician licensed in social work) provided referrals for the study, and reported that their patients/clients resided in various surrounding rural counties. This resulted in a total of 34 participants diagnosed with RAD without subtype designations.

The total sample of 34 participants consisted of 19 (55.9%) males and 15 (44.1%) females, ranging in age from 5.92 – 19 years ( $M = 10.65$  years). The average age of the female participants ( $M = 10.84$  years) was similar to the average age of the male participants ( $M = 10.50$  years). The distribution of ethnicity was 22 (64.7%) Caucasian, 3 (8.8%) African American, 2 (5.9%) Bi-racial, 2 (5.9%) Hispanic, 2 (5.9%) Native American, and 3 (8.8%) Romanian. Regarding permanency status at the time of testing, 31 (92%) of the participants were residing in permanent home situations and 3 (8.8%) were residing in temporary home situations (i.e., foster care or legal guardianship placement).

In addition to age, gender, ethnicity, and permanency status, additional demographic data were collected for description of the sample. These variables, age at

time of removal from home, length of time in out-of home placement, number of previous placements, and treatment history, are shown in Table 1; the number of participants for whom this data was available is noted by *n*.

Participants experienced removal from their biological homes at varied ages. Eleven (35.7%) respondents were removed from their biological homes at age 1 year or younger, 5 (17.9%) were removed between ages 1 and 3 years, 6 (21.4%) were removed at ages 3 to 5 years; and 7 (25%) were removed at ages 5 years or older.

Of the respondents, 7 (25.9%) spent 2 months or less in out-of-home placement, 6 (17.6%) spent from 3 months to 1 year, 7 (25.9%) spent between 1 and 3 years, and 7 (25.9%) spent 3 or more years in out-of home placement(s). There was also a varied distribution in the number of previous placements. Fifty percent had 0 or 1 previous placements, 25% had 2 previous placements, and 25% had 3 – 12 previous placements.

Treatment history was calculated by adding concurrent and sequential therapy and included various types of therapy (i.e., counseling, behavior therapy, family therapy, individual therapy, cognitive behavioral therapy, and trauma- based therapies). The amount of time spent in treatment ranged from 0 – 12.84 years.

In summary, this sample consisted of 34 children and adolescents with reactive attachment disorder (RAD) referred by clinicians. The sample was fairly evenly distributed with respect to gender and age, was composed primarily of participants with Caucasian ethnicity and a majority were living in permanent homes. Additional historical data were available for most of the participants, but there were missing values for the following variables: age removed from biological home, years in out-of-home

Table 1

*Historical Demographic Sample Data*

	<i>M (SD)</i>	Minimum	Maximum
Age Removed from Home (n=28)	2.85(2.54) years	1 month	7.75 years
Years Out-of-Home Placement(s) (n=27)	1.77(1.79) years	0	6 years
Previous Placements (n=24)	2.21(2.77)	0	12
Treatment History <sup>a</sup> (n=26)	5.57(3.63) years	0	12.84 years

<sup>a</sup> Combined types of therapy.

placement(s), number of previous placements, and treatment history. Of the respondents, age of removal from the biological home ranged from 1 month to 7.75 years, the number of out of home placements ranged from 1.77 - 6 years, the number of previous placements ranged from 0 to 12, and treatment history ranged from 0 - 12.84 years. Within this RAD sample, participants varied in the age of removal from home, time spent in out-of-home placements, number of out-of-home placements, and treatment history. Descriptive statistics results for the social relatedness dimension scores and facial expression recognition scores are presented in the following section.

### **Descriptive Statistics**

Descriptive statistics results for the social relatedness dimension scores and facial expression recognition scores are presented in this section.

### **Social Relatedness Dimensions, Sample Distributions**

Social relatedness variables were scores for the two social relatedness dimensions, DIS and INH from the Relationship Problems Questionnaire (RPQ). Individuals' DIS score was the total of ratings for RPQ items 3, 5, 7, and 11 (with a possible range of 0 - 12), and INH score was the total of ratings from RPQ items 8, 10, 14, 16, 17, and 18 (with a possible range of 0 - 20). The total RPQ (RPQ-T) was the sum of the total ratings for 18 RPQ items (with a possible range of 0 - 54). Table 2 shows the average and range of RPQ scores for the sample. With respect to the relationship between the social relatedness dimensions there was not a statistically significant correlation between DIS and INH scores ( $r = .046, p = .79$ ).

Table 2

*Social Relatedness Distributions*

	<i>M</i>	<i>SD</i>	Range	Minimum	Maximum
RPQ DIS <sup>a</sup>	6.03	4.239	12	0	12
RPQ INH <sup>b</sup>	6.57	4.143	16	0	16

<sup>a</sup> Sum of scores for items 3, 5, 7, 11. <sup>b</sup> Sum of scores for items 8, 10, 14, 16, 17, 18.

### **Social Relatedness Dimensions and Demographic Variables**

Relationships among DIS and INH and demographic variables were explored by computing Pearson's correlations (for numeric variables), t-tests (for dichotomous variables, gender and permanency status) using an exploratory statistical level of  $\alpha = .10$ , and by computing means and standard deviations of DIS and INH scores for each ethnicity category. The correlations between the DIS and INH and the numeric demographic variables are shown in Table 3. Missing data were excluded pairwise. Statistically significant positive correlations were found between the DIS dimension scores and the age of removal from home ( $r = .344, p = .073$ ).

A statistically significant positive correlation was also found between the INH dimension and the number of previous placements ( $r = .587, p = .003$ ). Independent t-tests for the two dichotomous variables, gender and permanency status, found that there were no statistically significant differences for gender (DIS:  $t, df 32 = -1.109, p = .276$ ; INH:  $t, df 32 = -.963, p = .343$ ) or permanency status (DIS:  $t, df 32 = .839, p = .437$ ; INH  $t, df 32 = -1.218, p = .232$ ) in DIS or INH scores. Table 4 shows the average scores for DIS and INH by gender and permanency status. Distributions of DIS and INH scores by ethnicity were reported using means and standard deviations (see Table 5).

In summary, the exploration of demographic and historical variables within this sample found no statistically significant differences for gender or permanency status in DIS or INH scores, and two statistically significant correlations between DIS and/or INH and additional demographic variables. For the DIS dimension, higher DIS scores had a statistically significant positive association with the age of removal from the biological

Table 3

*Correlations Among Social Relatedness and Numeric Historical Variables*

Demographic Variable	DIS Correlation ( <i>p</i> - value)	INH Correlation ( <i>p</i> - value)
Age ( <i>n</i> = 34)	-.180 ( <i>p</i> = .309)	.067 ( <i>p</i> = .709)
Age Removed from Home ( <i>n</i> = 28)	<b>.344 (<i>p</i> = .073)</b>	-.191 ( <i>p</i> = .331)
Years in Out-of-Home Placement(s) ( <i>n</i> = 27)	.208 ( <i>p</i> = .298)	.164 ( <i>p</i> = .141)
Number of Previous Placements ( <i>n</i> = 24)	-.036 ( <i>p</i> = .869)	<b>.587 (<i>p</i> = .003)</b>
Years in therapy <sup>a</sup> ( <i>n</i> = 26)	-.071 ( <i>p</i> = .729)	.123 ( <i>p</i> = .549)

*Note.* Correlations with *p* – values less than .10 are show in boldface.

<sup>a</sup> Combined types of therapy.

Table 4

*DIS and INH Mean Scores by Gender and Permanency Status*

	DIS <i>M (SD)</i>	INH <i>M (SD)</i>
Gender		
Male (n=19)	5.32 (4.19)	7.18 (4.55)
Female (n=15)	6.93 (4.27)	5.8 (3.57)
Permanency Status		
Permanent Home (n=31)	5.84 (4.33)	6.3 (4.08)
Temporary Home (n=3)	8.0 (3.0)	9.33 (4.62)

Table 5

*Social Relatedness Scores by Ethnicity*

Ethnicity	DIS <i>M (SD)</i>	INH <i>M (SD)</i>
African American (n=3)	4.67 (4.51)	6.67 (5.03)
Bi-racial (n=2)	6.0 (2.83)	3.5 (.707)
Caucasian (n=22)	7.23 (3.84)	6.70 (4.44)
Hispanic (n=2)	1.0 (1.41)	7.5 (.707)
Native American (n=2)	0.0 (.00)	7.0 (4.24)
Romanian (n=3)	6.0 (6.0)	6.67 (5.51)

home at older ages ( $r = .344, p = .073$ ). For the INH dimension, INH scores had a statistically significant positive association with having experienced more out-of-home placements ( $r = .587, p = .003$ ). Distributions of DIS and INH scores by ethnicity were described by computing means and standard deviations (see Table 5). The following section discusses facial expression recognition DANVA 2 scores.

### **Facial Expression Recognition**

Facial expression recognition was measured by several scores on the DANVA 2. First, total accuracy scores for the DANVA 2 and for the DANVA 2-CF (i.e., child faces), and the DANVA 2-AF (i.e., adult faces) were examined. Then, the recognition error scores by displayed intensity level (i.e., high or low intensity) were examined, followed by examination of attribution bias scores (i.e., number of times a particular emotion was incorrectly attributed to facial expressions). Then, because some previous studies have found associations between facial recognition and age and facial recognition and gender (Maxim & Nowicki, 2003), these two variables were included in the examination of the relationships among the facial recognition measures (i.e., DANVA 2 scores) and the social relatedness variables, DIS and INH, in correlational analyses and t-tests.

**Total sample scores.** Overall, 1224 (75%) of the presented facial expressions were accurately recognized by participants and 408 (25%) were recognition errors (i.e., not correctly recognized). Each participant viewed 48 facial expressions. The number of recognition errors per participant ranged from 4 to 33 with a mean of 12 ( $SD = 6.99$ ). Age was negatively correlated with total recognition errors ( $r = -.295, p = .09$ ). No

significant difference in total errors between genders was found,  $t(32) = .341$ ,  $p = .735$ ,  $CI_{.95} = -4.16, 5.83$ .

**Total recognition error scores by emotion.** Each participant viewed 12 facial expressions of each emotion (i.e., happy, sad, angry, fearful). Recognition error scores were determined by examining the number of times a particular facial expression was not correctly recognized. For example, if *happy* was the displayed facial expression, and the participant selected *sad*, this was coded an error in recognizing happy (i.e., Recognition Error Happy). Examination of the recognition errors by displayed emotions found that most errors occurred in the recognition of angry ( $M = 4.74$ ,  $SD = 1.27$ ), followed by errors in recognizing fearful ( $M = 3.79$ ,  $SD = 2.91$ ), sad ( $M = 2.74$ ,  $SD = 2.1$ ), and happy expressions ( $M = .74$ ,  $SD = 1.27$ ). By number and percentage, approximately 161 (39.5%) of errors were for the recognition of angry expressions, 129 (31.6%) were for fearful expressions, 93 (22.8%) were for sad expressions, and 25 (6.2%) were for happy expressions.

**Total attribution bias scores by emotion.** Attribution bias scores were determined by examining the number of times a particular emotion was incorrectly attributed. For example, if *happy* was the displayed facial expression, and the participant selected *sad*, this would be coded as an attribution bias for sad (Attribution Bias Sad). Overview of the sample responses found that happy ( $M = 4.65$ ,  $SD = 2.49$ ) was the most frequent attribution bias response, followed by fearful ( $M = 3.53$ ,  $SD = 3.4$ ), sad ( $M = 2.53$ ,  $SD = 2.93$ ), angry ( $M = 1$ ,  $SD = 1.48$ ), and other ( $M = .29$ ,  $SD = 1.24$ ). Of the total 408 errors, 158 (38.7%) were attribution biases for happy, 120 (29.4%) for fearful, 86

(21.1%) for sad, 34 (8.3%) for angry, and 10 (2.5%) for other. Responses coded as 'other' were non-standard responses (i.e., 'shocked', 'silly', 'I don't know').

**Child and adult facial expression scores.** Child facial expressions were recognized with greater accuracy than were adult facial expressions; 647 (79%) of the child faces were accurately recognized, while 577 (71%) of the adult faces were accurately recognized. Each participant viewed 24 child and 24 adult facial expressions. Participants made more errors recognizing emotion displayed by adult faces ( $M = 7.03$ ,  $SD = 3.71$ ) than displayed by child faces ( $M = 4.97$ ,  $SD = 3.75$ ). Of the 408 total errors, 239 (58.5%) were for adult faces and 169 (41.4%) were for child faces. There were negative correlations approaching statistical significance ( $\alpha = .10$ ) between age and errors for child faces ( $r = -.269$ ,  $p = .124$ ), and errors for adult faces ( $r = -.285$ ,  $p = .102$ ). Table 6 shows additional information regarding recognition error scores for child faces compared to adult faces and the specific response attribution bias scores.

