



Published in final edited form as:

J Child Fam Stud. 2014 July ; 23(5): 800–811. doi:10.1007/s10826-013-9732-3.

Predictors of Positive Outcomes in Offspring of Depressed Parents and Non-depressed Parents Across 20 Years

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Abstract

Understanding differences in factors leading to positive outcomes in high-risk and low-risk offspring has important implications for preventive interventions. We identified variables predicting positive outcomes in a cohort of 235 offspring from 76 families in which one, both, or neither parent had major depressive disorder. Positive outcomes were termed *resilient* in offspring of depressed parents, and *competent* in offspring of non-depressed parents, and defined by two separate criteria: absence of psychiatric diagnosis and consistently high functioning at 2, 10, and 20 years follow-up. In offspring of depressed parents, easier temperament and higher self-esteem were associated with greater odds of resilient outcome defined by absence of diagnosis. Lower maternal overprotection, greater offspring self-esteem, and higher IQ were associated with greater odds of resilient outcome defined by consistently high functioning. Multivariate analysis indicated that resilient outcome defined by absence of diagnosis was best predicted by offspring self-esteem; resilient outcome defined by functioning was best predicted by maternal overprotection and self-

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Conflict of interest Myrna Weissman has received funding from the National Institute of Mental Health (NIMH), the National Institute on Drug Abuse (NIDA), the National Alliance for Research on Schizophrenia and Depression (NARSAD), the Sackler Foundation, the Templeton Foundation and the Interstitial Cystitis Association; and receives royalties from the Oxford University Press, Perseus Press, the American Psychiatric Association Press, and MultiHealth Systems.

esteem. Among offspring of non-depressed parents, greater family cohesion, easier temperament and higher self-esteem were associated with greater odds of offspring competent outcome defined by absence of diagnosis. Higher maternal affection and greater offspring self-esteem were associated with greater odds of competent outcome, defined by consistently high functioning. Multivariate analysis for each criterion indicated that competent outcome was best predicted by offspring self-esteem. As the most robust predictor of positive outcomes in offspring of depressed and non-depressed parents, self-esteem is an important target for youth preventive interventions.

Keywords

Resilience; High risk; Longitudinal; Depression; Developmental psychopathology; Functioning

Introduction

Parental depression is among the strongest predictors of depression and other psychiatric disorders in offspring (Beardslee et al. 1998; Bureau et al. 2009; Murray et al. 2011; Warner et al. 1999; Weissman et al. 1987; Weissman et al. 1997). Despite the elevated risk of psychopathology and functional impairment in high-risk offspring of depressed parents, many function well over the life course and do not develop depression or another disorder. The term “resilience” has been used to describe positive adaptation in the face of circumstances involving a high likelihood of maladjustment (Luthar 2006). Positive outcomes without exposure to conditions of significant risk are labeled *competent*, rather than resilient (Luthar and Zelazo 2003). Several points about resilience should be underlined: (1) Resilience is defined by two components: *high risk* and *positive adaptation*. A resilient outcome *requires* exposure to a risk condition, such as parental depression. Positive adaptation is an outcome that is substantially better than what would be expected given the risk exposure (Luthar 2006). Positive adaptation may be defined as social competence, absence of mental illness, or meeting stage-salient developmental tasks (Luthar et al. 2000; Masten 2001; Masten and Coatsworth 1998); (2) Resilience refers to an *outcome or process*, rather than to a trait or quality of the individual. Children are not themselves resilient; instead, children achieve resilient outcomes. Offspring characteristics, such as temperament or self-esteem, may however contribute to resilient outcomes (Luthar and Zelazo 2003); (3) What constitutes a resilient outcome depends on the severity of the stressor. In the face of severe stressors, the absence of psychopathology can be considered resilient (Luthar and Zelazo 2003).

Predictors of positive outcome in offspring exposed to a range of high-risk conditions, including parental depression, may include parenting characteristics (Brennan et al. 2003; NICHD Early Child Care Research Network 1999), family environmental features (Carbonell et al. 2002; Prevatt 2003), and offspring characteristics such as self esteem (Kidd and Shahar 2008; Venden 2004), temperament (Smith and Prior 1995; Tschann et al. 1996, Bruder-Costello et al. 2007), and IQ (Fergusson and Lynskey 1996; Horowitz and Garber 2003; Kandel et al. 1988; Masten et al. 1990; Masten and Coatsworth 1995, 1998; Tiet et al. 1998). Positive outcomes in low-risk offspring of non-depressed parents similarly may be predicted by self-esteem (Dumont and Provost 1999) and a wide range of other individual,

family, and environmental variables (Porter et al. 2003; Prevatt 2003). Understanding differences in the factors that contribute to positive outcome in high-risk and low-risk offspring has important implications for the design of preventive interventions, which may be tailored specifically to address the needs of risk groups or aimed more broadly at all children. Resilience researchers (e.g. Conrad and Hammen 1993; Masten 2001) distinguish between protective factors, which have an effect on outcomes for high-risk but not low risk offspring, and resource factors, which predict positive outcomes in both high and low-risk offspring. Differentiating between protective and resource factors is important for the development of treatment interventions which may require different elements and specific foci for offspring that are exposed to risk conditions and those that are not.

