



Disinhibited Social Engagement Disorder in Early Childhood Predicts Reduced Competence in Early Adolescence

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Abstract

Psychosocial deprivation is associated with the development of socially aberrant behaviors, including signs of disinhibited social engagement disorder (DSED). In longitudinal studies, signs of DSED have been shown to decrease over time, especially as children are removed from conditions of deprivation. What is less clear is whether signs of DSED in early childhood are associated with poorer functioning in early adolescence, including among children who no longer manifest signs of DSED at this age. In a sample of 136 Romanian children from the Bucharest Early Intervention Project (BEIP), who were exposed to early psychosocial deprivation in the form of institutional care, we examined caregiver-reported (ages 30, 42, and 54 months and 12 years) and observer-rated (age 54 months) signs of DSED. Competent functioning in early adolescence (age 12 years) was assessed across seven domains (i.e., family relationships, peer relationships, academic performance, physical health, mental health, substance use, and risk-taking behavior). A diagnosis of DSED in early childhood was associated with reduced competence in early adolescence. Furthermore, this association was significant even when signs of DSED diminished by age 12 years. We conclude that signs of DSED in early life are associated with reduced likelihood of competent functioning many years later in adolescence, even if signs of the disorder remit.

Keywords Institutional care · Disinhibited social engagement disorder · Competence · Early adolescence

Disinhibited social engagement disorder (DSED) involves socially aberrant behaviors such as wandering away from a caregiver, willingness to depart with a stranger, and engagement in overly familiar physical behaviors (e.g., seeking physical contact such as a hug) with unfamiliar adults (American Psychiatric Association 2013; ZERO TO THREE 2016). Explicit in the etiology of DSED is the requirement that a child's early caregiving environment is insufficient—that

is—involves social neglect or lack of opportunities to develop a preferred attachment (American Psychiatric Association 2013; ZERO TO THREE 2016). Thus, severe deprivation early in life is associated with elevated rates of DSED (Corval et al. 2017; Gleason et al. 2014; O'Connor and Rutter 2000; Smyke et al. 2002; Zeanah et al. 2005).

In young children, signs of DSED are associated with impairment in functioning across domains. For example, signs of DSED are linked to deficits in cognitive control, and with higher levels of impulsivity and hyperactivity (Gleason et al. 2011). DSED is also associated with poorer functioning in the domains of socialization and motor skills (Giltaj et al. 2016). In adolescence, signs of DSED have been concurrently linked to impairment in social functioning and hyperactivity (Guyon-Harris et al. 2019; Moran et al. 2017).

Development is a dynamic rather than static process and is subject to change based on individual and environmental factors (Cicchetti 1993; Sroufe 1990). Specifically, understanding factors related to the persistence and desistance of psychopathology, as well as the potential long-term outcomes associated with each, are important tasks for developmental psychopathologists. Longitudinal studies of children raised in depriving institutions have demonstrated only moderate

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persistence of signs of the disorder over time, with some children showing persistence of signs through early and middle childhood and others showing desistence (Guyon-Harris et al. 2018; Kreppner et al. 2010). Thus, while some children continued to evince signs of DSED across development, others do not. It is important to understand the impact of signs of DSED early in life on later functioning, both for those who do and do not continue to show signs of DSED.

The presence of concurrent functional impairments of DSED in early and middle childhood (Giltaij et al. 2016; Gleason et al. 2011) and in early adolescence (Guyon-Harris et al. 2019; Moran et al. 2017) suggest that signs of DSED impact current functioning. What is less clear, however, is whether children who show signs of DSED in early childhood that later desist are still at risk for subsequent functional impairments. Historically, there has been some debate within the field of developmental psychopathology about the degree to which early experiences have an impact on later child behavior and, furthermore, whether such effects are enduring or effaced away by subsequent experiences (Clarke and Clarke 2000; Fraley et al. 2013; Haltigan et al. 2013).

We examined the association between a diagnosis of DSED in early childhood and competent functioning in early adolescence across a range of domains. We previously validated an indicator of competence in 12-year-old children who had experienced severe psychosocial deprivation, creating a composite score based on adaptive functioning in seven domains (i.e., family relations, peer relations, academic performance, physical health, mental health, substance use, and risk-taking behavior) (Humphreys et al. 2018). This measure was externally validated through significant associations with children's stress response and cognitive ability. We found that only 40% of children with histories of psychosocial deprivation were determined to be "competent" in their functioning at age 12 years (i.e., above the adaptive functioning threshold for at least six domains), whereas 82% of the never institutionalized community comparison children met the same threshold. The domains of competence used to create this composite do not overlap with the clinical features of DSED, and therefore provide an outcome metric that would not simply serve as a marker of impairment specific to DSED. In the present study, we sought to extend our previous work by examining the prolonged effects of DSED on competent functioning in a sample of children who had experienced profound early deprivation.

The current investigation has three purposes. First, we wanted to determine if signs of DSED at age 12 years were associated with reduced competence concurrently, given that early adolescence is an age at which little is known about DSED. Our first hypothesis was that signs of DSED would be associated with reduced competence, assessed concurrently. With this we aimed to build upon existing literature (e.g., Tizard and Hodges 1978) that suggests that signs of DSED are associated with concurrent social and functional difficulties.

Findings are expected to determine if DSED is associated with reduced competence and across a broader range of domains of functioning. Our second hypothesis was that signs of DSED measured in early childhood, assessed using both caregiver report (ages 30, 42, and 54 months; hypothesis 2a) and an observational paradigm (age 54 months; hypothesis 2b), would prospectively predict reduced competence at age 12 years. To our knowledge, this is the first known study to examine the prospective association between signs of DSED in early childhood on later competence in adolescence. Thus, findings from hypotheses 2a and 2b two are expected to add to our understanding of whether early DSED has an enduring effect on functioning in adolescence. In our third hypothesis, we were interested in exploring whether signs of DSED in early childhood have a lasting impact on competent functioning at age 12 years even if signs of DSED have desisted by age 12 years. If signs of DSED in early childhood are associated with reduced competence in early adolescence even in the absence of signs of DSED in early adolescence (i.e., even when signs remit over time) there are significant implications for clinical assessment and treatment in early childhood and adolescence. This exploratory hypothesis offers a test of persistence versus desistence with regard to the relation of early signs of DSED to later functioning.