**Intensity of displayed emotion in facial expressions scores.** High intensity expressions were recognized with greater accuracy than were low intensity expressions; of the total 408 recognition errors, 145 (35.5%) were for high intensity expressions and 263 (64.4%) were for low intensity expressions. Each participant viewed 24 high intensity expressions and 24 low intensity expressions. Participants made more errors overall recognizing low intensity facial expressions ( $M = 7.74$ ,  $SD = 4.09$ ) than high intensity expressions ( $M = 4.26$ ,  $SD = 3.26$ ). As shown in Table 7, participants also made more errors recognizing each of the four emotions when displayed with low, as compared to high, intensity expressions.

Table 6

*Recognition Error and Attribution Bias Scores by Displayed Emotion and Child/Adult Faces*

Emotion Displayed <sup>a</sup> Child/Adult	Recognition Errors	Attribution Bias Happy	Attribution Bias Sad	Attribution Bias Angry	Attribution Bias Fearful	Attribution Bias Other
<b>Happy</b>						
Child Faces	6 (3.0%)		2 (1.0%)	1 (0.5%)	3 (1.5%)	0 (0.0%)
Adult Faces	19 (9.4%)		9 (4.4%)	0 (0.0%)	10 (4.9%)	0 (0.0%)
<b>Sad</b>						
Child Faces	24 (11.8%)	10 (4.9%)		3 (1.5%)	11 (5.4%)	0 (0.0%)
Adult Faces	69 (33.9%)	11 (5.4%)		16 (7.8%)	42 (20.6%)	0 (0.0%)
<b>Angry</b>						
Child Faces	80 (39.3%)	24 (11.8%)	26 (12.7%)		29 (14.2%)	1 (0.05%)
Adult Faces	81 (39.7%)	39 (19.1%)	16 (7.8%)		25 (12.7%)	1 (0.05%)
<b>Fear</b>						
Child Faces	59 (29%)	38 (18.6%)	11 (5.4%)	4 (2.0%)		6 (2.9%)
Adult Faces	70 (34.4%)	36 (17.6%)	22 (10.8%)	10 (19.6%)		2 (1%)
<b>DANVA 2 Totals<sup>b</sup></b>	<b>408 (25%)</b>	<b>158 (9.7%)</b>	<b>86 (5.3%)</b>	<b>34 (2.1%)</b>	<b>120 (7.4%)</b>	<b>10 (0.6%)</b>

<sup>a</sup> For each Emotion Displayed, there are 408 possible responses (34 participants x 6 expressions for each emotion x 2 types of faces, i.e., child faces, adult faces). For each subtest (i.e., child faces, adult faces) there are 204 possible responses. Attribution Bias is the emotion incorrectly attributed to facial expressions; number (percent). For each Attribution Bias emotion total there are 408 possible responses; number (percent). <sup>b</sup> For DANVA 2 Totals there are 1632 possible responses.

Table 7

*Recognition Error and Attribution Bias Scores by Displayed Emotion and Intensity*

Emotion and Intensity Displayed <sup>a</sup>	Recognition Errors	Attribution Bias Happy	Attribution Bias Sad	Attribution Bias Angry	Attribution Bias Fearful	Attribution Bias Other
Happy						
High Intensity	3 (1.5%)		2 (1.0%)	0 (0.0%)	1 (0.5%)	0 (0.0%)
Low Intensity	22 (10.8%)		9 (4.4%)	1 (0.5%)	12 (5.9%)	0 (0.0%)
Sad						
High Intensity	43 (21.1%)	10 (4.9%)		7 (3.4%)	26 (12.7%)	0 (0.0%)
Low Intensity	50 (24.5%)	11 (5.4%)		12 (5.9%)	27 (13.2%)	0 (0.0%)
Angry						
High Intensity	60 (29.4%)	18 (8.8%)	20 (9.8%)		21 (10.3%)	1 (0.5%)
Low Intensity	101 (49.5%)	45 (22.1%)	22 (10.8%)		33 (16.2%)	1 (0.5%)
Fearful						
High Intensity	39 (19.1%)	15 (7.4%)	15 (7.4%)	6 (2.9%)		3 (1.5%)
Low Intensity	90 (44.1%)	59 (28.9%)	18 (8.9%)	8 (3.9%)		5 (2.5%)
Totals <sup>b</sup>	408 (25.0%)	158 (9.7%)	86 (5.3%)	34 (2.1%)	120 (7.4%)	10 (0.6%)

<sup>a</sup> For each Emotion Displayed, there are 408 possible responses (34 participants x 6 expressions for each emotion x 2 levels of intensity, i.e., high intensity, low intensity). For each subtest (i.e., high intensity, low intensity) there are 204 possible responses. Attribution Bias is the emotion incorrectly attributed to facial expressions; number (percent). For each Attribution Bias emotion total there are 408 possible responses; number (percent). <sup>b</sup> For DANVA 2 Totals there are 1632 possible responses.

### **Facial Expression Recognition and Social Relatedness Dimensions**

To begin exploration of the relationship between social relatedness and facial expression recognition, correlations were computed. With respect to the social relatedness dimension DIS, no statistically significant correlations ( $\alpha = .10$ , two sided) were found between DIS and any of the following facial expression recognition variables: total recognition error scores, recognition error or attribution bias scores by specific emotion expression, or recognition error scores or attribution bias scores by adult or child expressions. With respect to the social relatedness dimension INH, statistically significant correlations were found between INH and two attribution bias scores displayed by adult faces. The correlation between INH and Attribution Bias Happy/AF was  $r = .392$ ,  $p = .022$  and between INH and Attribution Bias Angry/AF was  $r = -.292$ ,  $p = .093$ . Neither of these attribution bias scores had statistically significant correlations with age or associations with gender.

In summary, exploration of facial expression recognition within this RAD sample found a statistically significant ( $p \leq .10$ , two sided) negative correlation between age and total recognition errors, and no statistically significant associations with gender and total recognition errors. With respect to errors recognizing specific emotions in facial expressions, most errors were made in recognizing angry, followed by fearful, sad, and happy. With respect to attribution bias, happy was the most frequently incorrectly attributed emotion, followed by fearful, sad, and angry. In addition, child facial expressions were recognized with greater accuracy than were adult expressions. Facial expressions displayed with high intensity were recognized with greater accuracy than

were expressions displayed with low intensity. Exploration of the relationships between each of the social relatedness dimensions and facial expression recognition found statistically significant ( $p \leq .10$ ) correlations between INH and two attribution bias scores, Bias Happy/AF and Bias Angry/AF. The following section reports results for hypotheses testing.

### **Data Analyses Results for Hypotheses Testing**

This section consists of an introduction to the hypotheses testing section, results of data screening for multiple regression assumptions, and results of the analyses for each of the hypotheses. This information is followed by a summary of the hypotheses testing results.

Three hypotheses regarding predictions about the relationship between social related variables (i.e., DIS and INH) and facial expression recognition were investigated by computing Pearson's correlations, carrying out backward selection multiple regression analyses, and t-tests for comparison of correlations. Correlations were considered statistically significant at  $\alpha = .10$  (one sided). For backward selection multiple regression analyses, in addition to the social relatedness variable of interest (i.e., DIS or INH), demographic variables (i.e., age and gender) were considered for inclusion as explanatory variables. Due to previous research findings that suggested age and gender had effects on facial recognition (Maxim & Nowicki, 2003), the current study attempted to control for the effects of these variables. Thus, age and gender were initially included in multiple regression analyses. When either age or gender was not found to be a good predictor, the variable was removed to simplify the model. Criteria for the removal of variables was  $p$ -

values  $\geq .20$  for the  $t$ -test coefficients, or an increase in adjusted  $r^2$  when the variable was removed. The criterion used to determine support for hypotheses 1 and 2 was an exploratory statistical significance level (i.e.,  $\alpha = .10$ ) of best fitting backward selection regression models. The strength of associations was determined by effect sizes of the models. The criterion used to determine support or lack of support for hypothesis 3 was an exploratory statistical significance level (i.e.,  $\alpha = .10$ ) of a  $t$ -test to compare correlations (Sheskin, 2007).

Multiple regression analyses did not include ethnicity, due the small number of participants within distinct ethnic groups, and did not include historical variables, due to missing values. For Hypothesis 3,  $t$  - tests for comparison of correlations were computed (Sheskin, 2007).

For each regression model reported in this chapter, the assumptions for linear regression were reasonably well met. There were no major violations of assumptions of normality, linearity, or homoscedasticity. There also was little or no multicollinearity. Assumptions were investigated by examination of Quantile-Quantile (QQ) Plots and scatterplots of the residuals. Tolerance and Variance Inflation Factor (VIF) scores were used to check for the presence of multicollinearity.

Results from the investigations of each of the three hypotheses are presented in the following sections. Following the reporting of these results, a summary of hypotheses testing results is presented.

## Hypothesis 1 Data Analyses

Hypothesis 1: Within a RAD sample there will be a positive association between DIS dimension scores and recognition error scores for sad, angry, and fearful facial expressions. Specifically, recognition error scores for the following were examined: sad facial expressions, angry facial expressions, fearful facial expressions, and combined recognition error scores for sad, angry, and fearful facial expressions.

Pearson correlations were computed to investigate the association between DIS scores and the total number of recognition errors for sad, angry, and fearful facial expressions. Recognition error scores for sad, angry, and fearful combined and for each emotion (i.e., sad, angry, fearful) were also examined in relation to specific stimuli (i.e., child and adult faces).

**Sad facial expressions.** The correlation between DIS dimension scores and error scores for the recognition of sad facial expressions displayed by child faces (i.e., Recognition Errors Sad/CF) was statistically significant,  $r = .265$ ,  $p = .065$ . Examination of DIS as an explanatory variable in a model with errors in the recognition of sad in child faces (i.e., Recognition Errors Sad/CF) using linear regression showed support for Hypothesis 1,  $t(32) = 1.555$ ,  $p = .065$ . Neither age nor gender was statistically significant in the model. The backward selection procedure used for the removal of variables to improve the model is described next.

Examination of the model for DIS, age, and gender as explanatory variables for Recognition Errors Sad/CF,  $F = 1.396$ ,  $p = .263$ , found that the  $p$ -value for Gender was the largest,  $t = .943$ ,  $p = .353$ . Therefore, in the first step, Gender was removed, resulting

in an adjusted  $\hat{r}$  change from .035 to .038. In the second step, age,  $t = -.949$ ,  $p = .35$ , was removed, resulting in an adjusted  $\hat{r}$  change from .038 to .041.

**Angry facial expressions.** No statistically significant correlations were found between DIS dimension scores and error scores for the recognition of angry facial expressions.

**Fearful facial expressions.** No significant correlations were found between DIS dimension scores and error scores for the recognition of fearful expressions.

**Sad, angry, and fearful expressions: Combined total recognition errors.** No statistically significant correlations were found between DIS dimension scores and the combined total error scores for sad, angry, and fearful expressions (i.e., Recognition Errors Sad + Recognition Errors Angry + Recognition Errors Fearful).

**Summary of hypothesis 1 analyses.** Examination of the data with DIS as an explanatory variable in models with errors in the recognition of sad, angry, and fearful as the response variable found partial support for Hypothesis 1. This support was found in a statistically significant linear regression model with DIS as the explanatory variable for the errors in the recognition of sad in child faces (i.e., Recognition Errors Sad/CF).

## **Hypothesis 2 Data Analyses**

Hypothesis 2: Within a RAD sample, there will be a positive association between INH dimension scores and sad and fearful attribution bias scores (i.e., incorrect attribution of sad and/or fearful when viewing facial expressions of other emotions). Specifically, the following attribution bias scores were examined: sad, fearful, and the combined attribution bias scores for sad and fearful.

Pearson correlations were conducted to investigate the association between INH scores and the attribution bias scores for the selection of sad and fearful facial expressions. Attribution bias scores for sad and fearful expressions combined and for each emotion (i.e., sad, fearful) were also examined in relation to specific stimuli (i.e., child and adult faces). Demographic variables (i.e., age and gender) were included in testing multiple regression models.

**Attribution bias for sad facial expressions.** No statistically significant positive correlations were found between INH dimension scores and the attribution bias (i.e., incorrect selection) of sad for other expressions. Positive correlations approaching significance were found for INH and the attribution bias for sad in adult faces (Attribution Bias Sad/AF,  $r = .177$ ,  $p = .158$ ), the total attribution bias scores for sad (Attribution Bias Sad/T,  $r = .224$ ,  $p = .102$ ), and attribution bias for sad in child faces (Attribution Bias Sad/CF,  $r = .209$ ,  $p = .118$ ). Examination of each of these attribution bias scores in multiple regression analyses resulted in two models with statistical significance.