We aimed to identify predictors of positive outcomes in a long-term follow-up of offspring of depressed parents that are at high risk for depression, and offspring of non-depressed parent that are considered at low risk for depression. Due to the elevated risk of psychopathology in offspring of depressed parents, we consider positive adaptation in this group a resilient outcome. Two outcomes were defined: (1) the absence of psychiatric diagnosis and (2) consistent high functioning, across 2, 10, and 20 year follow-up. Previous analyses using this sample have shown that predictor variables function differently in high and low risk offspring, thus analysis was conducted separately for offspring of depressed and non-depressed parents (Nomura et al. 2002; Pilowsky et al. 2006). Researchers have suggested that many different risk and protective factors be included in the same analysis to clarify the relative contribution of wide ranging factors so that interventions may focus directly on variables that will contribute most substantially to positive outcomes (Kessler et al. 2001; Pargas et al. 2010; Sameroff et al. 2003). We used a wide range of variables shown to be potentially predictive of positive outcomes in both high and low risk offspring including: maternal affection, maternal overprotection, family cohesion, marital adjustment, self-esteem, temperament, and IQ. We also assessed individual and family sociodemographic variables, including offspring age and sex, and parental occupation, education, and marital status to guard against the potential confounding effect of these factors. We hypothesized that positive outcomes (absence of psychiatric diagnosis and consistent high functioning) in high and low risk children would be predicted by higher parental affection, lower parental overprotection, higher family cohesion, more positive parent marital adjustment, higher offspring self esteem, and easier offspring temperament.

Method

Sample

For this analysis, we used data from a sample of parents and their offspring who participated in a 20-year follow-up study of offspring of depressed and non-depressed parents.

The study was initiated in 1982 and, with a few exceptions, procedures remained unchanged across follow-up waves to avoid introducing method variation bias. At enrollment, adults gave informed consent and minors provided assent with the written consent from their parents after receiving a complete in-person description of the study. As minors attained age of consent during follow-up, they too were asked to give informed consent. High-risk offspring were those of parents who were depressed at baseline; low risk offspring were

those of parents who had no current or lifetime history of depression. At baseline, high risk offspring ranged in age from 5 to 25, with a mean age of 16.8 and standard deviation of 5.03; low risk offspring ranged from 7 to 23 years, with a mean age of 16.7 and a standard deviation of 4.13. Parents (referred to as Generation 1) and their offspring (referred to as Generation 2) were interviewed independently.

Offspring were considered to be at high risk for depression if one or both parents had a lifetime history of major depressive disorder (MDD) and at low risk for depression if neither parent had a lifetime history of MDD. Our analysis included 115 offspring (of an original 150 enrolled at baseline) from 50 high-risk families in which one or both parents were depressed, and 67 offspring (of an original 85 enrolled at baseline) from 26 low-risk families in which neither parent was depressed. Depressed parents had moderate to severe MDD diagnosis that resulted in impairment and were receiving treatment at the Yale University Depression Research Unit. Sixty-six offspring had depressed mothers, 27 offspring had depressed fathers, and 22 had depressed mothers and depressed fathers. Non-depressed parents were obtained from a community survey and had no history of psychiatric illness.

There were no statistically significant differences between high and low risk offspring at baseline assessment on a range of demographic variables. Fifty-five point three percent of high-risk offspring came from families in which the family heads of household held white collar or clerical jobs and 34.21 % came from families in which the head of household had attended college. Sixty-three point five percent of low-risk offspring came from white collar families and 42.4 % came from families in which the head of household had attended college. Parents of 80.7 % of high-risk and 72.9 % of low-risk offspring were married or common law partners at baseline.

We excluded high-risk and low-risk offspring from the analysis if they did not have complete baseline data on the predictor variables of interest. There is no widely accepted proportion of missing data that would preclude imputation, however when a substantial amount of data is missing, missing data techniques can be problematic (Cohen and Cohen 1983; Tabachnik and Fidell 2001). We decided against a data imputation to address missing data since over 41.6 % of values for high-risk offspring were missing. Among high-risk offspring, there were no significant differences between those included and excluded by sex, parent occupation at baseline, maternal affection, maternal overprotection, offspring self-esteem, offspring temperament, offspring IQ, or proportion of offspring with resilient outcome defined by no psychiatric diagnosis. Compared to excluded offspring, included offspring had a lower proportion of resilient outcome defined by consistently high functioning, and were significantly less likely at baseline to have had parents who attended college. Depending on the sub-sample used in specific statistical tests, between 41 and 52 high-risk offspring were male (41.7–46.9 %). The sample included siblings from the same family. The number of offspring per family ranged from 1 to 7, with a mean of 2.3 offspring per family.