Method

Participants

Participants in the present study were drawn from the Bucharest Early Intervention Project (BEIP). The BEIP is a prospective examination of foster care as an alternative to institutional care in Romania. Children ($n = 187$) were recruited from six institutions. Fifty-one children were excluded from participation for medical reasons (e.g., genetic syndromes and microcephaly). Thus, 136 children (51% female) ages 6 to 31 months who had been abandoned and were living in institutions in Bucharest were enrolled into the study. The children were randomly assigned to high quality foster care (foster care group, FCG, $n = 68$) or to care as usual (care as usual group, CAUG, $n = 68$). The CAUG comprised 33 boys and 35 girls and the FCG comprised 34 boys and 34 girls. The groups did not differ based on age, sex, ethnicity, birth weight, developmental quotient, observed caregiving environment, or caregiver rated behavioral problems (Smyke et al. 2007). All caregivers (institution staff and primary foster parent) who participated in the study were female.

Children were assessed prior to randomization (at baseline, M age = 22 months), and then followed up at age 30, 42 and 54 months, when the trial concluded. Additional follow-up assessments occurred when children were age 8 and 12 years. Additional details about the original sample are available

elsewhere (Nelson et al. 2014; Zeanah et al. 2003). While a never institutionalized group has also been studied as part of the trial to provide a local comparison group, the present analyses involved only children from the FCG and CAUG. We used available data on children who participated at the 30, 42, and 54 month and 12 years assessments (see supplemental Table 1, available online).

Children who dropped out of the study between the baseline and age 12 years assessments did not differ in age placed in foster care, birth weight, gestation age at birth, and APGAR score from children who were retained.

Foster Care Intervention

Foster parents were supported by Romanian social workers who were trained in an attachment-based model of child-centered foster care by clinicians in the United States (US). US-based clinicians provided weekly consultation to the social workers throughout the period of the RCT (baseline through the age 54 months assessment). BEIP foster care was high quality in that it was created with the idea that foster parents make a full and long-term commitment to the children in their care, treating them as if they were their biological children. The system was supported by project trained social workers who provided regular support and help as needed to foster families (Smyke et al. 2009). The stability of placements was 87% over the course of the trial, and the care provided was rated by coders naïve to group to be significantly better than the care provided by institutional caregivers (Nelson et al. 2014). Following the age 54 month assessment, direction of the foster care network was transferred to the Romanian government for continued support.

Measures

All measures were translated into Romanian, then back translated into English, and assessed for meaning at each step by bilingual research staff.

Disturbances of Attachment Interview Signs of DSED at ages 30, 42, and 54 months were assessed using the Disturbances of Attachment Interview (DAI; Smyke et al. 2002), which is a 12-item, semi-structured caregiver interview that has been well validated (Gleason et al. 2011, 2014; Oosterman and Schuengel 2007). Items are rated following a series of probes by trained researchers on a scale from “0” to “2,” with higher ratings indicating a greater probability of presence of signs. Three items assess for signs of DSED (lack of reticence around strangers; failing to check back in unfamiliar places; and wandering off with strangers). Additional items on the DAI assess for other attachment disturbed behaviors not specific to DSED. Meeting criteria for DSED was operationalized as a score of “2” on two of the three items of the DAI assessing DSED (see

Gleason et al. 2011). Strong internal consistency ($\alpha = 0.83$) along with good inter-rater reliability ($\kappa = 0.88$) for the DAI have been established (Smyke et al. 2002). DSED as assessed by the DAI has been shown to be related to other caregiver report measures and behavioral measures of disinhibited social behavior (Gleason et al. 2014; Zeanah et al. 2002).

At age 12 years, signs of DSED were assessed using the Disturbances of Attachment Interview—Early Adolescence (DAI-EA; Humphreys et al. 2017), which is a 15-item structured caregiver interview administered and scored in the same manner as the DAI and validated by distinguishing deprived from non-deprived samples (Humphreys). The same items noted above for the early childhood version were used to assess signs of DSED.

Stranger at the Door Indiscriminate social behavior at age 54 months was assessed using the Stranger at the Door observational procedure (Gleason et al. 2014). At the age 54-month interview, following coordination with the child’s caregiver, a research assistant who was a stranger to the child came to the door of the child’s residence, looked at the child, and said, “Hello, my name is Florin. Come with me, I have something to show you.” The caregiver was briefed about the procedure ahead of the interview and told to accompany the child to the door when the stranger arrived. The caregiver was instructed not to signal any directions verbally or nonverbally in response to the stranger’s invitation. If the child left with the stranger, they were taken around the corner and greeted by a familiar research assistant who said, “Hello, I am here to play with you again.” Whether children stayed with the caregiver (“0”) or left (“1”) was coded from a written description of the child’s behavior composed by the research assistants at the time of the procedure. Two coders, without knowledge of the child’s placement status, achieved perfect inter-rater reliability on these ratings ($\kappa = 1.0$; Gleason et al. 2014).

The Stranger at the Door procedure was developed and introduced midway through the initiation of the age 54 month assessment protocol (i.e., after many children already had been assessed at age 54 months), and thus is only available for a subset of participants ($n = 53$). The Stranger at the Door procedure was developed out of the need to have a more comprehensive assessment of disinhibited behavior that involved child behavior to supplement caregiver report.

Social Skills Rating System The Social Skills Rating System (SSRS; Gresham and Elliott 1990) is a caregiver report of social and behavioral functioning. Internal consistency ($\alpha = 0.90$ for the total social skills scale) and good convergent validity with another established measure of social skills have been established (Gresham et al. 2011). Items from the SSRS were used to derive the family relationships domain (see Table 1). The family relationship domain demonstrated good internal consistency ($\alpha = 0.77$). Example items from the

Table 1 Competence domain information

	Family relationships	Peer relationships	Academic performance	Physical health	Mental health	Substance use	Risk-taking behavior	Overall competent functioning
Competent functioning threshold	Within 1 standard deviation of community children on a scale comprising 8 items from the SSRS	Within 1 standard deviation of community children on a scale comprising 8 items from the HBQ	In a regular school setting and within 1 standard deviation of community children on a scale comprising 3 items from the HBQ	Health has never interfered with functioning	Within 1 standard deviation of community children on a scale comprising 8 items on the HBQ	Using no substances, Used tobacco only, or used alcohol only	Within 1 standard deviation of community children on a scale comprising 6 items from the YRBS	Threshold met for 6 or 7 domains
Alpha	0.77	0.81	0.91	0.38 (0.76)	0.87	0.69 (0.72)	0.64	0.64
Overall scale <i>M</i> (<i>SD</i>)	11.11 (3.21)	15.80 (3.58)	15.80 (3.58)	0.38 (0.76)	2.52 (3.19)	0.69 (0.72)	1.73 (1.55)	5.18 (1.72)
Range	3–16	5–20	3–15	0–3	0–14	0–2	0–6	0–7
Cutoff value	9 or higher	16 or higher	Regular school and 9 or higher	0 only	2 or fewer	0 or 1	3 or fewer	6 or higher
<i>N</i> (%) classified as competent	118 (80%)	98 (67%)	89 (61%)	111 (76%)	95 (65%)	125 (85%)	125 (85%)	79 (54%)