One regression model consisted of attribution bias scores for sad displayed by adult faces (Attribution Bias Sad/AF) as the response variable and Age and INH as the explanatory variables,  $F(2,31) = 2.973$ ,  $p = .06$ . Using the backward selection procedure, Gender was removed to simplify and improve the model (i.e., for Gender,  $t$ -test =  $-.064$ ,  $p = .949$ , and adjusted  $r^2$  increase was from  $.077$  to  $.107$  when Gender was removed from the model). In the final model, the one sided  $p$ -value for Age was  $t(32) = -2.187$ ,  $p = .018$ , and for INH was  $t(32) = 1.222$ ,  $p = .117$ . Thus, the slope for INH was not

significantly greater than zero. In this model, Age and INH accounted for 16.1% ( $r^2 = .161$ ) of the variance in Attribution Bias Sad/AF scores. The regression equation was Attribution Bias Sad/AF Score = 2.880 - .189 (Age) + .079 (INH Score). INH scores added mildly (i.e., 4% increase) to the linear regression model with Age as the single explanatory variable,  $F(1,32) = 4.386$ ,  $p = .044$ , in which age accounted for 12.1% of the variance in Attribution Bias Sad/AF scores.

The second regression model consisted of the total attribution bias scores for sad (Attribution Bias Sad/T) as the response variable and Age and INH as the explanatory variables,  $F(2,31) = 2.508$ ,  $p = .098$ . Using the backward selection procedure, Gender was removed to simplify and improve the model (i.e., for  $t = -.764$ ,  $p = .451$ , and adjusted  $r^2$  increase was from .071 to .084 when removed from the model). In the final model, the one sided  $p$ -value for Age was  $t(32) = -1.792$ ,  $p = .042$ , and for INH was  $t(32) = 1.459$ ,  $p = .078$ . Thus, the slope for INH was significantly greater than zero. In this model, Age and INH accounted for 13.9% ( $r^2 = .139$ ) of the variance in Attribution Bias Sad/T scores. The regression equation was Attribution Bias Sad/T Score = 4.427 - .284 (Age) + .172 (INH Score). INH scores added mildly (i.e., 5.9% increase) to the linear regression model with Age as the single explanatory variable,  $F(1,32) = 2.787$ ,  $p = .105$ , in which age accounted for 8% of the variance in Attribution Bias Sad/AF scores.

**Attribution bias for fearful facial expressions.** No statistically significant positive correlations were found between the INH dimension scores and the attribution bias scores for (i.e., incorrect attribution of) fearful expressions.

**Attribution bias for sad and fearful facial expressions.** No statistically significant positive correlations were found between INH dimension scores and the combined total attribution bias scores for sad and fearful.

**Summary of hypothesis 2 results.** The hypothesis that INH scores would be positively associated with specific attribution bias in the selection of sad and fearful for other facial expressions was partially supported by the data. Some support for a positive association between INH and the attribution bias for sad was evident as found in two regression models. In terms of strength, the models showed mild effects. No support for a positive association between INH and a bias for fearful was found.

### **Hypothesis 3 Data Analyses**

Hypothesis 3: The associations appearing in Hypotheses 1 and 2 will be stronger for low intensity facial expressions than for high intensity facial expressions. To investigate this hypothesis, each of the statistically significant regression findings reported for hypotheses 1 and 2 were examined in relation to displayed intensity level (i.e., high and low intensity facial expressions) by comparison of correlations. The criterion used to determine support for this hypothesis was statistically significant ( $\alpha \leq .10$ ) differences in correlations between the social relatedness variable (i.e., DIS or INH) and the high and low intensity expressions for each response variable in statistically significant models. T-tests were computed for each model found to support Hypotheses 1 or 2 (Sheskin, 2007).

**Effect of intensity of displayed expressions for hypothesis 1.** The association between DIS and errors recognizing sad facial expressions, reported as a model found

through investigation of Hypothesis 1, was further examined in relation to the intensity (i.e., high versus low intensity) of displayed facial expressions. In this model, DIS accounted for 6.5% of the variance in Recognition Errors Sad/CF. With respect to DIS, comparison of correlations between Recognition Errors Sad/CF for both low intensity expressions (i.e.,  $r = .242$ ) and Recognition Errors Sad/CF for high intensity expressions (i.e.,  $r = .210$ ) were positive as expected. Also, the correlation was larger for DIS and Recognition Errors Sad/CF for low intensity expressions, than for DIS and Recognition Errors Sad/CF for high intensity expressions, but these differences were not statistically significant,  $t(31) = .0179$ ,  $p = .43$  (one sided). Thus, this association between DIS and Recognition Errors Sad/CF was not significantly stronger for facial expressions displayed with low intensity than for expressions displayed with high intensity.

**Effect of intensity of displayed expressions for hypothesis 2.** The association between INH and attribution bias for the recognition of sad and fearful (i.e., Attribution Bias Sad/T, Attribution Bias Sad/AF) in other facial expressions, reported as two significant models found through investigation of Hypothesis 2, were further examined in relation to the intensity (i.e., high versus low intensity) of displayed facial expressions.

In one model, INH and Age accounted for 16.1% of the variance in Attribution Bias Sad/AF scores. With respect to INH, comparison of correlations between Attribution Bias Sad/AF for expressions displayed with low intensity (i.e.,  $r = .176$ ) and Attribution Bias Sad/AF for expressions displayed with high intensity (i.e.,  $r = .090$ ) were positive as expected. Also, the correlation was larger for INH and Attribution Bias Sad/AF for low intensity expressions, than for INH and Attribution Bias Sad/AF for high

intensity expressions, but the difference between these correlations were not statistically significant,  $t(31) = .3976$ ,  $p = .35$  (one sided). Thus, this association between INH and Attribution Bias Sad/AF was not significantly stronger for facial expressions displayed with low intensity than for expressions displayed with high intensity.

In the second model that supported hypothesis 2, INH and Age accounted for 13.9% of the variance in Attribution Bias Sad/T scores. With respect to INH, comparison of correlations between Attribution Bias Sad/T for expressions displayed with low intensity (i.e.,  $r = .124$ ) and Attribution Bias Sad/T for expressions displayed with high intensity (i.e.,  $r = .296$ ) were positive as expected. Also, the correlation was larger for INH and Attribution Bias Sad/AF for high intensity expressions, than for INH and Attribution Bias Sad/AF for low intensity expressions, but the difference between these correlations were not statistically significant,  $t(31) = - 1.1604$ ,  $p = .87$  (one sided). Thus, this association between INH and Attribution Bias Sad/T was not significantly stronger for facial expressions displayed with low intensity than for expressions displayed with high intensity and this association may be at least as strong for high intensity expressions as for low intensity expressions.

**Summary of hypothesis 3 results.** The hypothesis that associations appearing in Hypotheses 1 and 2 would be stronger for facial expressions displayed with low intensity than for facial expressions displayed with high intensity was not supported by the data. T-tests (Sheskin, 2007) found no statistically significant differences in associations by intensity level for the models that supported Hypotheses 1 or 2.

**Summary of hypotheses results.** Data analyses revealed partial support for Hypotheses 1 and 2, and no support for Hypothesis 3. For Hypothesis 1, support was found in a statistically significant ( $\alpha = .10$  level) linear regression model in which DIS scores accounted for 6.5% of the variance in recognition error scores for sad in child faces (i.e., Recognition Errors Sad/CF). Using Cohen's (1992) guidelines, the effect size of the relationship between DIS and Recognition Errors Sad/CF was small. For Hypothesis 2, support was found in two statistically significant models. In one model, Age and INH accounted for 16.1% ( $r^2 = .161$ ) of the variance in Attribution Bias Sad/AF scores. When controlling for age, the effect size of the relationship between INH and Attribution Bias Sad/AF was small. In the second model found to support Hypothesis 2, Age and INH accounted for 13.9% ( $r^2 = .139$ ) of the variance in Attribution Bias Sad/T scores. When controlling for age, the relationship between INH and Attribution Bias Sad/T was small. Hypothesis 3, that associations appearing in Hypotheses 1 and 2 would be stronger for low intensity facial expressions than for high intensity facial expressions was not supported by the data. T-tests (Sheskin, 2007) to compare correlations found no statistically significant differences by intensity level for any of the reported models supporting Hypotheses 1 or 2. Thus, the association between DIS and recognition errors or between INH and attribution bias may be at least as strong for high intensity expressions as for low intensity expressions. A summary of the results follows.

### **Summary of Results**

This study investigated the relationship between facial expression recognition and social relatedness in a sample of 34 participants with reactive attachment disorder

diagnoses (RAD). Using archival data from part of a research study investigating characteristics of children and adolescents with RAD, the current study included data from a demographic form, a history form, the Relationship Problems Questionnaire (RPQ) and the Diagnostic Analysis of Nonverbal Abilities 2 (DANVA 2). Statistical analyses included descriptive data, correlations, t-tests, and multiple regression. This summary briefly reviews the findings by describing the sample, and then by reviewing the results of hypotheses testing.

This RAD sample was fairly evenly distributed with respect to gender and age, was composed primarily of participants with Caucasian ethnicity and a majority (92%) were living in permanent homes. Although some information was missing, analysis of the available data found that the mean average age at which respondents were removed from their biological homes was 2.85 ( $SD = 2.54$ ) years, and that they spent an average of 1.77 ( $SD = 1.79$ ) years in out of home placements. Respondents had an average of 2.21 ( $SD = 2.77$ ) previous placements, and had spent an average of 5.57 ( $SD = 3.63$ ) years receiving treatment (i.e., combined types and times of treatment). Exploration of the DIS and INH dimensions found that there were no statistically significant differences for gender, and that there were no statistically significant correlations between dimensions (i.e., DIS and INH) and age.

Exploration of facial expression recognition within this RAD sample found a statistically significant ( $p \leq .10$ , two sided) negative correlation between age and total errors, and no significant correlation between gender and total errors. With respect to errors in recognizing specific emotions in facial expressions, most errors were made in

recognizing angry, followed by fearful, sad, and happy. With respect to attribution biases, happy was the most frequently incorrectly selected emotion, followed by fearful, sad, and angry. Child facial expressions were recognized with greater accuracy than were adult expressions. Facial expressions displayed with high intensity were recognized with greater accuracy than were expressions displayed with low intensity. Exploration of the relationships between each of the two social relatedness dimensions and facial expression attribution bias scores found statistically significant ( $p \leq .10$ , two sided) correlations between INH and two attribution bias scores, Attribution Bias Happy/AF ( $r = .392, p = .022$ ) and Attribution Bias Angry/AF ( $r = -.292, p = .093$ ).

Regarding hypotheses, results of the data analyses showed partial support for Hypothesis 1 and for Hypothesis 2 and no support for Hypothesis 3. Data analyses for Hypothesis 1, predicting a positive correlation between DIS and errors in the recognition of sad, angry, and fearful expressions revealed only one significant result. The effect size for the correlation between DIS and Attribution Bias Sad scores was small,  $r = .265$  (Cohen, 1992), and in the linear model, DIS accounted for 6.5% of the variance in Attribution Bias Sad/CF scores.

Data analyses for Hypothesis 2, predicting a positive association between INH scores and attribution bias scores for (i.e., incorrect attribution of) sad and fearful facial expressions revealed two significant linear regression models. In one model, INH and Age accounted for 16.1% of the variance in Attribution Bias Sad/AF scores. When controlling for age, the effect size of the model was medium. In a second model, INH and Age accounted for 13.9% of the variance in Attribution Bias Sad/T scores. When

controlling for age, the effect size of the model was small. Findings from the results of statistical analyses computed with the data from this study are discussed in the following chapter.

## **CHAPTER 5: DISCUSSION**

### **Introduction to the Chapter**

This chapter begins with a summary of this study's purpose, variables, participants, and data collection procedures. Following this summary, results of the study, including sample demographics, descriptive statistics for the main study variables, and research hypotheses analyses are discussed. Then the limitations of the study, followed by the possible implications of the results for practitioners, rehabilitation/counselor educators, and future research are presented. A final summary concludes this chapter and manuscript.

### **Summary of the Study**

The purpose of this study was to explore the association between social relatedness disturbances exhibited by individuals with reactive attachment disorder (RAD) and the ability to recognize emotion in facial expressions. This study used a correlation design, including multiple regression analyses to examine archival data collected from a cross sectional research study focused on children with RAD and their caregivers. Specifically, this study examined the association between the two types of social relatedness disturbances in RAD, DIS and INH, and particular types of facial expression recognition errors and attribution biases.