Among low-risk offspring, there were no significant differences between those included and excluded by marital status, parent education and parent occupation at baseline, maternal affection, maternal overprotection, offspring self-esteem, offspring temperament, offspring

IQ, or proportion of offspring with competent outcome defined by absence of psychiatric diagnosis or consistently high functioning. Depending on the sub-sample used in specific statistical tests, between 23 and 34 low-risk offspring were male (46–46.25 %). The low risk sample also included siblings. The number of offspring per family ranged from 1 to 7, with a mean of 2.2 offspring per family.

All offspring were interviewed 2 years after baseline and again 10 years after baseline (Time 2 and 10, respectively). Generation 2 participants were re-interviewed 20 years after baseline (Time 20). One hundred high-risk offspring and 53 low-risk offspring included in this analysis received diagnostic and functioning assessments at all 4 follow-up waves. In cases where diagnostic and functioning assessments were missing at one or multiple waves, offspring were classified based on available data from the remaining waves. Losses to follow-up were due to refusal to participate or inability to locate them for reassessment. There were no significant differences among high or low risk offspring who had outcome data at all follow-up waves and those who did not on the following variables: sex, maternal affection and maternal overprotection, marital adjustment, family cohesion, offspring self-esteem, temperament, and IQ, parental education, parental marital status. Offspring who had outcome data at all follow-up waves did not significantly differ in proportion of resilient outcomes defined by no psychiatric diagnosis or by consistently high functioning. High and low-risk offspring with outcome data at each follow-up were statistically significantly older than those without, which is to be expected since offspring enrolled after baseline assessment will have been younger than those enrolled at baseline. Significantly more females (57.6 %) were interviewed ($p = 0.019$) at all waves in the high-risk group compared to the low-risk group. The study was approved by the Institutional Review Board at New York State Psychiatric Institute and Columbia University.

Assessments and Measures

Psychiatric diagnoses at baseline and follow-up waves were based on a best estimate procedure that incorporated all available assessment information (Leckman et al. 1982). For adults, assessments included a semi-structured diagnostic assessment (schedule for affective disorders and schizophrenia—lifetime version for adults; Mannuzza et al. 1986). For participants between the ages of 6 and 17, the child version of this interview, known as the schedule for affective disorders and schizophrenia for school-age children was used (K-SADS-E; Orvaschel et al. 1982). Acceptable test–retest reliability for the K-SADS-E has been reported (Chambers et al. 1985) and inter-rater reliability was verified by the study team (Gammon et al. 1983). Offspring functioning was measured using the Children’s Global Assessment Scale Questionnaire (C-GAS) (Endicott et al. 1976) and the Global Assessment Scale (GAS; Shaffer et al. 1983) as appropriate given offspring age at time of assessment. Both assessments have shown excellent inter-rater reliability and good validity and have been shown to adequately distinguish symptom severity and caseness (Endicott et al. 1976; Shaffer et al. 1983). Assessments were conducted by child psychiatry fellows, and doctoral and master’s level clinicians who received 30 h of training in the administration of research assessments, and who also had a minimum of 4 years of clinical experience with children. Offspring interviewers were blind to the clinical status of the parents. Inter-rater reliability was checked prior to the start of the study and monitored throughout using the

field supervisor as the standard. Two experienced clinicians who were not involved in the interviewing and who were blind to the diagnostic status of the previous generation and prior assessments independently reviewed all of the material were responsible for assigning Diagnostic and Statistical Manual, Fourth Edition (DSM-IV) diagnosis based on the best estimate procedure. Inter-rater agreement on offspring best estimate diagnosis was 80 % or higher at each follow-up wave. Diagnoses were cumulative across all waves.

Several measures were collected at baseline and used to predict outcomes across follow-up.

Marital adjustment was assessed using the short marital adjustment test (Locke and Wallace 1959), a 15-item measure of marriage quality. This measure has demonstrated good validity and adequate reliability [Cronbach's $\alpha = 0.81$] (Cross and Sharpley 1981; Freeston and Plechaty 1997).

Family cohesion was assessed using the Cohesion sub-scale of the Family Adaptability and Cohesion Evaluation Scale (FACES), a 111-item questionnaire for assessing family style of interaction (Olson et al. 1979). The Cohesion subscale has demonstrated adequate reliability [Cronbach's $\alpha = 0.83$] and good validity against comparable measures (Olson et al. 1978).

Parental affection and overprotection were assessed using individual scales of the parental bonding instrument (PBI) a self-rating scale given to offspring to measure perceived relationships and experiences with parents (Parker 1983). Cronbach's α for the affection and over-protection scales have been assessed at 0.85 and 0.69, respectively (Parker 1989).