Values in table as based on the entire sample (i.e., EIG and NIG) with available data at age 12 years (*N* = 147)

family relationships domain include: “*Volunteers to help family members with tasks,*” “*Controls temper in conflict situations with you,*” and “*Cooperates with family members without being asked to do so.*”

MacArthur Health and Behavior Questionnaire The MacArthur Health and Behavior Questionnaire (HBQ; Essex et al. 2002) is a caregiver-report of child health and emotional and behavioral adjustment. The HBQ has been used with institutionally reared children (Wiik et al. 2011) and has demonstrated good test-retest reliability and discriminant validity (Ablow et al. 1999). Items from the HBQ contributed to assessments of the peer relationships ($\alpha = 0.81$; Example items: “*Will try to help someone who has been hurt or is feeling sick,*” “*Offers to help peers who are having difficulty with a task,*” “*Comforts a peer who is upset or feel down*”), academic performance ($\alpha = 0.91$; Example items: “*What is the child’s current school performance in math?*”), physical health (a single item was used: “*To what extent does health limit this child in any way, keeping him or her from activities?*”), and mental health domains. For the mental health domain, caregivers rated impairment in eight areas (e.g., difficulty getting along with teachers, missing school, difficulties getting along with others) as a result of behavioral problems noted in a previous section of the HBQ ($\alpha = 0.87$).

Academic Performance The academic performance competence domain was based on information from two sources. The first source was BEIP staff reports of whether the youth was in a regular or special school setting. The second source was three items from the HBQ pertaining to school performance in math, reading/language arts, and general school performance (details presented above). Children were classified as competent in the academic performance domain if they were in a regular school setting and also scored within one standard deviation of community comparison youth on the items from the HBQ pertaining to school performance.

Youth Risk Behavior Survey (YRBS; Centers for Disease Control and Prevention 2001) The YRBS is a youth-report of engagement in risky behavior including drug and alcohol use and general risk-taking (e.g., not wearing a seatbelt), supplemented with culturally relevant risk-taking behaviors among youth in Romania (e.g., provoking street dogs). Successful use of the YRBS in previous research has been documented (Aklin et al. 2005; Lejuez et al. 2003; MacPherson et al. 2010). More specifically, scores on the YRBS are correlated with measures of risk taking and sensation seeking (Aklin et al. 2005; Lejuez et al. 2003)

Items from the YRBS contributed to the substance use (“*Have you ever smoked a cigarette, even a puff?*” and “*Have you ever had a drink of alcohol, even a sip?*”) and risk-taking-behavior (e.g., “*In the past year, how many times have*

you provoked or participated in the provocation of street dogs?” “In the past year, how many times have you ridden in a car driven by someone who had been drinking alcohol?”) domains. Only two items were used to assess the substance use domain, therefore, internal consistency could not be calculated. The risk-taking behavior domain demonstrated adequate internal consistency ($\alpha = 0.64$).

Competent Functioning We created a composite of competent functioning based on functioning in seven domains (i.e., family relationships, peer relationships, academic performance, physical health, mental health, substance use, risk-taking behavior). In addition to a sum of the number of domains in which the threshold for competent functioning was met (range = 0–7), each child was grouped based on whether their composite score was above the threshold for competent functioning (i.e., competent in at least six of the seven domains). A binary variable was created with a score of “0” indicating children who did not meet the threshold of at least six domains and “1” indicating children who met the overall competence threshold. Details regarding the make-up of each domain are briefly reported in Table 1.

Percent Time in Institutional Care For each child, we determined the placement history, including the number of months spent in institutional care. This information was used to calculate the percentage of the child’s life that was spent in institutional care through age 12 years.

Procedures

At 54 months, the Stranger at the Door procedure was administered during a data collection home visit to assess indiscriminate social behavior (Gleason et al. 2014). At the 30, 42, and 54-month and 12-year assessments, a primary caregiver (e.g., foster parent, adoptive parent, biological parent, relative caregiver or institutional care staff member who knew the child well, depending upon the child’s placement status) completed assessments with interviews and questionnaires in-person in the BEIP laboratory. Caregivers also reported on children’s school status and performance. Children reported on their substance use and risk-taking behaviors at the 12-year assessment.

Ethical Considerations

Approval for the study was granted by the institutional review boards of the three principal investigators (Boston Children’s Hospital, University of Maryland, and Tulane University), and by the local Commissions on Child Protection in Bucharest. The BEIP was conducted in collaboration with the Institute of Maternal and Child Health in the Romanian Ministry of Health. At each assessment wave, the child’s legal guardian

provided consent for participation. At the age 12-year follow-up, assent from each child for each procedure was obtained. Many children in both the FCG and CAUG changed placements over the course of the study. Throughout the course of the study, we did not interfere with decisions about placement following the initial randomization. Instead, all placement decisions following randomization were made by local child protection authorities. Ethical dimensions of the study have been discussed by us and others in detail elsewhere (Miller 2009; Millum and Emanuel 2007; Nelson et al. 2014; Zeanah et al. 2012).

Data Analysis

To test hypothesis 1, we examined concurrent associations between signs of DSED and competent functioning. Signs of DSED at age 12 years (measured dimensionally) were first used to predict which children were classified as competent using logistic regression. Next, bivariate correlations were used to examine the association between signs of DSED and the competence domain count.

To examine the association between signs of DSED in early childhood and competent functioning in early adolescence, we grouped children based on whether or not they met criteria for DSED at age 30, 42, or 54 months. Those who met criteria at least once during early childhood were classified as having early signs of DSED. The association between DSED and competent functioning (hypothesis 2a) was then examined by comparing the proportion of children who met criteria for DSED in early childhood with the proportion of children who met the overall competence threshold in early adolescence, using chi-square analyses.

Associations between the presence of DSED in early childhood and competent functioning were also examined using competence measured dimensionally as the number of competence domains met. Means, standard deviations, and effects sizes were provided. The impact of signs of DSED measured dimensionally as the maximum score across assessments at ages 30, 42, and 54 months on meeting the threshold for competent functioning in each of the seven domains was assessed using logistic regression.

To examine the association between disinhibited behavior from an observational assessment at age 54 months (i.e., Stranger at the Door; hypothesis 2b) in relation to competent functioning, we grouped children who did or did not leave with the stranger using dummy-coding (see Gleason et al. 2014). Analyses were completed on 42 children with complete data on the Stranger at the Door procedure at 54 months and competent functioning at age 12 years. The proportion of children who left with a stranger at age 54 months was compared to the proportion of children rated as competent at age 12 years using chi-square.