To allow for the possibility that the two types of social relatedness disturbances may not be symptomatically distinct or mutually exclusive (Minnis et al., 2007; Zeanah et al., 2004), DIS and INH were studied as dimensions, rather than as categorical groups. The current study hypothesized that there would be associations between each of these

dimensions and particular difficulties recognizing emotion in facial expressions. To investigate hypotheses, separate multiple regression analyses were conducted with social relatedness variables (i.e., DIS and INH), as well as two additional variables, age and gender, as explanatory variables with facial expression recognition error scores or attribution bias scores as response variables. Descriptive statistics were computed for additional variables of interest (i.e., ethnicity, age at time of removal from home, number of out-of-home placements, length of time in out-of-home placement, treatment history, and current permanency status). Due to the histories often typically found in children with RAD, gathering this information regarding their experiences in out-of-home placements was considered important for descriptive purposes.

The current sample consisted of 34 children diagnosed with RAD, aged 6 – 19 years, and referred by clinicians. Clinician referrals enabled the researchers to acquire a sample of children diagnosed by licensed professionals as having RAD. Similar recruiting for an identified sample was used by Hall and Geher (2003), although their sample was directly recruited by contact with caregivers (through referrals from therapists, social service agencies, and other caregivers). In a different study, maltreated toddlers living in foster care and participating in an intervention program were evaluated by clinicians for signs of RAD (Zeanah et al., 2004). Although the recruitment methods used in these two studies and the current study differ somewhat, the aim of each sampling strategy was to acquire a sample of children clinically identified as having reactive attachment disorder.

Trained research assistants administered the facial expression recognition measure (DANVA 2 Child Faces and Adult Faces subtests) to participants individually, and collected the social relatedness measure, the Relationship Problems Questionnaire (RPQ; Minnis et al., 2007) and demographic and history forms completed by caretakers or parents. In some of the few studies focused on RAD, researchers used behavioral ratings and/or questionnaires completed by caretakers (Bennett, Espie, Duncan, & Minnis, 2009; Hall & Geher, 2003, Hall, Geher & Brackett, 2004, Zeanah et al., 2004). One other study was found that indirectly measured facial expression recognition in RAD (Hall et al., 2004). However, Hall et al. (2004) used caretaker reports of children's ability to recognize emotion in facial expressions, whereas the current study utilized a more direct measure, in which children viewed facial expressions and provided their own responses. Although no other studies were found that investigated facial expression recognition in RAD, numerous researchers have studied facial expression recognition in clinical samples with participants who had social relatedness difficulties (Blair & Coles, 2000; Blair et al., 2004; Da Fonseca et al., 2008). The current study utilized a standardized and validated measure (i.e., DANVA 2) which had a forced choice format to investigate participants' abilities to recognize four basic emotions in still facial expressions. Similarly, several studies have used this measure (i.e., DANVA 2) or similar measures (Carr & Lutjemeier, 2005; Izard et al., 2001; Leist & Dadds, 2009; Maxim & Nowicki, 2003), while a other studies have used dynamic stimuli, in which facial expressions gradually morph or change from one emotion expression to another (Blair et al., 2004;

Fraley et al., 2006; Pollak & Sinha, 2002), allowing researchers to examine factors such as processing speed (see Herba & Phillips, 2004 for a review).

For the current study, the raw data for participants with RAD diagnoses were collected, entered, checked, and analyzed. Analyses were conducted to describe the sample and to investigate the associations between social relatedness disturbances in RAD and facial expression recognition. The following section discusses the results of this study.

### **Interpretation of Results**

This section discusses the results of statistical analyses reported in the previous chapter. Following discussion of the sample's response rate, demographics, and descriptive statistics for the main study variables, the findings from statistical analyses conducted to investigate hypotheses are discussed.

#### **Response Rate**

Although the raw data did not include information regarding response rates, one of the clinicians reported that approximately 90% of her clients with RAD participated in the study, and that the majority of those who did not participate were too young for inclusion (D. Adieuis, personal communication, August 15, 2009). Response rates in purposeful sampling may be difficult to ascertain, particularly when acquiring a sample for which prevalence rates are unknown, as is the case with RAD.

#### **Sample Demographics**

Participants lived with adoptive parents or caretakers, ranged in age from 6 – 19 years, were fairly evenly distributed with respect to gender (i.e., 41% females) and were

mostly of Caucasian ethnicity (64.7%). As shown in Table 7, the number of participants in the current RAD sample was similar to the number of participants in other RAD studies. The current RAD sample was also similar to three studies with regard to age distributions (Becker-Weidman, 2006; Hall & Geher, 2003, Hall, Geher, & Brackett 2004). However, the current RAD sample differed from one study sample in which participants were toddlers (Zeanah et al., 2004). Participants' ethnicity was available for three of the studies; the current sample is similar to Becker-Weidman's study, in that a majority of participants were of Caucasian ethnicity.

Participants in the current study were removed from their biological homes at an average age of 2.85 years of age, and had histories of an average of 2.21 previous placements. The age of removal from home was not available for the comparison studies, and only one of these studies reported the average number of previous out-of-home placements. As shown in Table 8, participants in the Hall and Geher (2003) study had more out-of home placements (i.e., 4.9) than did participants in the current study (i.e., 2.21). The following information was not available in the comparison studies, but is presented here to more fully describe the current sample. Participants in the current sample had spent an average of 1.77 years in out-of-home placement(s) and 92% of the participants were living in permanent home situations. One of the challenges in studying this population may be that historical information may be lacking or difficult to acquire (Boris, 2005). Foster parents may not know the details of children's histories, and researchers may not have access to other records (e.g., social service department records, adoption records). The studies cited here were selected as comparison studies because

Table 8

*Comparison of Participant Demographics Among RAD Studies*

	Hall & Geher 2003	Hall et al., 2004	Zeanah et al., 2004	Becker-Weidman, 2006	McLaughlin et al., 2009	Current Study, 2010
Number of RAD cases	21	45	38	64	34	34
Age Range <sup>a</sup>	4.5 - 9.3	6 - 17	.84 - 2	5 - 16	5 - 8	6 - 19
Gender						
Male	38%	36%	44% <sup>b</sup>	59%	66%	59%
Female	62%	64%	56% <sup>b</sup>	41%	44%	41%
Ethnicity						
African American	<i>na</i>	<i>na</i>	55%	6%	0%	8.8%
European American	<i>na</i>	<i>na</i>	40%	88%	0%	64.7%
Other	<i>na</i>	<i>na</i>	4%	6%	100% <sup>c</sup>	26.5%
Age Removed from Home <i>M (SD)</i>	<i>na</i>	<i>na</i>	<i>na</i>	<i>na</i>	<i>na</i>	2.85 (2.54)
Previous Placements <i>M (SD)</i>	4.9 (2.39)	<i>na</i>	<i>na</i>	<i>na</i>	<i>na</i>	2.21 (2.77)

Note. *na* = Data not available.

<sup>a</sup> Years. <sup>b</sup> Gender distribution reported for the larger sample of 94 children. <sup>c</sup> British White.

they focused on groups of children with RAD. Qualitative or case studies were not included as sample comparison studies due to limited sample sizes inherent in these studies. Overall, the current study appeared similar to some studies in which RAD was investigated in groups of children (Becker-Weidman, 2006; Hall & Geher, 2003; Hall et al., 2004; McLaughlin, Espie, & Minnis, 2009). This section continues with a discussion of the results of descriptive statistics.

### **Descriptive Statistics**

**Social relatedness dimensions.** The social relatedness dimensions, DIS and INH, were analyzed as numeric/continuous variables. Statistical analyses results revealed that the two dimensions were not independent or mutually exclusive. Similarly, in a study of RAD in young children (i.e., younger than aged 4 years) in foster care, using both continuous scores of signs of RAD and categorical scores for diagnoses, researchers found a lack of exclusivity as some children were diagnosed with both the disinhibited and inhibited types of RAD (Zeanah et al., 2004). Although DIS behaviors were historically associated with children who experienced deprivation in institutional orphanages abroad, and researchers theorized that INH behaviors would be more likely to result following multiple foster placements (Zeanah, 2000), recent studies and clinical reports have suggested that DIS behaviors may be more prevalent than INH behaviors in children with RAD who have experienced foster care and/or early maltreatment (Minnis et al., 2007; Susan Foreman, personal communication, February 13, 2009). Thus, finding in the current study that most participants exhibited varying degrees of both DIS and INH dimension behaviors, adds to the accumulating research evidence and clinical reports

suggesting that individual differences within RAD may not be best conceptualized as distinct subtypes (Minnis et al., 2007; Zeanah et al., 2004).

**Social relatedness dimensions and demographic variables.** Statistical analyses revealed that the DIS and INH dimension scores were fairly evenly distributed with regard to age and gender. Although age and gender distribution among RAD subtypes is unknown, a study of attachment among children found no significant gender differences for measures of attachment (Kerns et al., 2007). In addition, two significant findings were revealed for correlations between dimension scores and other demographic variables. These findings are discussed next.

**DIS social related dimension.** The positive significant association between the DIS dimension and the age participants were removed from the biological home suggests that higher, as compared to lower, DIS scores were associated with children who remained in their biological homes for longer periods of time before being removed. The constellation of behaviors measured by the DIS dimension may reflect one trajectory for children who have experienced a particular type of disruption in attachment processes. In studies with young children reared in institutional orphanages, DIS behaviors (i.e., socially indiscriminate behaviors) were associated with severe and prolonged neglect (Zeanah, 2000; Zeanah et al., 2002). One likely possibility is that in the current study, some children experienced similarly neglectful environments.

**INH social relatedness dimension.** The positive significant association between the INH dimension scores and the number of out-of-home placements experienced by participants suggests that higher, as compared to lower, INH scores were likely to be

associated with children who had more out-of-home placements. The constellation of behaviors measured by the INH dimension may reflect one trajectory for children who have experienced a particular type of disruption in attachment processes (i.e., several different placements and caretakers). Individuals with RAD have experienced early childhoods marked with pathological caretaking and disruptions in the attachment process. As attachment difficulties are, by nature, dyadic processes, one consideration is the child's ability to respond to caretakers. Early disruption in attachment processes may make it difficult for the child to respond easily (e.g., the child may withdraw, become easily distressed and difficult to sooth) in subsequent interactions with caretakers (Zeanah & Fox, 2004).

**Facial expression recognition, gender, and age.** Participants' accuracy significantly increased with age, and did not appear to be associated with gender. Although some studies found that females were slightly more accurate in facial expression recognition studies, other studies found no significant differences between males and females (Hall, 1984; Lancelot & Nowicki; 1997; Steele et al., 2008). The effects of RAD on facial expression recognition may be stronger than the effects of gender.

**Facial expression recognition, total recognition errors by emotion.** Examination of recognition error scores (i.e., the number of times a particular facial expression was not correctly recognized) revealed that participants made the most errors recognizing angry, followed by fearful, sad, and happy facial expressions. Although analyses were not conducted to ascertain the statistical significance of differences in error

scores across emotions, comparison of these findings to those from other studies may be useful. For example, finding that current participants made the most errors in recognizing angry seems to parallel findings from a study with adult attachment styles (Magai et al., 2000). Magai et al. (2000) found that in adults, a dismissing attachment pattern, defined by high avoidance and low anxiety, was associated with a particular deficit in the ability to recognize anger.

However, the current study's finding contrasted the findings reported by Wismer Fries, and Pollak (2004) in their study with children who had experienced early deprivation in institutional orphanages abroad. These children were as accurate as a control group in the recognition of anger, but had more difficulty recognizing happy, sad, and fearful facial expressions. In addition, several studies have found that children who had been physically abused were particularly sensitive to angry expressions, and showed a significant bias in the recognition of anger in other facial expressions (Pollak et al., 2000). Pollak et al. (2000) theorized that facial expressions of anger may have indicated threat, and so these children learned early to be sensitive to anger expressions. However, in spite of the histories of maltreatment and pathological caretaking experienced by the participants, anger was the least frequently recognized facial expression. Some children with RAD may have learned avoidant strategies (i.e., deactivation, minimization) which in turn, negatively affected their ability to recognize anger in facial expressions. In essence, rather than becoming more sensitive to angry facial expressions, as noted in some children who experienced physical abuse, some children with RAD may have developed an insensitivity to angry facial expressions.