Temperament was assessed using the Dimensions of Temperament Survey (DOTS), which describes temperament on 5 axes. The DOTS has demonstrated good reliability [Cronbach $\alpha = 0.89$] (Lerner et al. 1982).

Self-esteem was assessed using the Coopersmith Self-Esteem Inventory (CSEI; Coopersmith 1967), which comprises 50 items spread over four scales assessing perceptions of peers, parents, school and self. The CSEI has been shown to be reliable [Cronbach's $\alpha = 0.86$] and to have convergent validity with other measures (Johnson et al. 1983).

The Block Design and Vocabulary subscales of the Wechsler Intelligence Scale for Children Revised Version (WISC-R; Wechsler 1974) were used to assess offspring IQ. The Block Design subscales has good reliability [Cronbach $\alpha = 0.88$] and the Vocabulary subscale has fair reliability [Cronbach $\alpha = 0.69$] (Dean 1977). Concurrent validity for these subscales with the full WISC was 0.90 and 0.81, respectively (Dean 1977).

Definition of Outcomes

We defined two separate outcomes for this analysis: Resilient outcome for high-risk offspring and competent outcome for low-risk offspring were defined according to two separate criteria: (1) absence of lifetime psychiatric diagnosis; (2) consistent high functioning. For the first criterion, offspring were classified as having resilient or competent outcomes if they had no diagnosis of any mood, anxiety, or substance abuse disorder at any follow-up assessment (2- and 10-year) from baseline to Time 20. For the second criterion, outcomes were considered resilient or competent if they functioned at a consistently high

level, defined as a GAS score of 71 or higher, from baseline to Time 20. Due to missing data, the number of individuals classified as having resilient or competent outcomes varied for each predictor of interest. For resilient outcome defined by absence of diagnosis, the sample size ranged from 98 to 115 among high-risk offspring. Across all predictors of interest, between 19 and 22 high-risk offspring were classified as having resilient outcomes (17.1–20.4 %). In the sample used for multivariate analysis, 17 of 98 (17.4 %) offspring were classified as having resilient outcomes according to absence of diagnosis. The sample size for resilient outcome defined by consistent high functioning was the same as for resilience defined by absence of diagnosis, ranging from 98 to 115. Across all predictors of interest, between 13 and 16 (12.6–15.3 %) offspring were classified as having resilient outcomes. In the sample used for multivariate analysis, 13 of 104 (12.5 %) high-risk offspring were classified as having resilient outcomes according to functioning.

Among low-risk offspring, for competent outcome defined by absence of psychiatric diagnosis, the sample ranged from 50 to 67 offspring. Depending on the predictor of interest, between 29 and 35 low-risk offspring were classified as having competent outcomes defined by this criterion (52–58 %). In the sample used for multivariate analysis, 30 of 58 (52 %) offspring were classified as having competent outcomes according to absence of diagnosis. The sample size range was unchanged for competent outcome defined by consistent high functioning. Across all predictors of interest, between 33 and 35 low-risk offspring were classified as having competent outcomes (49–70 %). In the sample used for multivariate analysis, 26 of 58 (44.8 %) offspring were classified as having competent outcomes according to absence of diagnosis according to functioning.

Statistical Analyses

We used univariate and multivariate logistic regression to assess the association of variables measured at baseline with outcomes across follow-up and to explore the relative importance of each predictor in the presence of the others. Because our variables of interest were measured using non-equivalent scales (for example, increments in IQ measured by the WISC are not comparable to increments in self-esteem measured by the CSEI) we standardized scalar outcome data to allow for easier comparison of results. We conducted univariate analyses using all data available for each variable of interest. Variables that significantly predicted resilience in univariate analyses were included in multivariate analyses. We then used multivariate hierarchical logistic regression to establish the most parsimonious predictive model for both resilience outcomes. We assessed the overall change in model fit [i.e. the change in the likelihood ratio (LR) statistic] with the addition of individual predictors for each of 5 regression models. Due to the presence of siblings in the sample, we conducted our analyses within the framework of the generalized estimating equations (GEE) approach, which adjusts for the possible non-independence of observations in members of the same family (Liang and Zeger 1986). Our multivariate analyses and model comparisons included all individuals for whom we had complete data for all variables found to be significant in univariate analysis. Analyses were performed using the Intercooled Stata 8.1 software package.