For hypothesis 3, we examined whether early signs of DSED present risk for deficits in competent functioning in early adolescence even in the absence of signs at this age (i.e., when signs are present at or before 54 months but not at age 12 years), by creating four groups of children based on presence (vs. absence) at each time point: never (no DSED at or before ages 54 month or at age 12 years), early only (DSED only at or before age 54 months), late only (DSED only age 12 years), and persistent (DSED at or before age 54 months and age 12 years). First, the DSED categories were compared on time spent in institutional care through age 12 years to examine whether children with and without signs of DSED differed in their exposure to institutional care. Next, the proportion of children in each DSED diagnosis category who met the threshold for competence was examined. Associations between DSED and competent functioning were also examined using competent functioning measured dimensionally as the number of competence domains met. This analysis was tested using ANOVA with planned comparisons between the early only and never categories and between the early only and persistent categories.

Significance levels at alpha level 0.05 and 95% confidence levels (CI) were provided for all effect sizes. Bivariate correlations between major study variables are presented in supplemental Table 2 (available online).

Results

Caregiver Report of DSED and Competent Functioning

As predicted in hypothesis 1, more signs of DSED at age 12 years were associated with an increased likelihood of not meeting the threshold for competent functioning at age 12 years (OR = 2.78, 95% CI [1.38, 5.59], $p = 0.004$). Signs of DSED at age 12 years were also negatively associated with the competence domain count at age 12 years ($r = -.44$, 95% CI [-0.59, -0.26], $p < 0.001$). Neither sex of the child nor intervention group (i.e., FCG versus CAUG) moderated the relation between signs of DSED at age 12 and competence domain count at age 12 years (sex: $b = 0.43$, $se = 0.25$, 95% CI [-0.07, 0.93]; intervention group: $b = -0.47$, $se = 0.27$, 95% CI [-1.00, 0.06]).

In testing hypothesis two, of the 111 children with available data in early childhood, forty-five (41%) met the diagnostic threshold for DSED at either age 30, 42, or 54 months. Data on competent functioning were available for 35 of the children with early DSED. Children with early DSED were significantly less likely to be classified as competent at age 12 years compared to children without an early diagnosis of DSED ($\chi^2[1] = 10.58$, $p = 0.001$; Table 2), providing support for hypothesis 2a. In fact, only seven children (20%) with DSED in

Table 2 Associations between disinhibited social engagement disorder signs in early childhood and competent functioning at Age 12 Years

	No DSED <i>n</i> (%)	DSED <i>n</i> (%)	$\chi^2(df)$
Not competent	26	28	10.58(1)**
Competent	31	7	
Total	57	35	

** $p < 0.01$

early childhood met the threshold for competence at age 12 years, whereas 31 (54%) who did not have DSED met the threshold for competence.

To further examine the predictions made in hypothesis 2a regarding associations between early DSED and later competence, associations between early signs of DSED and competent functioning were assessed using a count of the seven competence domains. Children with early childhood DSED met the threshold for competent functioning in significantly fewer domains ($m = 4.06$, $sd = 1.55$) at age 12 years compared to children without early signs of DSED ($m = 5.18$, $sd = 1.76$; $t[90] = 3.09$, $p = 0.003$, $d = 0.68$, 95% CI [0.40, 1.84]). Results were similar when using signs of DSED as a dimensional metric; more signs of DSED in early childhood were associated with lower competence domain count ($r = -0.32$, 95% CI [-0.45, -0.11], $p = 0.002$). In particular, children with more signs of DSED (measured dimensionally) in early childhood were more likely to be classified as not competent in the domains of academic performance and risk-taking behavior (see Table 3). There were no differences in likelihood of competent functioning between children with and without DSED in the domains of family relationships, peer relationships, mental health, physical health, or substance use.

Here, there was no moderation for child sex ($b = 0.14$, $se = 0.18$, 95% CI [-0.21, 0.50]) or for intervention group ($b = -0.24$, $se = 0.18$, 95% CI [-0.58, 0.11]).

Table 3 Odds of being classified as not competent by domain for children with signs of DSED in early childhood

	OR	95% CI		<i>p</i> value
		Lower	Upper	
Family relationships	1.12	0.89	1.40	0.340
Peer relationships	1.21	1.00	1.48	0.054
Academic performance	1.36	1.10	1.69	0.005
Physical health	1.19	0.96	1.47	0.120
Mental health	1.13	0.93	1.26	0.223
Substance use	1.11	0.89	1.40	0.383
Risk-taking behavior	1.46	1.12	1.91	0.006

OR = odds ratio, CI = confidence interval

Observed Disinhibited Social Behavior and Competent Functioning

As previously reported (Gleason et al. 2014), among the 60 ever institutionalized children who participated in the “Stranger at the Door” procedure at 54 months, 18 children (33%) left their caregivers to go with a stranger. At age 12 years, data on competent functioning were available on 42 (70%) of these children. Of the children who left with the stranger and for whom data on competent functioning are available ($n = 12$), only one was classified as competent at age 12 years (8%; see Table 4). Of the children who stayed with their caregiver ($n = 30$), a majority ($n = 18$; 60%) were classified as competent at age 12 years. Hypothesis 2b was supported; a Fisher’s exact test revealed that those who left with the stranger were significantly less likely to meet the threshold for competence compared to those children who remained with their caregiver (OR = 16.50, 95% CI [1.88, 145.02], $p = 0.011$).

DSED Categories and Competent Functioning

Of the 100 children with available data in early childhood and age 12 years, forty-eight children (48%) met criteria for DSED in either early childhood, early adolescence, or at both assessments compared to 52 (52%) who never met criteria for DSED. There were 14 (14%) in the persistent category, 6 (6%) in the late category (i.e., children who only met criteria for DSED at age 12 years) and 28 (28%) in the early only category (i.e., children who only met criteria for DSED in early childhood).

Prior to examining associations between the DSED categories and competent functioning (hypothesis 3), the DSED categories were compared on percent time in institutional care through age 12 years. Significant differences between DSED categories were found ($F(3, 96) = 9.45, p < 0.001$, partial $\eta^2 = 0.23$). Post-hoc testing revealed that children who never met criteria for DSED spent a significantly less time in institutional care ($m = 18.09$ months, $sd = 13.64$) compared to children in the early only ($m = 42.89$ months, $sd = 29.45$, M diff = 24.80 months, $p < 0.001, d = 1.08$) and persistent ($m = 40.46$ months, $sd = 28.29$, M diff = 22.38 months, $p = 0.007, d = 1.01$) categories. The early only and persistent categories

did not differ significantly from one another and the late only ($m = 40.51$ months, $sd = 31.14$) category did not differ from any of the other categories, despite a large mean difference and effect size when compared to the never category (M diff = 22.43 months, $p = 0.100, d = 0.93$).