**Facial expression recognition, total attribution bias by emotion.** Examination of attribution bias scores (i.e., the number of times a particular emotion was recognized when a different expression was displayed) revealed that the current participants incorrectly attributed happy most frequently, followed by fearful, sad, angry, and other (non-standard responses). Finding an attribution bias for happy (when sad, angry or fearful was displayed), has seldom been reported in the maltreatment or attachment literature. However, Bowen and Nowicki (2007) reported a congruous finding in children (aged 8.5 years) who had experienced violence (i.e., maternal victimization) in early childhood. Specifically, they found that children who had lived in homes in which they experienced maternal victimization, compared to children without histories of maternal victimization, were significantly more likely to exhibit an attribution bias for seeing happiness in expressions of sadness, anger, or fearfulness. Finding a bias for happy was an unexpected finding in their study, as well as in the current study, and is difficult to interpret. In terms of attachment theory, it may be that children with RAD who see sad, angry, or fearful facial expressions as happy ones are manifesting the use of deactivation strategies. In essence, deactivation strategies or behaviors learned as infants (e.g., minimization, turning away from caretakers) may continue to influence the perception of nonverbal expressions of emotion in facial expressions (Fraley et al., 2006). In addition, considering the possible impact of seeing happy in non-happy expressions on social interactions may be useful. Seeing another as happy would seem to be an invitation to approach. If a child sees sad, angry, or fearful expressions and expressions of happiness, he/she may then engage in approach behavior without consideration of the

other person's emotion state. In this type of interaction, the child may then be viewed as insensitive or shallow.

**Facial expression recognition, child and adult faces.** Descriptive statistics revealed that participants made more errors in recognizing emotion in adult facial expressions than in recognizing emotion in child facial expressions. This makes sense when considering the limited interaction between adults and children in cases of neglect. According to Pollak et al. (2000), "there is evidence from both laboratory and observational studies that neglected children suffer from impoverished opportunities for interactions with adults" (p. 680). Children reared in such environments may not have adequate exposure to appropriate and consistent adult emotion expression. Additionally, children may focus on the needs of their siblings, adapting caretaking roles in lieu of parental caretaking. Thus, becoming more accurate recognizing emotion in children's as compared with adults' facial expressions may be a product of increased exposure as well as an adaptive process; each of these possibilities may relate to inadequate early child-caretaker interactions.

**Facial expression recognition, intensity of displayed emotion.** Descriptive statistics revealed that these participants made more errors in recognizing emotion when displayed by low intensity facial expressions than when displayed by high intensity expressions. Similar findings have been reported in numerous studies with varied populations (e.g., Blair et al., 2001). Lower intensity expressions are more subtle forms of emotional expression, and therefore not as easily recognized, as are more clear or obvious expressions. The current samples distributions of recognition errors and

attribution bias by intensity level were in line with most studies. However, a study with maltreated children found that participants made more errors when viewing high intensity expressions than when viewing low intensity expressions (Bowen & Nowicki, 2007). Researchers suggested that high intensity expressions may have generated anxiety in participants, thereby interfering with their ability to recognize emotions in facial expressions when displayed with high intensity.

**Facial expression recognition and social relatedness dimensions.** Correlation analyses revealed no significant associations between the social relatedness dimension, DIS, and facial expression recognition variables, and two statistically significant associations between INH and facial expression recognition variables. A significant positive association between INH and Attribution Bias Happy/AF was found, as well as a significant negative association with Recognition Errors Angry/AF. In other words, compared to participants with lower INH scores, those with higher INH scores were more likely to recognize happy in non-happy facial expressions, and were also likely to be more accurate (i.e., make fewer errors) in the recognition of anger. Returning to the infant caretaker studies by Ainsworth et al. (1978), the behaviors observed in infants with anxious/resistant attachment (i.e., withdrawal and clinginess) reflect ambivalence regarding attachment. Perhaps early caretaker expressions of anger were frightening or communicated rejection, and infants learned to adaptively withdraw. Thus, they may have become sensitized to angry expressions, recognizing them readily. Viewing other expressions as if they were happy expressions also makes sense when considering the possibility of deactivating strategies. Not unlike denial, deactivation of attachment

behavioral processes involves the turning away from, or disregard of, the emotion expressed by others. Perhaps one way to accomplish this is to imagine these are happy expressions, thus inviting approach behaviors.

In summary, descriptive analyses revealed that, in line with many studies, facial recognition accuracy for the sample was negatively associated with age, and did not appear to be associated with gender. Descriptive results revealing that most errors were made in recognizing angry facial expressions and that the most frequent attribution bias was for seeing happy in other facial expressions were discussed in relation to attachment theory. Descriptive results also revealed that participants made more errors in the recognition of emotion in adult faces than in child faces; this was discussed in terms of children's possible developing changes in attachment relationships. Similar to findings from other studies with various populations, descriptive results for the current study revealed that more errors were made in the recognition of emotions in facial expressions displayed with low intensity than in those displayed with high intensity expressions. These results were discussed in terms of attachment theory and processes, and child maltreatment and psychopathology findings. Data analyses results for the hypotheses testing are discussed next.

### **Results of Hypotheses Testing**

Hypothesis 1: Within a RAD sample there will be a positive association between DIS dimension scores and recognition error scores for sad, fearful, and angry facial expressions.

Data analyses found some support for a positive association between the DIS dimension and errors in the recognition of sad, angry, or fearful facial expressions. DIS scores were significantly associated with recognition errors for sad facial expressions when displayed in child faces, but were not associated with recognition errors for angry or fearful facial expressions, or for combined recognition errors for sad, angry, and fearful expressions. The association between DIS errors in the recognition of sad facial expressions is discussed next, followed by discussion of the lack of association found for an association between DIS and errors in the recognition of angry and fearful facial expressions.

The finding that individuals with higher DIS scores made more errors in the recognition of sad than individuals with lower DIS scores may be understood in terms of research and theory in the areas of attachment and psychopathology. Considering this finding within an attachment theory framework, participants experienced early disruption in attachment processes, and may have developed early, adaptive strategies to manage distress caused by the unavailability of attachment figures. Some children with RAD, particularly those with higher indiscriminate behaviors (as suggested by higher DIS scores), may utilize what Ainsworth et al. (1978) and Bowlby (1982) referred to as *deactivating strategies*. In infants found to have avoidant attachment, deactivating strategies, such as turning away from a caregiver, focusing on the environment (e.g., toys), and a lack of approach behaviors with caregivers, served to minimize expected aversive outcomes and internal distress by distancing from the source (i.e., the attachment figure) of pain (Ainsworth et al., 1978; Bowlby, 1982).

Attachment researchers who studied attachment styles in adults posited that in order to accomplish these strategies, adults with avoidant attachment learned as infants to inhibit experiences of emotion states and exclude them from awareness (Milkulincer et al., 2003). Thus, individuals using avoidant attachment strategies may turn away from, or not attend to, a caregiver's face in an effort to minimize distress (Koulomzin et al., 2002). Within this framework, the finding in the current study, that individuals with higher DIS scores (i.e., higher ratings of indiscriminate behaviors) were more likely to make more errors in the recognition of sad in facial expressions makes some sense. An adaptive pattern developed in infancy, including a lack of attending to facial expressions and avoidance of anticipated pain by inhibiting experiences of emotions, may have persisted as these children developed. In essence, according to attachment theory, an individual's attachment style filters or shapes the information that is perceived from facial expressions (Niedenthal et al., 2002), thus for individuals with higher DIS scores this filter may serve to keep particular emotional facial expressions (i.e., sad) from awareness.

Children may internalize patterns of emotion regulation that develop during attachment processes (Contreras & Kerns, 2000). Similarly, Niedenthal et al. (2002) suggested that facial expressions of emotion are particularly critical for providing information that promotes attachment-related goals, and the individual's style of attachment shapes or filters the information that perceived. Thus, finding that DIS was associated with errors in the recognition of sad in child faces but not in adult faces may relate to changes in attachment relationships as children develop. As peers become more important, attachment strategies learned as infants for managing attachment interactions

with adults may persist and be evident in relationship with peers (Kemph & Voeller, 2007).

As presented in the literature review, studies of facial expression recognition in individuals with psychopathic (i.e., antisocial) tendencies were relevant to the current study, due to some of the shared characteristics between these two populations (e.g., described as demonstrating insensitivity to others feelings or a lack of empathy). Expecting that individuals with high DIS dimension scores may have similar facial expression recognition deficits, findings from some of these studies were reviewed (Blair & Coles, 2000; Woodworth & Waschbusch, 2008). Comparing these studies to the current finding of a significant positive association between DIS and errors in the recognition of sad facial expressions, as well as a lack of a significant association with errors in the recognition of fearful facial expressions may be useful.

Although several studies found significant positive associations between psychopathy scores and difficulty recognizing sad and fearful facial expressions (Blair & Coles, 2000; Blair et al., 2001; Hastings et al., 2008; Stevens et al., 2001), some found significant associations for the recognition of sad, but not of fearful, facial expressions (Hastings et al., 2008; Woodworth & Waschbusch, 2008). The current study findings seem to parallel findings from the Woodworth and Waschbusch study with children (aged 7 – 12) with disruptive behavior problems. Measuring two variables within psychopathology, callous/unemotional traits (e.g., lacking remorse and empathy), and conduct problems, they found a significant association between callous/unemotional traits and a specific deficit in the ability to recognize sad facial expressions. Specifically,

children with higher callous/unemotional scores, whether or not they had elevated conduct problems scores, were significantly less accurate in the recognition of sad in facial expressions than were children with lower callous/unemotional scores. Thus, it may be that the current study results are more in line with findings with a particular aspect of psychopathology, namely, callous/unemotional traits (i.e., lack of empathy), than with findings from more general studies with psychopathology. A related possibility for the finding of a lack of sensitivity in recognizing facial expressions of sadness, but no apparent difficulties recognizing happy, angry, and fearful, is that expressions of sadness may signal a desire or need for emotional assistance or help. Individuals high in DIS may be unequipped to contribute emotional validation or support. Not receiving necessary sensitive responsiveness from caretakers in early childhood, these children may not experience empathetic responses to their peers.

The lack of association found between DIS and recognition errors may be due to participants' improvement in facial recognition abilities as a function of improved caretaking and/or ongoing treatment. Although hypothesis 2 reflected the expectation that DIS (i.e., indiscriminate behaviors) would be associated with recognition errors for sad, angry, and fearful expressions, one explanation for these findings is that DIS behaviors persist despite recognition abilities. As noted in studies with children who had been reared in institutional orphanages, indiscriminate behaviors were found to be quite stable, persisting in some cases even after children had formed attachments with caretakers in families (Chisholm, 1998; Zeanah et al., 2000; Zeanah et al., 2004). A large majority (93%) of children in the current study were living in permanent placements, and

all were participating in therapeutic treatment. One or both of these factors may have positively affected facial expression recognition abilities, despite continued DIS behaviors.

In summarizing the results of analyses for hypothesis 1, the significant positive association between DIS and errors in the recognition of sad in child facial expressions provided partial support for the hypothesis that DIS would be positively associated with errors in the recognition of sad, angry, and fearful facial expressions. Finding the expected association between DIS and errors in the recognition of sad facial expressions may be explained within the framework of attachment theory, whereas the lack of significant findings for errors in the recognition of fearful and angry were more difficult to interpret. The lack of findings may suggest that facial expression recognition abilities have improved as a function of improved interactions with adoptive or foster parents or therapeutic treatment.

Research findings from the psychopathology literature added to the understanding of this finding, by highlighting the link between impairments in the recognition of sad facial expressions and a lack of empathy. According to Camras et al. (1983), "Emotion recognition plays an important role in empathetic responding" (p. 325). Impairment in the ability to recognize sad facial expressions (as suggested by the current findings), may impact social relatedness in individuals high in DIS by impeding their ability to perceive information that would affect subsequent actions and is vital for empathetic interactions.

Hypothesis 2: Within a RAD sample, there will be a positive association between INH dimension scores and sad and fearful attribution bias scores (i.e., incorrect attribution of sad and fearful when viewing facial expressions of other emotions).

Data analyses found some support for a positive association between the INH dimension and attribution bias for sad and fearful. The INH scores were significantly associated an attribution bias for sad (i.e., seeing sad in non-sad facial expressions). Significant associations were found between INH and Attribution Bias Sad/AF (i.e., Adult Faces) and between INH and Attribution Bias Sad/T (i.e., Total). Data analyses found no support for a positive association between INH and an attribution bias for seeing fearful in other facial expressions. Thus, findings of a positive significant association between INH and an attribution bias for sad and a lack of significant findings for an association between INH and an attribution for fearful are discussed.

The finding that individuals with higher INH scores had higher scores for an attribution bias for sad (i.e., seeing sad in non-sad facial expressions) may be understood in terms of some of the research and theory in the areas of child maltreatment and attachment. Research from child maltreatment literature has suggested that “aberrant emotional experiences associated with maltreatment may alter the allocation of attention and sensitivity that children develop to process specific emotion information” (Pollak et al., 2001, p. 268). For example, children with histories of neglect, and therefore limited exposure to appropriate interaction with adults, have been found to have overall deficits in facial expression recognition (Pollak et al., 2000).