Results

High-Risk Offspring

Among high-risk offspring, univariate logistic regressions (Table 1) indicated that resilience, defined by absence of diagnosis, was significantly associated with offspring self-esteem and offspring temperament. Offspring who had higher self-esteem at baseline (OR = 1.96, $p = 0.009$) and easier temperament (OR = 1.86, $p = 0.024$) had significantly greater odds of resilient outcome. Maternal affection predicted resilient outcome at the level of a trend (OR = 1.44, $\chi^2 p = 0.096$). Family cohesion, marital adjustment, offspring IQ, offspring age and sex and parental education, occupation, and marital status, did not significantly predict resilient outcome. Multivariate logistic regression (Table 2) indicated that neither offspring temperament nor offspring self-esteem predicted resilient outcome defined by absence of diagnosis when each variable was included in the model. Hierarchical logistic regression modeling (Table 3) indicated that resilient outcome was best predicted by a univariate model including self-esteem (Model 1). In the model including offspring self-esteem and temperament (Model 2), neither self-esteem nor temperament predicted resilient outcome above and beyond the contribution of the other variable. Comparison between the univariate model including self-esteem (Model 1) and a multivariate model including self-esteem and temperament (Model 2) yielded a non-significant LR, indicating that the model including self-esteem alone was more parsimonious.

Univariate logistic regression revealed that resilience, defined by consistent high functioning, was significantly associated with maternal overprotection, self-esteem, and IQ (Table 1). Offspring who had less overprotective mothers (OR = 0.27, $p = 0.10$), higher self-esteem (OR = 3.43, $p = 0.001$), or higher IQ (OR = 1.64, $p = 0.039$) at baseline had significantly greater odds of resilient outcome. A trend association was found between offspring temperament and resilient outcome, with offspring with easy temperament having greater odds (OR = 1.76, $p = 0.104$). The other hypothesized predictors, i.e. maternal affection, family cohesion, and marital adjustment, were not significantly associated with resilience. Confounding variables offspring age and sex, and parental education, occupation, and marital status did not predict resilience.

Multivariate logistic regression (Table 2) indicated that self-esteem significantly predicted resilient outcome defined by consistent high functioning over and above the effect of maternal overprotection and offspring IQ (OR = 2.58, $p = 0.003$). Neither maternal overprotection nor offspring IQ significantly predicted resilient outcome in the presence of offspring self-esteem. Multivariate hierarchical analysis (Table 3) established that a model including maternal overprotection and offspring self-esteem best predicted resilient outcome defined by consistently high functioning. In the model including offspring self-esteem and maternal overprotection (Model 2), both self-esteem (OR = 3.14, $p = 0.004$) and maternal overprotection (OR = 0.15, $p = 0.043$) significantly predicted resilient outcome over and above the effect of the other variable. The comparison between a multivariate model including both maternal overprotection and self-esteem (Model 2) and a univariate model including self-esteem alone yielded a significant LR (LR $\chi^2 = 8.16$, $p = 0.004$) indicating the superiority of the augmented model. In the model including offspring self-esteem, maternal

overprotection, and offspring IQ, self-esteem (OR = 3.91, 0.015) and maternal overprotection (OR = 0.14, $p = 0.006$) both significantly predicted resilient outcome, but offspring IQ did not (OR = 1.78, $p = 0.189$). The comparison between the model including self-esteem and maternal overprotection (Model 2), and the model including maternal overprotection, offspring self-esteem, and offspring IQ (Model 3), yielded a non-significant LR indicating that resilient outcome defined by consistent high functioning is most parsimoniously predicted by self-esteem and overprotection.

Low-Risk Offspring

Among low-risk offspring, univariate logistic regressions (Table 4) indicated that competence, defined by absence of diagnosis, was significantly associated with family cohesion, offspring temperament, and offspring self-esteem. Offspring from families rated as having higher cohesion (OR = 1.85, $p = 0.019$) and offspring who had easier temperament (OR = 2.23, $p = 0.012$) and higher self-esteem (OR = 2.58, $p = 0.003$), all measured at baseline, had significantly greater odds of competent outcome across follow-up. Maternal affection, maternal overprotection, marital adjustment, offspring IQ, offspring age and sex and parental education, occupation, and marital status did not significantly predict competence. Multivariate logistic regression (Table 5) indicated that self-esteem significantly predicted competent outcome defined by absence of diagnosis over and above the effect of family cohesion and offspring temperament (OR = 3.11, $p = 0.014$). Neither family cohesion nor offspring temperament significantly predicted competent outcome in the presence of offspring self-esteem. Hierarchical regression modeling (Table 6) indicated that competent outcome was best predicted by a univariate model including self-esteem (Model 1). In the model including offspring self-esteem and temperament (Model 2), self-esteem remained a significant predictor of competent outcome (OR = 3.22, $p = 0.01$) while temperament did not. Comparison between the univariate model including self-esteem (Model 1) and a multivariate model including self-esteem and temperament (Model 2) yielded a non-significant LR, indicating that the model including self-esteem alone was more parsimonious. In a model including self-esteem and family cohesion (Model 3), self-esteem remained a significant predictor of resilient outcome (OR = 2.33, $p = 0.01$), while family cohesion predicted resilient outcome at the level of a trend (OR = 1.53, $p = 0.09$). Comparison between the univariate model including self-esteem and a bivariate model including self-esteem and family cohesion yielded a non-significant LR, again indicating that the model including self-esteem alone was more parsimonious.