A cross-tabulation comparing the proportion of children in each DSED category with the proportion of children classified as competent was examined to obtain a descriptive account of how many children in each category met the threshold for competence at age 12 years (see Table 5). A majority ($n = 28$; 57%) of children in the never category met the threshold for competence at age 12 years compared to only seven children (28%) in the early only category, two (33%) children in the late only category, and no children in the persistent category. A chi-square analysis could not be conducted because there were cells with fewer than five observations.

Competent functioning was examined dimensionally as a competence domains count. Statistically significant differences between DSED categories were found ($F[3,86] = 6.34, p = .001$, partial $\eta^2 = .18$). Planned comparisons between the early only and never and between the early only and persistent categories provided support for hypothesis 3. Children with early only signs of DSED ($m = 4.40, sd = 1.47$) had lower competence domain counts compared to children who never met criteria for DSED ($m = 5.33, sd = 1.65; t[86] = -2.32, p = 0.023, d = 0.60, 95\% CI [-1.73, -0.13]$), and there was a statistical trend (with a large effect size) in competence domain count comparing those with early signs and those with persistent signs of DSED ($m = 3.20, sd = 1.48; t[86] = -1.97, p = .052, d = 0.81, 95\% CI [-2.41, 0.01]$).

Discussion

We examined associations between DSED and competent functioning in early adolescence in a sample of children who had experienced early deprivation from being raised in large impersonal institutions. Several important findings emerged. First, signs of DSED when the children were 12 years old were concurrently associated with reduced competence,

Table 4 Associations between “Stranger at the Door” behavior at age 54 months and competent functioning at age 12 years

	Stayed	Left
	<i>n</i> (%)	<i>n</i> (%)
Not competent	12 (40%)	11 (92%)
Competent	18 (60%)	1 (8%)
Total <i>n</i>	30	12

Table 5 Associations between disinhibited social engagement disorder categories and competent functioning at age 12 years

	Never	Early only	Late only	Persistent
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
Not competent	21 (43)	18 (72)	4 (67)	10 (100)
Competent	28 (57)	7 (28)	2 (33)	0 (0)
Total <i>n</i>	49	25	6	10

Never = never met criteria for DSED. Early only = only met criteria for DSED at or before 54 months of age. Late = only met criteria for DSED at age 12 years. Persistent = met criteria for DSED at or before 54 months and at 12 years of age

demonstrating an association between signs of DSED and broad concurrent impairment. Second, children with signs of DSED in early childhood were less likely to be functioning competently in early adolescence compared to their counterparts without early signs of DSED. Third, negative associations between early DSED and later competent functioning remained even when signs of DSED diminished over time. Additionally, results were consistent across measurement types, with observational indicators of DSED converging with caregiver interview, helping to show that measurement variance did not explain the pattern of results. Therefore, early signs of DSED indicate substantial risk for competent functioning many years later in adolescence.

To gain further specificity about the domains of competence most negatively impacted by early signs of DSED, we examined the odds of being classified as not competent by domain for children with signs of DSED in early childhood. Academic performance and risk-taking behavior appeared to be most impacted by early signs of DSED. This may be due to difficulties with impulsivity and impulse control, which are common among children with DSED and may lead to academic difficulties and risk-taking behavior. One might expect that early DSED would lead to ongoing interpersonal difficulties, however, we did not find an association with the peer and family relationships domains, though an increase in signs of DSED in early childhood was associated with a modest (21%) increase in the likelihood of not meeting the threshold for competence in peer relationships ($OR = 1.21$). This could be partially explained by past work suggesting that DSED, as opposed to reactive attachment disorder (RAD), can co-occur with secure caregiver–child attachment and is less responsive (again, as opposed to RAD) to placement in a loving, supportive family setting (Bakermans-Kranenburg et al. 2011; Rutter et al. 2007; Smyke et al. 2012). Therefore, DSED in adolescence may have fewer effects on relationships with caregivers during adolescence. The association between DSED and peer relationships merits further examination.

Still, it was surprising not to find support for later interpersonal difficulties given past work where we have reported concurrent associations between signs of DSED and social functioning (Guyon-Harris et al. 2019). It is possible that the impact of DSED on interpersonal difficulties may be stronger when measured concurrently and weaker or non-existent when measured prospectively. To further assess this possibility, we examined concurrent associations between signs of DSED at age 12 and each competence domain at age 12. We found that there are significantly greater odds of not meeting the threshold for competence functioning in every domain except physical health. Thus, while early signs of DSED appear to be less related with peer and family relationship functioning in adolescence, concurrent signs of DSED in adolescence do appear to be related to impaired peer and family relationships in adolescence. More research is needed about

the prospective and concurrent associations between signs of DSED and interpersonal functioning.

We demonstrated that signs of DSED in early childhood were markers for risk of reduced competence in early adolescence. Associations between early signs of DSED and competent functioning were evident across both caregiver-reported and observed signs of DSED. This could be explained by children whose signs of DSED persist from early childhood into early adolescence or by children whose signs of DSED desist but who still have subsequent reductions in competent functioning—both were true in this sample. That is, associations between DSED and competent functioning remained even for children who once met criteria for DSED in early childhood yet no longer met criteria in early adolescence (posited in hypothesis 3). Of note, similar findings have been reported for attention-deficit/hyperactivity disorder (ADHD), which was shown to have lasting impacts on adolescent functioning even when symptoms improved from preschool through adolescence (Lee et al. 2008). In contrast, Bolton and colleagues (Bolton et al. 2004) reported that recovery from posttraumatic stress disorder or major depressive disorder assessed during childhood led to a subsequent recovery of psychosocial functioning across several domains. In fact, those who recovered from psychopathology reported better functioning in the domain of friendship compared to the control group. Thus, the persistence of impairment despite reduction in signs of the disorder seems to vary with disorders.

One curious finding was the discovery of a small subset of children with “late only” signs of DSED ($n = 6, 6\%$), meaning they met criteria for DSED at age 12 years but not in early childhood (i.e., prior to age 54 months). DSED is believed to develop early in life (i.e., before 60 months of age) as a response to a lack of adequate caregiving and extreme psychosocial deprivation. Although we and other researchers have demonstrated previously that signs of DSED may extend from early childhood into adolescence (Guyon-Harris et al. 2018; Humphreys et al. 2017) and even adulthood (Sonuga-Barke et al. 2017), the presumption has been that these were persistent signs rather than late onset DSED. Nevertheless, although Rutter and colleagues (Rutter et al. 2007) reported that two children who had no signs of disinhibition at 6 years showed marked signs of disinhibition at 11 years. It is unclear at present what to make of these findings about late onset disinhibition. For example, it might simply reflect measurement error. The adolescent phenotype of DSED is less clearly established than the early childhood phenotype (Zeanah and Gleason 2015), and what it means to fail to check back with a caregiver or being willing to leave with strangers differs based on age, and what caregivers meant by responses to probes about those behaviors needs more exploration. Clearly, the possibility of a true “late onset” DSED requires further study.