However, similar to the current study findings, a few studies have reported that compared to controls, children with histories of neglect displayed an attribution bias for seeing sad in neutral or ambiguous facial expressions (Pollak et al., 2000; Pollak & Kistler, 2002; Pollak & Sinha, 2002). Although children with RAD have, by definition, experienced pathological caregiving, the particular types of maltreatment vary. Children with RAD who have high INH behaviors may have experienced neglectful caretaking and/or interactions with caretakers who had depressive symptomatology. Neglectful caretakers may be more likely to be depressed, thus making facial expressions of sadness frequent and salient (Chaffin et al., 1996). Additionally, in a study examining the facial expressions displayed by mothers of maltreated children, Camras et al. (1990) reported that compared to nonmaltreating mothers, maltreating mothers displayed more facial expressions of sadness.

Considering this finding of an attribution bias for seeing sad in other facial expressions within an attachment theory framework, individuals with RAD who exhibit high levels of inhibited behaviors (INH) may be utilizing what Ainsworth et al. (1978) and Bowlby (1982) referred to as *hyperactivating strategies*. For example, infants found to have anxious or anxious-resistant attachment exhibited more attachment behaviors (e.g., crying, clinging) than infants with secure attachment or avoidant attachment (Ainsworth et al., 1978). Ainsworth et al. noted that the mothers of these children seemed to lack sensitivity and responsiveness to their infants' attachment behaviors. Although these mothers held and approached their infants, their timing was not synchronized with the infants' apparent distress. Compared to mothers of avoidant or

secure infants, mothers of anxious/anxious resistant infants took longer to respond to attachment behaviors (e.g., responding to their infants' crying). In addition, observational studies of these infants' normal attempts to be independent (e.g., hold their own bottles, feed themselves) frequently met with maternal resistance. Infants struggled and resisted and the interactions were often difficult for both infant and mother. According to Ainsworth et al. (1978), these infants developed a "classic ambivalence" (p. 92). Infants with anxious/anxious resistant attachment were highly distressed upon their mother's departures and difficult to sooth upon her return; at times they were clingy with their mothers and at other times they were withdrawn. Thus, in contrast to infant with avoidant attachment (observed to exhibit deactivating strategies), infants with anxious/anxious-resistant attachment used hyperactivating strategies (e.g., increased expressions of distress) to achieve proximity to attachment figures. Thus, individuals using hyperactivating strategies may exhibit sensitivity for salient facial expressions.

An example of the use of hyperactivating strategies was discussed in a study related to anxious attachment in adults (Fraley et al., 2006). According to these researchers, adults with anxious attachment styles exhibit hyperactivating strategies as they remain vigilant for perceived attachment related threats in facial expressions (Fraley et al., 2006). Similarly, in the current study, participants with high INH scores displayed this type of vigilance in the perception of sadness in other facial expressions. Although the experiences these children had as infants is not precisely known, they developed a sensitivity for sad expressions, and this sensitivity may be related to perceived attachment threats.

Hypothesis 3: These associations appearing in Hypotheses 1 and 2 will be stronger for facial expressions displayed with low intensity than for facial expressions displayed with high intensity.

Results of data analyses did not show support for Hypothesis 3. There were no statistically significant differences in associations by intensity level for the models that supported Hypotheses 1 or 2. This was an unexpected finding, as low intensity expressions are more ambiguous expressions of emotions (Maxim & Nowicki, 2003), and attachment schemas would be expected to be more evident in ambiguous, high threat conditions (Bugental, 2005). In the current study, the associations found to support Hypotheses 1 and 2 were not found to be stronger for facial expressions displayed with low intensity than for facial expressions displayed with high intensity at a statistically significant level.

Although numerous studies have found recognition errors or attribution biases more prevalent for low intensity than for high intensity facial expressions, a study found that compared to a maternal victimization group and a control group, a maltreatment group made significantly more errors in recognizing emotions in high intensity facial expressions than in low intensity facial expressions (Bowen & Nowicki, 2007). The researchers suggested that “seeing high intensity emotion generates anxiety in maltreated children that in turn interferes with the child’s ability to accurately decode it” (p. 180). Within the framework of attachment theory, particular high intensity expressions could have similar effects, generating attachment-related anxiety that subsequently interfered with facial expression recognition.

Specifically, high intensity facial expressions of sadness may have generated attachment – related anxiety in participants with either high DIS or high INH dimension scores. Participants with high DIS dimension scores, using deactivating strategies, may essentially turn away from clear (i.e., high intensity) expressions of sadness, and would therefore be likely to err in the recognition of sadness in facial expressions. Participants with high INH scores, however, using hyperactivating strategies, may be vigilant for expressions of sadness, and would therefore be likely to attribute sadness to other facial expressions displayed with high intensity (particularly if the displayed expressions generated attachment-related anxiety). Thus, a preliminary explanation in line with attachment theory suggests that high intensity expressions may have generated attachment-related anxiety in participants high in DIS or INH dimensions. This anxiety may have interfered with in participants high in DIS or INH dimensions in distinct ways.

### **Summary of Hypotheses Results**

Hypotheses results are consistent with the idea that social relatedness disturbances in RAD are somewhat related to facial expression recognition deficits. Although these findings showed limited or partial support for hypotheses (i.e.,  $p < .01$ , small and medium effect sizes), they are intriguing and indicate the need for further study.

### **Study Limitations**

Given the exploratory nature of this study as well as an understudied population of interest, several limitations may affect the interpretation of results. These limitations, as related to research design, sampling, and instrumentation are now discussed.

## Research Design

The cross sectional correlation design with the inclusion of multiple regression analyses allowed for analyses to test the directional hypotheses under investigation. This design enabled the inclusion of age and gender as possible explanatory variables.

However, “A concern in any study examining correlates of attachment is whether there are variables other than attachment that might account for the findings” (Kerns et al., 2007, p. 36). Although the design was intended to include investigation of the influence of several historical variables, due to missing information, multiple regression analyses could not include this data. In addition, although regression analyses help explain relationships among variables, the results of this study may be accepted as representing associations, rather than as indicating causal relationships.

**Instrumentation.** The possible threats of instrumentation to internal validity include the forms for the collection of demographic and historical data and the measures used to assess the two main variables of interest.

Although the demographic data collected for this research study allowed for a fairly good description of the sample by collecting important historical information (i.e., age the child was removed from the biological home, number of previous out of home placements, permanency status, treatment history), several pieces of information were either missing or unable to be coded. For example, the association found between INH and the number of out of home placements experienced by the child was statistically significant ( $p = .003$ ) and the effect size moderate ( $r = .587$ ). However, interpretation of this association is limited due to several missing values from the data set (i.e., 10 missing

values). As noted previously, caretakers or parents may not have known this information. The unknown histories of participants have been noted in several studies (Camras, Perlman, Wismer Fries, & Pollak, 2006). In addition, caretakers may not have completely understood what was being asked on demographic questionnaires. The lack of information posed a problem for this study, in that this researcher was not able to clearly describe the sample among these variables.

Regarding the measures used to determine scores for the variables, the use of the DANVA 2 to assess facial expression recognition had benefits, including a strong research history, standardized instrumentation, and ease of administration. However, the DANVA 2 is limited to the assessment of four basic facial expressions, thereby limiting its use in assessing blended other emotions (e.g., surprise, disgust). Another benefit of the DANVA is the inclusion of both high (i.e., more clear) and low (more subtle) intensity facial expressions. However, assessment of more intricate processes, such as the point at which a facial expression is recognized as it shifts from one expression to another, or the amount of time it takes individuals to recognize a facial expression, was not possible. Individuals had 2 seconds to make selections when viewing facial expressions, and in real life interactions, this is not usually the case. Real life interactions are dynamic and facial expression recognition may be enhanced by other environmental cues, or impaired by the vast amount of available information. Thus, the DANVA2 measure may not have identified these more subtle cues. Another concern relates to the reliance upon parent/caregiver behavioral ratings. Certainly, supplementing these ratings with those from teachers and treatment providers would strengthen the possibility

accurate appraisals of behavior and could increase confidence in the internal validity of the study and improve the design. Social relatedness disturbances in RAD are exhibited across social contexts, and without gathering this information, the interpretation of results may be limited.

**Data collector characteristics.** Elements of the research design were developed to minimize the threats to internal validity posed by data collector characteristics, including structured training protocols with practice sessions, and the use of a standardized measure with strong inter-rater reliability (i.e., DANVA-2). Despite these efforts, the possibility remains that having several different data collectors may have influenced participants' responses. For example, although data collectors were trained to interact with participants in a neutral manner, some may have displayed responses, and these responses may have influenced participants' motivation.

**Sampling and external validity.** Although comparable to the few studies of RAD, the small sample size and purposeful sampling strategies used in this study may limit the ability to generalize results. In addition, participants were referred by outpatient treatment providers, and thus, may not be representative of children with RAD in residential treatment. The range of ages studied was large and having a small sample size may have limited the ability to detect individual differences. To strengthen the ability to generalize study results, sampling procedures included attempts to increase the representativeness of participants by the development of a wide referral/recruitment base (i.e., contact with a variety of types of treatment providers: private practice professionals, university medical school providers, and pediatricians). These

professionals' clients/patients access both public and private funding, which was intended to strengthen the representativeness of the sample. Despite these efforts, the referral base was small (i.e., two treatment providers).

### **Implications of the Study**

Results of this study have several implications for rehabilitation counselor education and for treatment providers. Implications for rehabilitation counselor education are discussed, followed by implications for treatment providers.

#### **Implications for Rehabilitation Counselor Education**

First, the results of this study highlight the importance of increasing the awareness of RAD by including education about the etiology of RAD, including attachment processes in early childhood (e.g., see Ainsworth et al., 1978) and information about RAD as a psychiatric disorder in rehabilitation counselor education curricula. This information could be easily integrated in required courses (e.g., theory, developmental, family, or psychiatric courses). Although the prevalence of RAD is unknown, a growing number of children with RAD and their caretakers or parents are in need of counseling intervention. Counselors need to be educated in how to identify RAD, as well as prepared to help families manage the behavioral and emotional problems presented by these families.

Second, this study added to the existing research evidence regarding the importance of assessing nonverbal skills, such as facial expression recognition, to understand more about social relatedness disturbances. In line with training rehabilitation counselors to be aware of their own and their clients' nonverbal expressions of emotion,

rehabilitation counselor educators may want to consider providing education regarding the assessment of clients' nonverbal receptive abilities (e.g., facial expression recognition), as well as interventions to promote improvement in these abilities. This could be accomplished in a number of ways. As examples, course assignments could include any of the following: (1) the review of journal articles describing research findings focused on the investigation of facial expression recognition abilities of various populations (e.g., individuals with depression, individuals with histories of child abuse or neglect), (2) the use of still photographs (e.g., as in the DANVA), software packages, or in-vivo practice of facial expression recognition; instructors and students would then provide feedback regarding accuracy or could use a software package that includes feedback for training, and (3) remind students that the listening skills they learn as counselors-in-training are the same skills their clients may benefit from learning, and ask them to develop an activity or technique to help dyads (e.g., couples, parent and child) improve their communication by attending to the emotions nonverbally expressed by their partner; students may then learn how to facilitate more sensitive responding between dyads. Exercises such as these begin to assist students in making the connection between the perception of emotions and social relatedness, and may encourage sensitivity and responsiveness between counselors-in-training and their clients, as well as among clients and their family members.

Third, this study highlighted the relevance of facial expression recognition in early childhood learning and attachment processes. Education about RAD could be included in family therapy, psychosocial aspects of disability, and substance abuse

courses, with an emphasis on the identification of behavioral disturbances, attachment problems, and possible inaccurate perceptions in individuals with RAD. Another important focus would be on how to manage complex cases (e.g., including collaboration with various systems). For individuals identified as having attachment disturbances, treatment needs to include a systems approach, including family therapy and collaboration with various systems (e.g., schools, medical providers, vocational counselors). Counselors-in-training will also need specific training in interventions geared toward helping caregivers or parents and their children interact with sensitivity and synchronicity while also setting necessary limits on behavior exhibited by individuals with RAD. In doing so, counselors-in-training may be better prepared to assist children with RAD and their families.

### **Implications for Treatment Providers**

Based on the results of this study, prudent treatment providers working with children with RAD and their families will assess how these children perceive the emotional states of others, as well as how they experience emotions. Results of this study suggested that within RAD, there were individual differences in the perception of sadness in facial expressions, and that these differences were associated with particular social relatedness disturbances. Individuals with higher DIS dimension scores (i.e., indiscriminate behaviors, lack of stranger wariness) were less accurate in recognizing sadness than individuals with lower DIS scores. Additionally, individuals with higher INH scores (i.e., withdrawn, anxious, resistant behaviors) exhibited a tendency to attribute sadness to other facial expressions. Treatment providers could assess the facial

expression recognition abilities of clients who have RAD and integrate this information in clinical conceptualization and treatment planning. In line with client-centered treatment, providers need to select approaches that best suit their clients' goals and abilities. Suggestions for facial expression recognition assessment and interventions that may benefit individuals with RAD are discussed next, and are followed by an example of the use of these methods.