Univariate logistic regression revealed that competent outcome defined by functioning, was significantly associated with maternal affection, and offspring self-esteem (Table 4). Offspring who had more affectionate mothers (OR = 1.95, $p = 0.05$) and higher self-esteem (OR = 2.51, $p = 0.01$) at baseline had significantly greater odds of competent outcome across follow-up. The other hypothesized predictors, i.e. maternal overprotection, family cohesion, temperament, and marital adjustment were not significantly associated with resilient outcome. Confounding variables offspring age and sex, and parental education, occupation, and marital status did not predict resilience.

Multivariate logistic regression (Table 5) indicated that neither offspring self-esteem nor maternal affection significantly predicted competent outcome defined by consistent high functioning in the presence of the other variable. Multivariate hierarchical analysis (Table 6) established that the univariate model including self-esteem alone best predicted resilient outcome (Model 1). In the model including offspring self-esteem and maternal affection (Model 2), neither maternal affection nor offspring self-esteem significantly predicted resilient outcome over and above the effect of the other variable. Comparison between the multivariate model including both maternal affection and self-esteem (Model 2) and the univariate model including self-esteem alone yielded a non-significant LR indicating that the univariate model including self-esteem alone is the most parsimonious predictor of resilient outcome.

Discussion

We sought to identify and compare factors that predict positive outcomes in offspring of depressed parents (resilient outcomes) and non-depressed parents (competent outcomes) and hypothesized that positive outcome (absence of psychiatric diagnosis and consistent high functioning) in high and low risk children will be predicted by higher parental affection, lower parental overprotection, higher family cohesion, more positive parent marital adjustment, higher offspring self esteem, and easier offspring temperament. Our hypotheses received mixed support. In high-risk offspring of depressed parents, greater offspring self-esteem and easier offspring temperament significantly predicted greater odds of resilient outcome defined by absence of diagnosis. Multivariate hierarchical modeling indicated that a univariate model including self-esteem was the most parsimonious predictor of resilient outcome. Lower maternal overprotection, higher child self-esteem, and higher child IQ predicted greater odds of resilient outcome defined by consistent high functioning. Multivariate hierarchical modeling indicated that the most parsimonious prediction of resilient outcome was derived from a model including maternal overprotection and offspring self-esteem. In low-risk offspring, greater family cohesion, easier offspring temperament, and greater offspring self-esteem predicted competent outcome defined by diagnostic status. Multivariate hierarchical modeling indicated that a univariate model including only self-esteem provided the most parsimonious prediction of competent outcome. For consistent high functioning, greater maternal affection and offspring self-esteem predicted greater odds of competent outcome. These results are summarized in Table 7.

Our results indicate that among the predictors assessed, self-esteem, which is defined by Coopersmith as “the evaluation the individual ... maintains with regard to himself ... [indicating] the extent to which the individual believes himself capable, significant, successful and worthy” (Coopersmith 1967, pp. 4–5), is the most robust predictor of positive outcome in both high and low-risk offspring across 20 years of follow-up. After accounting for the effect of offspring self-esteem, no other variable significantly predicted resilient and competent outcomes, defined by either psychiatric diagnosis or functioning, in either high or low-risk offspring respectively, with one exception: for offspring of depressed parents, lower maternal overprotection was significantly associated with greater odds of resilient outcome defined by functioning.

Few other studies have explored the effect of self-esteem in offspring of depressed parents, and we are not aware of any that have done so using a longitudinal design. Our findings in high and low risk offspring are consistent with what research does exist. Cross sectional studies of offspring exposed to risk conditions other than parental depression, including blind children, homeless children, and children with physical health problems, have found self-esteem to be a robust protective factor in high risk groups (Trzesniewski et al. 2006; Venden 2004; Kidd and Shahar 2008). An analysis using the Dunedin birth cohort, a longitudinal representative community sample with no specified risk exposure, showed that low-self esteem in adolescence predicted poor mental and physical health, worse economic prospects, and higher levels of criminal behavior at age 26 (Trzesniewski et al. 2006). Adolescents with low self-esteem compared to those with high self-esteem also had a significantly higher prevalence of depressive and anxiety disorders, and physical health problems, including cardio-respiratory health, poor perceived health, and higher waist-to-hip ratios. Similarly, cross-sectional research in non-high risk populations of young people ranging from grade-school to undergraduate age have found that low self-esteem predicted depression or depressive symptoms (Robinson et al. 1995; Whisman and Kwon 1993).