These findings are relevant in treatment planning for children who have experienced extreme adversity and developed

DSED early in life. If children are identified with signs of DSED in early childhood, they may need more than placement into an adequate – or even high quality – caregiving environment, given that children remain at risk for functional impairment even if disinhibited social behaviors diminish. DSED in this sample is a risk factor for reduced overall competence, but especially in the areas of academic performance and risk-taking at age 12 years. If signs of DSED contribute to reduced competence directly, treatments that target signs of DSED would be warranted. The only proven intervention for DSED is high quality caregiving. Supplementing high quality caregiving with treatments proven to enhance attachment security may reduce signs of DSED and potentially enhance competence in early adolescence. If DSED represents a susceptibility to specific negative outcomes associated with early adversity, treatment should focus more broadly on important developmental foundations of academic performance and risk-taking behaviors. Importantly, interventions that promote these competencies focus on healthy parent–child relationships and emotional regulation, which are enhanced by attachment-focused interventions as well.

There are a number of evidenced-based interventions shown to enhance security of attachment, such as Child–Parent Psychotherapy (Toth et al. 2018), Attachment and Biobehavioral Catch-up (Bernard et al. 2012; Dozier et al. 2011), Video-feedback Intervention to Promote Positive Parenting and Sensitive Discipline (VIPP-SD; Juffer et al. 2017a, b), and Circle of Security (Cassidy et al. 2017; Powell et al. 2014). None of these approaches has clear guidelines for the treatment of DSED. There is a single case report of modified parent–child interaction therapy (PCIT) for DSED (Dickmann and Allen 2017), in which a seven-year-old with DSED demonstrated a reduction in both behavior problems and DSED symptoms following a 17-session course of PCIT and establishing of “Stranger Rules.” Possibly, the broad focus on behavior management in the context of a parent/caregiving relationship may be most helpful for the behaviors and impairments associated with DSED and possibly the risk of limited functional competence later.

Results of the present study highlight the importance of early experiences for later development by suggesting that some of the negative effects of early deprivation are far-reaching. For some children, functional impairments are evident even after they are removed from institutional care and have reductions in disinhibited social behavior. The enduring impact of positive early interpersonal experiences on later child behavior has been demonstrated elsewhere (e.g., Haltigan et al. 2013). What remains to be understood are the specific mechanisms through which early signs of DSED may impact later functioning.

Three limitations should be noted. First, the current study include that individual caregivers who provided reports regarding DSED may have changed over time, particularly for

children who changed placements. Inconsistency in informants may lead to differences in reporting of signs of DSED from early childhood to early adolescence. Additionally, we did not obtain complete data for all participants throughout this multiyear longitudinal study, and due to the large amount of missing data, we did not feel it was appropriate to use data imputation. Second, given that the sample consisted of children with a history of institutional care in Romania, and therefore may limit comparability of the findings to children raised in other settings. Third, it is important to note that the mechanisms underlying the enduring impact of early signs of DSED on later competence in cases where signs of DSED remit remain unknown. We reiterate the need for further research examining the longitudinal impact of early signs of DSED on competence in adolescence.

In conclusion, removing children from institutions and placing them into families is an important first step in enhancing their functioning. However, we also must consider augmenting family care with more comprehensive interventions to prevent the functional impairments that may result from DSED early in life. Additional longitudinal studies will be especially valuable in our efforts to understand the course and consequences of this constellation of unusual behaviors.

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Compliance with Ethical Standards

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References

- Ablow, J. C., Measelle, J. R., Kraemer, H. C., Harrington, R., Luby, J., Smider, N., et al. (1999). The MacArthur three city outcome study: Evaluating multi-informant measures of young children’s symptomatology. *Journal of the American Academy of Child and Adolescent Psychiatry*, 38(12), 1580–1590. <https://doi.org/10.1097/00004583-199912000-00020>.
- Aklin, W. M., Lejuez, C. W., Zvolensky, M. J., Kahler, C. W., & Gwadz, M. (2005). Evaluation of behavioral measures of risk taking propensity with inner city adolescents. *Behaviour Research and Therapy*, 43(2), 215–228. <https://doi.org/10.1016/j.brat.2003.12.007>.