**Instructional methods.** Instructional methods may be more or less standardized and structured, including computerized assessment and training programs as well as using one-on-one inquiry (e.g., asking clients to identify emotion in facial expressions) and feedback (e.g., instructing clients to notice that eyes are looking down, and labeling the facial expression as sadness). Specifically, providers could use a standardized facial expression recognition training program, or select facial expressions from photographs, comic books, or videos, in addition to asking clients to identify how those in their presence are feeling. Due to attachment-related anxiety operating within individuals with RAD, there may be an advantage to beginning with the identification of emotion in facial expressions of less familiar people.

Once the provider has performed a baseline assessment, instructional methods offer opportunities to give corrective and sensitive feedback to clients. Individuals with RAD had disruptions in early attachment processes, which may have included a lack of exposure to particular facial expressions, as well as a lack of corrective and sensitive feedback from caretakers. When working with individuals with RAD, the treatment provider may facilitate these corrective experiences for the client. In addition, because an

overall goal of treatment is to facilitate attachment processes between the child and caretaker, treatment providers may include facial expressions recognition when doing dyadic or family therapy.

**Modeling, mirroring, and imitation.** Throughout this process of facial expression recognition training, providers could assist clients in the identification of emotions in others and in themselves. By modeling the expressions, and encouraging clients to imitate facial expressions, clients could be assisted in attending to facial expressions and experience emotions (Sheaffer, Golden, & Averett, 2009). Providers could then point out the physical changes in facial expressions, and discuss the significance of these changes, encouraging the client to attend to others' emotional expressions. Then, providers could help the client identify their own emotions by labeling emotional experiences, responding with empathetic listening, and through mirroring.

Individuals with RAD often have difficulty regulating their emotions (Hall & Geher, 2003). Providers, using interventions that increase the clients' awareness of others' facial expressions and promote the clients' identification of their own emotion, may also help the client regulate their own emotions. By increasing accurate awareness of facial expressions of others and awareness of their own emotions, clients may also be able to use this additional information to more accurately evaluate their environments. Thus, this additional information may help clients learn to regulate their emotions and to regulate social interactions in more successful ways.

**Example of methods with RAD.** For example, a provider working with a client with RAD exhibiting DIS dimension behaviors might first assess facial expression abilities by using a medium most likely to interest the client. If the client likes comic books, for example, the treatment provider may begin with pointing to facial expressions and asking the client to label the feelings. From comic books, the facial recognition task could then move to photographs and eventually to people with whom the client interacts. If the client displayed difficulty in recognizing sadness, for example, the provider may intervene saying, “See how her eyes looked downward when he said he didn’t like her, which makes her look sad.” To increase the client’s exposure to the facial expression, the provider may point out the expression fairly often. If the client turns away and attends to other stimuli in the room (e.g., possibly using adaptive deactivating strategies), the treatment provider may redirect the client’s attention. For individuals with RAD, attention, motivation, and support may be particularly important. To increase the client’s attention and motivation, the provider may include positive reinforcement (e.g., praise or concrete rewards for accuracy) or may use a system that increases the client’s motivation (e.g., the use of a computer).

A treatment provider working with an individual with RAD who has INH behaviors may find that the client has a tendency to attribute sadness to other facial expressions. Similar assessments and interventions would be appropriate. However, the treatment provider may also want to include two additional components. First, understanding that attribution bias implies that other emotions are not accurately recognized or are not attended to, providers may need to include exposure to and

instruction about various emotions. Second, if the client appears to have anxiety and/or resistance, these behaviors require intervention (e.g., teaching self-calming strategies, using supportive therapy and behavior contingencies for resistant behavior).

Treatment providers are in a good position to provide immediate, constructive feedback to enhance clients' abilities to recognize facial expressions of emotion, while providing the necessary support and teaching emotion regulation skills. This process could involve increasing clients' awareness of their own feelings by providing empathetic responses and labeling feeling states. As difficulties with facial expression recognition are intricately linked with the regulation of emotion states, treatment providers could integrate affective therapy with facial expressions recognition. As clients with RAD become more aware, they may begin to experience feelings associated with early maltreatment and attachment anxiety (e.g., fear, sadness, anger). Thus, the therapeutic process involves assisting clients with RAD in the development of emotion regulation strategies, as well as in improvement in social skills.

To summarize, in line with client-centered treatment, providers could easily integrate assessment of facial expression recognition as part of their initial evaluation, and could do so using a standardized measure as well as by observation and inquiry during their work with the child and his/her caretaker(s). Beneficial treatment interventions may include the active facilitation of the development of attachment between clients with RAD and their caregivers, through improving affective communication facilitated by accurate facial expression recognition.

### **Recommendations for Future Research**

The current study found that DIS dimension and INH dimension behaviors were present in varying degrees in most of these children diagnosed with RAD, suggesting that the current DSM subtype nosology may not accurately describe the social relatedness disturbances in RAD. This finding added to the accumulating research evidence and clinical reports suggesting that individual differences within RAD do not appear to be symptomatically independent, and that RAD may not be best conceptualized as two distinct subtypes (Minnis, 2007; Reekie, 2005; Zeanah et al., 2004). The DSM-IV-TR criteria (which require the specification of only one subtype and also assigns the DIS dimension behaviors to RAD-D only), do not account for the current findings. Thus, the current DSM criteria may be a diagnostic misclassification, which may mitigate the effective treatment for RAD. Assessment of the social relatedness disturbances in RAD may be more appropriate and successful if these disturbances are conceptualized as dimensions, or features of RAD, rather than as subtypes of RAD. Future research studies could incorporate this information in designs that allow for the identification of varied social relatedness disturbances within individuals diagnosed with RAD.

For example, increasing understanding about the various social relatedness disturbances exhibited by individuals with RAD could be facilitated by the use of caretaker behavior ratings, such as the RPQ. Measures such as these allow for studying social relatedness disturbances as dimensions or features, rather than as subtypes, and allow for the presence of varied behaviors within individuals. Researchers in future studies may consider the benefits of supplementing these caretaker rating scales, with

behavioral ratings from others who have opportunities to observe children in different social contexts, and perhaps researcher observations. Additional information regarding social relatedness disturbances could then be added to the DSM criteria, and clinicians could be better prepared to identify cases of RAD. The study of individual differences within RAD is in its infancy, and future research studies addressing individual differences within RAD could contribute to our understanding.

When investigating RAD, collecting accurate historical data is important, including information about when the child was first removed from the home, the amount of time spent in foster care or out-of-home placement, the number of placements the child has had, permanency status (i.e., whether the child is living with permanent caretakers or continues to be in foster care), and histories of abuse and neglect. In addition, information about the length of time the child has been in this/her current home would seem to be important. Due to the difficulty of acquiring this information encountered in the current study, one recommendation is that a researcher review the historical information with the caretaker, to increase the likelihood that caretakers understood the inquiries. Although researchers may not be able to access confidential records to verify information, it seems prudent that they gather collateral data when feasible (e.g., protective services reports, adoption records) to acquire accurate information.

Studies investigating the facial expression abilities of individuals with RAD may benefit from extending the current findings and exploring facial recognition abilities using a measure that incorporates the ability to assess the time at which an expression is recognized. In real life interactions, facial expressions may be recognized in fractions of

a second, whereas in facial expression studies, participants are given more time to determine the emotion being expressed.

Using a measure that enables researchers to assess the facility with which participants recognize emotions may help explain the role of facial expression recognition in various social relatedness problems. For example, using this kind of measure for additional investigation of the current study's findings regarding the association between INH and an attribution for sad facial expressions would enable researchers to examine influential and possible confounding variables. If research found, for example, that the attribution of sad to other facial expressions was to occur more quickly than the recognition of other facial expressions, we may learn that this attribution bias occurs automatically. Then, if participants were asked to delay their selection and an attribution bias for sad was no longer exhibited, mechanisms affecting ability may be considered. Rather than an inability to recognize an emotion accurately, these findings might suggest another mechanism, such as anxiety or impulsivity, was an important factor affecting facial expression recognition abilities. Connecting back to social relatedness disturbances, interventions to improve facial expression recognition would include strategies to manage anxiety or impulsiveness, thereby positively impacting social relatedness.

### **Conclusion**

This study may contribute to the limited knowledge of the of the social relatedness disturbances exhibited by children with RAD. By exploring associations between the social relatedness disturbances and facial recognition abilities, recognition

errors, and attribution biases in a clinical sample of RAD, results of this study add to the small body of empirical findings that will enable researchers and clinicians to understand more about individual differences within RAD. In addition, this study potentially makes indirect, yet important, contributions to children with RAD and their caretakers, as well as to the many social and private agencies that serve children with RAD. This study also supported findings from previous studies that suggest the current DSM subtype nosology may need to be revised. In addition, results of this study partially supported hypotheses of associations between the two social relatedness dimensions in RAD and particular facial expression recognition errors and attribution biases.

According to attachment theory, an individual's attachment style filters or shapes the information perceived from facial expressions (Niedenthal et al., 2002). Adaptive patterns developed in infancy, including a lack of attending to facial expressions, avoidance of anticipated pain by inhibiting experiences of emotions, or conversely, sensitivity for particularly salient facial expressions of emotion, may set trajectories for particular types of social relatedness disturbances.

The differential findings for facial expression recognition between the DIS and INH dimensions highlight the importance of considering particular facial expression recognition errors and attribution biases to add to our understanding of the individual differences within RAD. Specifically, compared to individuals with lower DIS scores, those with higher DIS scores made more errors recognizing sad in child facial expressions. In contrast, individuals with higher in INH scores, compared to those with lower INH scores, did not appear to have difficulty recognizing sad in facial expressions,

but did exhibit an attribution bias for seeing sad in happy, angry, and fearful facial expressions.

The two social relatedness dimensions were not mutually exclusive, and both dimensions were present in most participants in varying degrees, findings suggest that the differences in the social relatedness disturbances exhibited by these children may be related to the differences in how they perceived facial expressions of sadness.

Understanding that individuals with RAD exhibiting high DIS dimension behaviors (i.e., indiscriminate/disinhibited) may be missing important social cues (e.g., that a peer is experiencing sadness), may explain, in part, the lack of empathy observed in some individuals with RAD. Finding that individuals with RAD exhibiting high INH dimension behaviors (i.e., withdrawn/inhibited) exhibited an attribution bias for sad in other expressions may suggest particularly impoverished histories, perhaps including caretaker(s) with depressive symptomatology, and ambivalent attachment relationships.

The findings in the current study are theoretically consistent with the notion that individual differences in social relatedness disturbances in RAD may be associated with particular facial expression recognition errors and attribution bias. Further study is needed to further advance our understanding.