A noteworthy finding from our analysis is that in high-risk offspring, neither family cohesion nor marital adjustment was found to significantly predict resilient outcome defined by either outcome. While family cohesion and marital adjustment may very likely impact maternal over-protection itself, the current results suggest that mothers' overprotective behavior with their child remains the most important of the environmental factors evaluated in this analysis in predicting offspring functioning. Previous analyses of this data set (Pilowsky et al. 2006) showed that the presence of parental "affectionless control," which is a composite of maternal affection and overprotection, did not predict psychiatric diagnosis in high-risk offspring, but was associated with a fivefold increase in risk for depression in low-risk offspring. In the current analysis, maternal affection and overprotection were treated separately and as continuous variables instead of jointly and as categorical variables, which allowed for more sensitive tests of the effect of variations in affection and overprotection across the range of possible scores. Our results suggested that in high-risk offspring, the impact of maternal overprotection was greater than the effect of maternal affection.

A problem in any longitudinal study is missing data. We conducted our analysis using 185 of 235 offspring originally enrolled at baseline due to missing data on variables of interest. As reported above, we found no indication that offspring included in this analysis and those lost to follow-up differed systematically in ways that would create significant bias. Another possible limitation is the small number of individuals who met criteria for resilience in this sample. Depending on the resilience outcome and predictors under examination, between 13 and 22 of the 115 high-risk offspring included in the analysis were classified as having resilient outcomes. Therefore caution is required in generalizing these findings to all high-risk offspring of depressed parents. The subset of offspring included in our analysis were generally lower functioning, as measured by the GAS, than those who were not included. A significantly smaller proportion of included high-risk offspring and low-risk offspring had resilient or competent outcomes, respectively, measured by functioning compared to excluded offspring. There was no significant difference in proportion of included and

excluded high-risk or low-risk offspring who had resilient or competent outcome defined by absence of diagnosis.

We used predictors measured at baseline while outcomes were assessed over 20 years. Our analysis did not account for the possibility of longitudinal changes in predictors measured at baseline over the course of follow-up. It is possible that resilient or competent outcomes at follow-up during adulthood may be better explained by predictors also assessed in adulthood instead of at baseline. Future analysis with this data set will explore the variation of functioning and diagnosis over time with changing environmental factors, as well as the relative contribution of childhood versus current environment in predicting resilience.

A final consideration in interpreting our results is the fact that at baseline measurement, a large proportion of the sample had passed into adolescence and early adulthood and even the youngest offspring had passed the most sensitive period of development. Much research into the effects of maternal and family factors on functioning over the life course is based on very young children. We have assumed that baseline assessments of parenting and family environment are indicative of family features in the earlier, most sensitive period of development. The wide age range complicates interpretation of our results and we acknowledge the possibility that the relative impact of the predictors examined may vary at different offspring ages. Nevertheless, we found no evidence of statistical interactions between age and other predictors in our analyses. The sustained long-term influence of self-esteem, demonstrated in this paper, through adolescence and into young adulthood holds promise for interventions aiming to steer high-risk offspring onto a path of positive adaptation despite exposure to family risk conditions that challenge or fail to support self-esteem in offspring.

Our results indicate that greater offspring self-esteem, easier offspring temperament, lower maternal overprotection, and higher offspring IQ are associated with resilient outcomes in offspring of depressed parents, while offspring self-esteem and temperament, maternal affection and family cohesion are associated with competent outcomes in offspring of non-depressed parents. Self-esteem is best considered to be a resource factor, supporting positive outcomes in offspring regardless of risk status. Luthar et al. (2000) suggest that while it is plausible that pathways to positive adjustment in high-risk offspring and low-risk offspring may be congruent, there is insufficient evidence to support such an assumption; our findings contribute evidence to suggest that indeed there are essential similarities in pathways to positive adjustment for high and low risk children.

These findings offer some direction for intervention. Given that approximately 50 % of low-risk offspring in this sample did not meet criteria for competent outcome, it is not unreasonable to consider self-esteem as a target of developmentally supportive interventions for all children. Young children derive self-esteem mostly through their relationships with parents. During adolescence, however, self-esteem is drawn increasingly from multiple sources, including peer relationships, school and sports achievement (Laible et al. 2004; Biddle et al. 2005; Van der Horst et al. 2007; Trautwein et al. 2006; Baumeister et al. 2003). During this period, self-esteem may be readily bolstered through multiple means. Thus, community centers, municipal sports leagues, day camps, and school-based programs

represent potentially effective platforms for interventions aimed at building offspring self-esteem. Additionally, reducing maternal overprotection stands out as a potentially important area for intervention in high-risk offspring of depressed parents. Self-esteem in adolescent offspring has been shown to mediate the relationship between maternal psychological control and maternal rejection and depression in offspring of depressed mothers (Garber et al. 1997). Maternal overprotection or over-control may therefore have a direct negative impact on offspring self-esteem. In particular for adolescent offspring, overprotective mothering may interfere with participation in the social and recreational activities that are crucial for development of positive self-esteem. Intervening to reduce overprotective or overcontrolling behavior in depressed mothers may build offspring self-esteem and improve offspring outcomes.