- American Psychiatric Association. (2013). *DSM-5: Diagnostic and statistical manual of mental disorders, 5th edition. Diagnostic and statistical manual of mental disorders 4th edition TR*. Arlington, VA: American Psychiatric Publishing.
- Bakermans-Kranenburg, M. J., Steele, H., Zeanah, C. H., Muhamedrahimov, R. J., Vorria, P., Dobrova-Krol, N. A., et al. (2011). III. Attachment and emotional development in institutional care: Characteristics and catch up. *Monographs of the Society for Research in Child Development*, 76(4), 62–91. <https://doi.org/10.1111/j.1540-5834.2011.00628.x>.
- Bernard, K., Dozier, M., Bick, J., Lewis-Morrarty, E., Lindhiem, O., & Carlson, E. (2012). Enhancing attachment organization among maltreated children: Results of a randomized clinical trial. *Child Development*, 83(2), 623–636. <https://doi.org/10.1111/j.1467-8624.2011.01712.x>.
- Bolton, D., Hill, J., O’Ryan, D., Udwin, O., Boyle, S., & Yule, W. (2004). Long-term effects of psychological trauma on psychosocial functioning. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, 45(5), 1007–1014. <https://doi.org/10.1111/j.1469-7610.2004.t01-1-00292.x>.
- Cassidy, J., Brett, B. E., Gross, J. T., Stern, J. A., Martin, D. R., Mohr, J. J., & Woodhouse, S. S. (2017). Circle of security-parenting: A randomized controlled trial in head start. *Development and Psychopathology*, 29(2), 651–673. <https://doi.org/10.1017/S0954579417000244>.
- Centers for Disease Control and Prevention. (2001). *Middle school youth risk behavior survey* (p. 2001). Atlanta, GA: Centers for Disease Control and Prevention.
- Cicchetti, D. (1993). Developmental psychopathology: Reactions, reflections, projections. *Developmental Review*, 13(4), 471–502. <https://doi.org/10.1006/DREV.1993.1021>.
- Clarke, A. M., & Clarke, A. D. B. (2000). *Early experience and the life path*. London: Jessica Kingsley.
- Corval, R., Belsky, J., Baptista, J., Oliveira, P., Mesquita, A., & Soares, I. (2017). Inhibited attachment disordered behavior in institutionalized preschool children: links with early and current relational experiences. *Attachment and Human Development*, 19(6), 598–612. <https://doi.org/10.1080/14616734.2017.1342172>.
- Dickmann, C. R., & Allen, B. (2017). Parent–child interaction therapy for the treatment of disinhibited social engagement disorder: A case report. *Evidence-Based Practice in Child and Adolescent Mental Health*, 2(1), 19–29. <https://doi.org/10.1080/23794925.2017.1286959>.
- Dozier, M., Bick, J., & Bernard, K. (2011). Attachment-based treatment for young, vulnerable children. In J. D. Osofsky (Ed.), *Clinical work with traumatized young children* (pp. 75–95). New York: Guilford Press. <https://doi.org/10.1097/DBP.0b013e31826c8244>.
- Essex, M. J., Boyce, W. T., Goldstein, L. H., Armstrong, J. M., Kraemer, H. C., Kupfer, D. J., & Group, M. A. B. W. (2002). The confluence of mental, physical, social, and academic difficulties in middle childhood. II: Developing the MacArthur health and behavior questionnaire. *Journal of the American Academy of Child and Adolescent Psychiatry*, 41(5), 588–603. <https://doi.org/10.1097/00004583-200205000-00017>.
- Fraleigh, R. C., Roisman, G. I., & Haltigan, J. D. (2013). The legacy of early experiences in development: Formalizing alternative models of how early experiences are carried forward over time. *Developmental Psychology*, 49(1), 109–126. <https://doi.org/10.1037/a0027852>.
- Giltaij, H. P., Sterkenburg, P. S., & Schuengel, C. (2016). Adaptive behaviour, comorbid psychiatric symptoms, and attachment disorders. *Advances in Mental Health and Intellectual Disabilities*, 10(1), 82–91. <https://doi.org/10.1108/AMHID-07-2015-0035>.
- Gleason, M. M., Fox, N. A., Drury, S., Smyke, A. T., Egger, H. L., Nelson, C. A., et al. (2011). Validity of evidence-derived criteria for reactive attachment disorder: Indiscriminately social/disinhibited and emotionally withdrawn/inhibited types. *Journal of the American Academy of Child and Adolescent Psychiatry*, 50(3), 216–231. <https://doi.org/10.1016/j.jaac.2010.12.012>.
- Gleason, M. M., Fox, N. A., Drury, S. S., Smyke, A. T., Nelson, C. A., & Zeanah, C. H. (2014). Indiscriminate behaviors in previously institutionalized young children. *Pediatrics*, 133(3), e657–e665. <https://doi.org/10.1542/peds.2013-0212>.
- Gresham, F. M., & Elliott, S. N. (1990). *Social skills rating system (SSRS)*. American Guidance Service.
- Gresham, F. M., Elliott, S. N., Vance, M. J., & Cook, C. R. (2011). Comparability of the social skills rating system to the social skills improvement system: Content and psychometric comparisons across elementary and secondary age levels. *School Psychology Quarterly*, 26(1), 27–44. <https://doi.org/10.1037/a0022662>.
- Guyon-Harris, K. L., Humphreys, K. L., Fox, N. A., Nelson, C. A., & Zeanah, C. H. (2018). Course of disinhibited social engagement disorder from early childhood to early adolescence. *Journal of the American Academy of Child & Adolescent Psychiatry*, 57(5), 329–335. <https://doi.org/10.1016/j.jaac.2018.02.009>.
- Guyon-Harris, K. L., Humphreys, K. L., Fox, N. A., Nelson, C. A., & Zeanah, C. H. (2019). Signs of attachment disorders and social functioning among early adolescents with a history of institutional care. *Child Abuse and Neglect*, 88, 96–106. <https://doi.org/10.1016/j.chiabu.2018.11.005>.
- Haltigan, J. D., Roisman, G. I., & Fraleigh, R. C. (2013). The predictive significance of early caregiving experiences for symptoms of psychopathology through midadolescence: Enduring or transient effects? *Development and Psychopathology*, 25(01), 209–221. <https://doi.org/10.1017/S0954579412000260>.
- Humphreys, K. L., Nelson, C. A., Fox, N. A., & Zeanah, C. H. (2017). Signs of reactive attachment disorder and disinhibited social engagement disorder at age 12 years: Effects of institutional care history and high-quality foster care. *Development and Psychopathology*, 29(2), 675–684. <https://doi.org/10.1017/S0954579417000256>.
- Humphreys, K. L., Miron, D., McLaughlin, K. A., Sheridan, M. A., Nelson, C. A., Fox, N. A., & Zeanah, C. H. (2018). Foster care promotes adaptive functioning in early adolescence among children who experienced severe, early deprivation. *Journal of Child Psychology and Psychiatry*. <https://doi.org/10.1111/jcpp.12865>.
- Juffer, F., Bakermans-Kranenburg, M. J., & van IJzendoorn, M. H. (2017a). Pairing attachment theory and social learning theory in video-feedback intervention to promote positive parenting. *Current Opinion in Psychology*. <https://doi.org/10.1016/j.copsyc.2017.03.012>.
- Juffer, F., Struis, E., Werner, C., & Bakermans-Kranenburg, M. J. (2017b). Effective preventive interventions to support parents of young children: Illustrations from the Video-feedback Intervention to promote Positive Parenting and Sensitive Discipline (VIPP-SD). *Journal of Prevention and Intervention in the Community*, 45(3), 202–214. <https://doi.org/10.1080/10852352.2016.1198128>.
- Kreppner, J., Kumsta, R., Rutter, M., Beckett, C., Castle, J., Stevens, S., & Sonuga-Barke, E. J. (2010). Developmental course of deprivation-specific psychological patterns: Early manifestations, persistence to age 15, and clinical features. *Monographs of the Society for Research in Child Development*, 75(1), 79–101. <https://doi.org/10.1111/j.1540-5834.2010.00551.x>.
- Lee, S. S., Lahey, B. B., Owens, E. B., & Hinshaw, S. P. (2008). Few preschool boys and girls with ADHD are well-adjusted during adolescence. *Journal of Abnormal Child Psychology*, 36(3), 373–383. <https://doi.org/10.1007/s10802-007-9184-6>.
- Lejuez, C. W., Aklin, W. M., Zvolensky, M. J., & Pedulla, C. M. (2003). Evaluation of the balloon analogue risk task (BART) as a predictor of adolescent real-world risk-taking behaviours. *Journal of Adolescence*, 26(4), 475–479. [https://doi.org/10.1016/S0140-1971\(03\)00036-8](https://doi.org/10.1016/S0140-1971(03)00036-8).