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APPENDIX A: ANSWER SHEET FOR DANVA 2 RESPONSES

Adult Faces

- |                             |                             |
|-----------------------------|-----------------------------|
| 1. Happy Sad Angry Fearful  | 17. Happy Sad Angry Fearful |
| 2. Happy Sad Angry Fearful  | 18. Happy Sad Angry Fearful |
| 3. Happy Sad Angry Fearful  | 19. Happy Sad Angry Fearful |
| 4. Happy Sad Angry Fearful  | 20. Happy Sad Angry Fearful |
| 5. Happy Sad Angry Fearful  | 21. Happy Sad Angry Fearful |
| 6. Happy Sad Angry Fearful  | 22. Happy Sad Angry Fearful |
| 7. Happy Sad Angry Fearful  | 23. Happy Sad Angry Fearful |
| 8. Happy Sad Angry Fearful  | 24. Happy Sad Angry Fearful |
| 9. Happy Sad Angry Fearful  |                             |
| 10. Happy Sad Angry Fearful |                             |
| 11. Happy Sad Angry Fearful |                             |
| 12. Happy Sad Angry Fearful |                             |
| 13. Happy Sad Angry Fearful |                             |
| 14. Happy Sad Angry Fearful |                             |
| 15. Happy Sad Angry Fearful |                             |
| 16. Happy Sad Angry Fearful |                             |

APPENDIX B: RELATIONSHIP PROBLEMS QUESTIONNAIRE

Participant # \_\_\_\_\_

Informant \_\_\_\_\_

*Please check the statement that best describes your child.*

	Exactly like my child	Like my child	A bit Like my child	Not at all like my child	For Office Use Only
Tends to be afraid of new things or situations					<input type="checkbox"/> 1
Acts younger than his/her age					<input type="checkbox"/> 2
Gets too physically close to strangers					<input type="checkbox"/> 3
Is often unhappy, tearful or distressed					<input type="checkbox"/> 4
Is too cuddly with people s/he doesn't know well					<input type="checkbox"/> 5
Is apathetic/ "can't be bothered"					<input type="checkbox"/> 6
Often asks very personal questions even though s/he does not mean to be rude					<input type="checkbox"/> 7
Can be aggressive towards him/herself e.g., using bad language about him/herself, headbanging, cutting etc.					<input type="checkbox"/> 8
Has few friends					<input type="checkbox"/> 9
Has no conscience					<input type="checkbox"/> 10
Is too friendly with strangers					<input type="checkbox"/> 11
Very "clingy"/wants to be with you all the time					<input type="checkbox"/> 12
Is difficult to comfort when scared or upset					<input type="checkbox"/> 13
Sometimes looks frozen with fear, without an obvious reason					<input type="checkbox"/> 14
Is demanding or attention seeking					<input type="checkbox"/> 15
If you approach him/her, he/she often runs away or refuses to be approached					<input type="checkbox"/> 16
There is a false quality to the affection s/he gives					<input type="checkbox"/> 17
If you approach him/her, you never know whether s/he will be friendly or unfriendly					<input type="checkbox"/> 18
Scoring					

## APPENDIX C: INFORMED CONSENT DOCUMENT-IRB APPROVED

Title of Research Study: Reactive Attachment Disorders: Assessment and Diagnostic Procedures

Principal Investigator: Jeannie Golden, Ph.D., Psychology Department, Harriot College of Arts and Sciences

Subinvestigators: Cathy W. Hall, Ph.D., Psychology Department, Harriot College of Arts and Sciences; Beverly Sheaffer, Graduate Student, Department of Rehabilitation Studies

Institution: East Carolina University

Address: Department of Psychology

Telephone #: 252-328-6206

### INTRODUCTION

You are being asked to participate in a research study being conducted by Jeannie Golden Ph.D., Cathy Hall, Ph.D., and Beverly Sheaffer, M.A. This research study is investigating attachment difficulties in children and adolescents. The purpose of this research is to evaluate the reliability and validity of measures designed to assess RAD and to investigate deficits in emotional functioning in children diagnosed with RAD.

### PLAN AND PROCEDURES

As part of the study, you as parents are being asked to **either** complete two measures about your child that are designed to diagnose RAD **or** to give permission to have a social worker or therapist complete those two measures (in the case of foster parents) . There is very little information on any measures currently available that assess RAD. Through our research we hope to be able to develop better ways of assessing RAD and provide information on the scales that are available.

Also as part of the study your child will be given two measures that involve emotional responses. The first one is the Diagnostic Analysis of Nonverbal Accuracy (DANVA). This scale assess your child's ability to identify emotional expression in others by looking at pictures that show different adult's and children's facial expressions and by listening to voice recordings of adult's and children's voices and identifying the emotion motion they believe each person is expressing. The emotions we will be assessing are happy, sad, angry, and fearful.

Next, children will be asked to respond to several case vignettes depicting a situation they might experience at school that involves making a difficult decision. The child will be

asked what the individual in the story should do, and then they will be asked what they would do in a similar situation.

It will take the child about one hour to one hour and 15 minutes to complete the assessments. Your decision to participate or not participate in this study will in no way impact any service you or your child are currently receiving or will receive in the future through the Department of Social Services.

### **POTENTIAL RISKS AND DISCOMFORTS**

There is the potential for possible discomfort to you or your child associated with answering questions that might seem personal or intrusive. If either you or your child show any signs of discomfort, the researchers will inform you or your child that you have a right to not answer the question and/or to discontinue the assessment procedures without any penalty or loss of services.

### **POTENTIAL BENEFITS**

We are hopeful that our research will contribute to a greater understanding of RAD that could potentially help children and families in the future.

### **SUBJECT PRIVACY AND CONFIDENTIALITY OF RECORDS**

After all of the information is collected, each child will be assigned a participant number, and names and other identifying information will be separated from the research data. Only the researchers will see the information before individual identities are removed. All of the information collected for this research project will be handled securely. No individually identifiable information will be presented with regard to you or your child.

### **Research Participant Authorization to Use and Disclose Information**

The purpose of the information to be gathered for this research is to better understand the diagnosis of Reactive Attachment Disorder. The individuals that will receive or access your child's identifiable health information, for research purposes include Jeannie Golden, Ph D.; Cathy W. Hall, Ph.D.; Kristin Termini, Graduate Student; Katharine Bridgers, Graduate Student; Beverly Sheaffer, Graduate Student; Elizabeth Thrall, Student; and April Tharrington, Student. The type of information accessed for this research includes: any of your child's current psychiatric diagnoses,

therapy, current or past medical problems and medications that your child takes. The information will be used and released in such a way as to protect your identity as much as possible; however, confidentiality cannot be absolutely guaranteed. Someone receiving information collected under this authorization could potentially re-disclose it, and therefore it would no longer be protected under HIPAA. There is not an expiration date for the use and disclosure of the information collected for this research study.

You may not participate in this study if you do not sign this Authorization form. You can limit the amount and type of information that is shared or revoke the authorization by submitting a request in writing to Dr. Jeannie Golden, Department of Psychology, East Carolina University, Greenville, NC 27858. The research team will be able to use any and all the information collected prior to the request not to disclose information.

### **COSTS OF PARTICIPATION**

There is no cost to you for participating in this research.

### **COMPENSATION**

You will not receive any compensation for participating in this research. You will be able to attend a Parent Training Seminar one of the researchers is presenting through the Department of Social Services. Participation in the research is not a requirement of the Training. You may attend the Training even if you decide not to participate in our research study.

### **VOLUNTARY PARTICIPATION**

Participating in this study is voluntary. If you or your child decides not to be in this study after it has already started, you may stop at any time without losing benefits that you should normally receive, and all information that has been collected will be destroyed. You may stop at any time you choose without penalty.

### **PERSONS TO CONTACT WITH QUESTIONS**

The investigators will be available to answer any questions concerning this research, now or in the future. You may contact the principal investigator, Dr. Jeannie Golden at phone numbers 252-328-6206 (days) or 252-946-9500 (nights and weekends). If you have questions about your rights as a research subject, you may call the Chair of the University and Medical Center Institutional Review Board at phone number 252-744-2914 (days) and/or the ECU Risk Management Office at 252-328-6858.

## **CONSENT TO PARTICIPATE**

**Title of research study:** Reactive Attachment Disorders: Assessment and Diagnostic Procedures

I have read all of the above information, asked questions and have received satisfactory answers in areas I did not understand. (A copy of this signed and dated consent form will be given to the person signing this form as the participant or as the participant authorized representative.)

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Participant's Name <b>(PRINT)</b>	<b>Signature</b>	<b>Date</b>	<b>Time</b>
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If applicable:

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Guardian's Name <b>(PRINT)</b>	<b>Signature</b>	<b>Date</b>	<b>Time</b>
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Advocate's Name <b>(PRINT)</b>	<b>Signature</b>	<b>Date</b>	<b>Time</b>
--------------------------------	------------------	-------------	-------------

PERSON ADMINISTERING CONSENT: I have conducted the consent process and orally reviewed the contents of the consent document. I believe the participant understands the research.

---

Person Obtaining consent <b>(PRINT)</b>	<b>Signature</b>	<b>Date</b>
---	------------------	-------------

---

Principal Investigator's <b>(PRINT)</b>	<b>Signature</b>	<b>Date</b>
---	------------------	-------------

APPENDIX D: INFORMED MINOR ASSENT DOCUMENT-IRB APPROVED

Research Study: Reactive Attachment Disorders: Assessment and Diagnostic  
Procedures Principal Investigator: Jeannie Golden Ph.D.  
Contact Information: 252-328-6206

The following will be read to each child asked to participate in this research study:

We are asking you to take part in our research study. We will ask you to look at some pictures of people with different facial expressions and tell us what emotions you think the people in the pictures are feeling. Then we will ask you to listen to some voices recorded on a tape and tell us what you think the people on the tape are feeling. Next we are going to read you some stories about children at a school. We will ask you what you think the children will do in the story and then what you would do in a similar situation. Then you will complete some sentences. Finally, you will draw two pictures and tell us a story about one of the pictures. We hope our study will help us learn things that will be able to help other children and their families. Participating in our research is your choice, and you can stop at any time. Some of the questions we will ask you are kind of personal and you might not want to answer them. If that happens, please let us know and that will be okay. No one will be upset with you if you decide not to participate. Do you have any questions about our research? Will you agree to help us by taking part in our study?

Child gave assent:    Yes    or    No

Child's Name:

\_\_\_\_\_

Signature of Researcher obtaining assent:

\_\_\_\_\_

Date: \_\_\_\_\_

APPENDIX E: DEMOGRAPHIC AND HISTORY FORMS

Date \_\_\_\_\_  
Participant Number \_\_\_\_\_  
(To be completed by the researchers)

Reactive Attachment Disorders:  
Assessment and Diagnostic Procedures

Demographic Information  
And  
Treatment History

Child's Name:

\_\_\_\_\_

Last	First	Middle
------	-------	--------

Informant \_\_\_\_\_ Relationship of Informant \_\_\_\_\_

Please complete the form on the following page. Do not include the child's name or any other identifying information on pages 2 and 3. After each child has been assigned a participant number, the first page of this document will be removed, so that confidentiality will be maintained.

## Reactive Attachment Disorders: Assessment and Diagnostic Procedures

### Demographic Information

Thank you for supplying the following information. Please do not include the child's name or any other identifying information on this page.

Child's Current Age (in years and months) \_\_\_\_\_ Grade \_\_\_\_\_

Child's Gender \_\_\_\_\_ Child's Race or Ethnicity \_\_\_\_\_

What is your relationship to the child?

\_\_\_\_\_  
(Example: Biological mother, Foster mother, Grandfather)

Are you a primary caregiver? \_\_\_\_\_

If not, how much time do you spend in caregiving activities with the child? \_\_\_\_

Has the child ever been removed from the home or placed in foster care? \_\_\_\_\_

Child was placed outside the biological home due to \_\_\_\_\_

Has child been adopted? \_\_\_\_\_ Length of time child has been adopted \_\_\_\_\_

Length of time child has been in the foster care system \_\_\_\_\_

Number of previous foster placements \_\_\_\_\_

Length of time child has been with their current foster family \_\_\_\_\_



## APPENDIX F: IRB APPROVAL LETTER



University and Medical Center Institutional Review Board  
East Carolina University  
Ed Warren Life Sciences Building • 600 Moye Boulevard • LSB 104 • Greenville, NC 27834  
Office 252-744-2914 • Fax 252-744-2284 • [www.ecu.edu/irb](http://www.ecu.edu/irb)  
Chair and Director of Biomedical IRB: Charles W. Daeschner, III, MD  
Chair and Director of Behavioral and Social Science IRB: Susan L. McCammon, PhD

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TO: Jeannie Golden, PhD, Department of Psychology, ECU, Rawl Building 315

FROM: UMCIRB

DATE: March 21, 2007

RE: Full Committee Approval of a Study

TITLE: "Reactive Attachment Disorders: Assessment and Diagnostic Procedures"

### UMCIRB #07-0158

The above referenced research study was initially reviewed by the convened University and Medical Center Institutional Review Board (UMCIRB) on 3/7/07. The research study underwent a review and approval of requested modifications on 3/19/07 by Dr. C. Daeschner. The UMCIRB deemed this **unfunded** study **no more than minimal risk** requiring a continuing review in **12 months**. Changes to this approved research may not be initiated without UMCIRB review except when necessary to eliminate an apparent immediate hazard to the participant. All unanticipated problems involving risks to participants and others must be promptly reported to the UMCIRB. The investigator must submit a continuing review/closure application to the UMCIRB prior to the date of study expiration. The investigator must adhere to all reporting requirements for this study.

The above referenced research study has been given approval for the period of 3/7/07 to 3/6/08. The approval includes the following items:

- Internal Processing Form (modified 3/19/07)
- Demographic Information Form
- Protocol
- Consent Document (modified 3/19/07)
- Minor Assent (modified 3/19/07)
- COI Disclosure Form (dated 2/18/07)
- Case Scenarios (modified 3/19/07)

The following UMCIRB members were recused for reasons of potential for Conflict of Interest on this research study:  
None

NOTE: The following UMCIRB members with a potential Conflict of Interest did not attend this IRB meeting:  
None

**The UMCIRB applies 45 CFR 46, Subparts A-D, to all research reviewed by the UMCIRB regardless of the funding source. 21 CFR 50 and 21 CFR 56 are applied to all research studies under the Food and Drug Administration regulation. The UMCIRB follows applicable International Conference on Harmonisation Good Clinical Practice guidelines.**