- MacPherson, L., Magidson, J. F., Reynolds, E. K., Kahler, C. W., & Lejuez, C. W. (2010). Changes in sensation seeking and risk-taking propensity predict increases in alcohol use among early adolescents. *Alcoholism: Clinical and Experimental Research*, *34*(8), 1400–1408. <https://doi.org/10.1111/j.1530-0277.2010.01223.x>.
- Miller, F. G. (2009). The randomized controlled trial as a demonstration project: An ethical perspective. *American Journal of Psychiatry*, *166*(7), 743–745. <https://doi.org/10.1176/appi.ajp.2009.09040538>.
- Millum, J., & Emanuel, E. J. (2007). Ethics: The ethics of international research with abandoned children. *Science*. <https://doi.org/10.1126/science.1153822>.
- Moran, K., McDonald, J., Jackson, A., Turnbull, S., & Minnis, H. (2017). A study of attachment disorders in young offenders attending specialist services. *Child Abuse and Neglect*, *65*, 77–87. <https://doi.org/10.1016/j.chiabu.2017.01.009>.
- Nelson, C. A., Fox, N. A., & Zeanah, C. H. (2014). *Romania's abandoned children: Deprivation, brain development, and the struggle for recovery*. Cambridge, MA: Harvard University Press.
- O'Connor, T. G., & Rutter, M. (2000). Attachment disorder behavior following early severe deprivation: Extension and longitudinal follow-up. *Journal of the American Academy of Child & Adolescent Psychiatry*, *39*(6), 703–712. <https://doi.org/10.1097/00004583-200006000-00008>.
- Oosterman, M., & Schuengel, C. (2007). Autonomic reactivity of children to separation and Reunion with foster parents. *Journal of the American Academy of Child and Adolescent Psychiatry*, *46*(9), 1196–1203. <https://doi.org/10.1097/chi.0b013e3180ca839f>.
- Powell, B., Cooper, G., Hoffman, K., & Marvin, B. (2014). *The circle of security intervention : enhancing attachment in early parent-child relationships*. New York: Guilford Press.
- Rutter, M., Colvert, E., Kreppner, J., Beckett, C., Castle, J., Groothues, C., et al. (2007). Early adolescent outcomes for institutionally-deprived and non-deprived adoptees. I: Disinhibited attachment. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *48*(1), 17–30. <https://doi.org/10.1111/j.1469-7610.2006.01688.x>.
- Smyke, A. T., Dumitrescu, A., & Zeanah, C. H. (2002). Attachment disturbances in young children. I: The continuum of caretaking casualty. *Journal of the American Academy of Child and Adolescent Psychiatry*, *41*(8), 972–982. <https://doi.org/10.1097/00004583-200208000-00016>.
- Smyke, A. T., Koga, S. F., Johnson, D. E., Fox, N. A., Marshall, P. J., Nelson, C. A., & Zeanah, C. H. (2007). The caregiving context in institution-reared and family-reared infants and toddlers in Romania. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *48*(2), 210–218. <https://doi.org/10.1111/j.1469-7610.2006.01694.x>.
- Smyke, A. T., Zeanah, C. H., Fox, N. A., & Nelson, C. A. (2009). A new model of foster care for young children: the Bucharest early intervention project. *Child and Adolescent Psychiatric Clinics of North America*, *18*, 721–734. <https://doi.org/10.1016/j.chc.2009.03.003>.
- Smyke, A. T., Zeanah, C. H., Gleason, M. M., Drury, S. S., Fox, N. A., Nelson, C. A., & Guthrie, D. (2012). A randomized controlled trial comparing foster care and institutional care for children with signs of reactive attachment disorder. *American Journal of Psychiatry*, *169*(5), 508–514. <https://doi.org/10.1176/appi.ajp.2011.11050748>.
- Sonuga-Barke, E. J. S., Kennedy, M., Kumsta, R., Knights, N., Golm, D., Rutter, M., et al. (2017). Child-to-adult neurodevelopmental and mental health trajectories after early life deprivation: The young adult follow-up of the longitudinal English and Romanian adoptees study. *The Lancet*, *389*(10078), 1539–1548. [https://doi.org/10.1016/S0140-6736\(17\)30045-4](https://doi.org/10.1016/S0140-6736(17)30045-4).
- Sroufe, L. A. (1990). Considering normal and abnormal together: The essence of developmental psychopathology. *Development and Psychopathology*, *2*(04), 335. <https://doi.org/10.1017/S0954579400005769>.
- Tizard, B., & Hodges, J. (1978). The effect of early institutional rearing on the development of eight year old children. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, *19*(2), 99–118. <https://doi.org/10.1111/j.1469-7610.1978.tb00453.x>.
- Toth, S., Michl-Petzing, L., Guild, D., & Lieberman, A. F. (2018). Child-parent psychotherapy: Theoretical bases, clinical applications, and empirical support. In H. Steele & M. Steele (Eds.), *Handbook of attachment-based interventions* (pp. 296–317). New York: Guilford Press.
- Wiik, K. L., Loman, M. M., Van Ryzin, M. J., Armstrong, J. M., Essex, M. J., Pollak, S. D., & Gunnar, M. R. (2011). Behavioral and emotional symptoms of post-institutionalized children in middle childhood. *Journal of Child Psychology and Psychiatry*, *52*(1), 56–63. <https://doi.org/10.1111/j.1469-7610.2010.02294.x>.
- Zeanah, C. H., & Gleason, M. M. (2015). Annual research review: Attachment disorders in early childhood - clinical presentation, causes, correlates, and treatment. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *56*(3), 207–222. <https://doi.org/10.1111/jcpp.12347>.
- Zeanah, C. H., Smyke, A. T., & Dumitrescu, A. (2002). Attachment disturbances in young children. II: Indiscriminate behavior and institutional care. *Journal of the American Academy of Child and Adolescent Psychiatry*, *41*(8), 983–989. <https://doi.org/10.1097/00004583-200208000-00017>.
- Zeanah, C. H., Nelson, C. A., Fox, N. A., Smyke, A. T., Marshall, P., Parker, S. W., & Koga, S. (2003). Designing research to study the effects of institutionalization on brain and behavioral development: The Bucharest early intervention project. *Development and Psychopathology*, *15*(04), 885–907. <https://doi.org/10.1017/S0954579403000452>.
- Zeanah, C. H., Smyke, A. T., Koga, S. F., & Carlson, E. (2005). Attachment in institutionalized and community children in Romania. *Child Development*, *76*(5), 1015–1028. <https://doi.org/10.1111/j.1467-8624.2005.00894.x>.
- Zeanah, C. H., Fox, N. A., & Nelson, C. A. (2012). The Bucharest early intervention project: Case study in the ethics of mental health research. *The Journal of Nervous and Mental Disease*, *200*(3), 243–247. <https://doi.org/10.1097/NMD.0b013e318247d275>.
- Zero to Three. (2016). *DC:0-5TM: Diagnostic classification of mental health and developmental disorders of infancy and early childhood*. Washington, DC: Author.

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