Acknowledgments

Data collection for this work was funded by National Institute of Mental Health Grant R01 MH-036197 (M. Weissman PI). Data analysis was funded by a grant from the John Templeton Foundation (Proposal # 14918) "Understanding the role of belief in the resilience of families at risk for depression: religion, brain structure and genetics" (M. Weissman PI) Helen Verdelli is supported by National Institute of Mental Health K23 Award (MH071530). The funders of this research had no involvement in the study design, collection, analysis, and interpretation of data, the writing of this paper, or in the decision to submit it for publication.

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Table 1

Univariate logistic regression predicting resilient outcome in high-risk offspring defined by absence of psychiatric diagnosis and consistent high functioning

Predictor	No diagnosis		High functioning	
	Odds ratio (95 % CI)	<i>p</i>	Odds ratio (95 % CI)	<i>p</i>
Maternal affection (n = 113)	1.44 (0.94–2.20)	0.096	1.93 (0.78–4.74)	0.154
Maternal overprotection (n = 113)	0.94 (0.59–1.50)	0.798	0.27 (0.10–0.73) *	0.01
Parental marital adjustment (n = 98)	0.82 (0.55–1.22)	0.317	1.34 (0.70–2.55)	0.367
Family cohesion (n = 114)	1.31 (0.79–2.17)	0.286	0.93 (0.54–1.60)	0.803
Offspring temperament (n = 115)	1.86 (1.08–3.18) *	0.024	1.76 (0.89–3.50)	0.104
Offspring self-esteem (n = 114)	1.96 (1.19–3.25) **	0.009	3.43 (1.63–7.21) **	0.001
Offspring IQ (n = 111)	1.26 (0.81–1.96)	0.312	1.64 (1.02–2.63) *	0.039

All models adjusted for age, sex, and non-independence of observations

* Statistical significance indicated by $p < 0.05$

** Statistical significance indicated by $p < 0.01$

Table 2

Multivariate logistic regression predicting resilient outcome defined by absence of psychiatric diagnosis and consistent high functioning in high-risk offspring from predictors identified as significant in univariate analysis

Predictor (N = 99)	No diagnosis		High functioning	
	Odds ratio (95 % CI)	<i>p</i>	Odds ratio (95 % CI)	<i>p</i>
Offspring temperament	1.06 (0.94–1.19)	0.348	–	–
Offspring self-esteem	1.07 (0.97–1.17)	0.190	2.58 (1.38–4.83)**	0.003
Offspring IQ	–	–	1.35 (0.71–2.55)	0.361
Maternal overprotection	–	–	0.53 (0.25–1.13)	0.102

All models adjusted for age, sex, and non-independence of observations

* Statistical significance indicated by $p < 0.05$

** Statistical significance indicated by $p < 0.01$

Hierarchical logistic regression predicting resilient outcome in high-risk defined by absence of diagnosis and consistent high functioning

Table 3

No diagnosis		High functioning					
Model predictors (n = 99)	OR (95 % CI)	p	p > χ^2	Model predictors (n = 104)	OR (95 % CI)	p	p > χ^2
Model 1							
Offspring self-esteem	1.96 (1.19–3.25)**	0.009		Offspring self-esteem	3.43 (1.63–7.21)**	0.001	
Model 2							
Offspring self-esteem	1.55 (0.80–2.99)	0.190	0.332	Offspring self-esteem	3.14 (1.44–6.86)**	0.004	0.004
Offspring temperament	1.35 (0.72–2.51)	0.348		Maternal overprotection	0.15 (0.02–0.94)*	0.046	
Model 3							
				Offspring self-esteem	3.91 (1.30–11.82)*	0.015	0.17
				Maternal overprotection	0.14 (0.03–0.56)**	0.006	
				Offspring IQ	1.78 (0.75–4.23)	0.189	

All models adjusted for age and sex

* Statistical significance indicated by $p < 0.05$

** Statistical significance indicated by $p < 0.01$

Table 4

Univariate logistic regression predicting resilient outcome in low-risk offspring defined by absence of psychiatric diagnosis and consistent high functioning

Predictor	No diagnosis		High functioning	
	Odds ratio (95 % CI)	<i>p</i>	Odds ratio (95 % CI)	<i>p</i>
Maternal affection (n = 113)	1.44 (0.64–3.21)	0.378	1.95 (1.01–3.76) *	0.046
Maternal overprotection (n = 113)	0.53 (0.25–1.13)	0.102	0.55 (0.257–1.169)	0.12
Parental marital adjustment (n = 98)	2.45 (0.61–9.89)	0.209	1.99 (0.339–11.60)	0.446
Family cohesion (n = 114)	1.85 (1.11–3.10) *	0.019	1.54 (0.89–2.66)	0.121
Offspring temperament (n = 115)	2.23 (1.19–4.18) *	0.012	1.52 (0.84–2.76)	0.163
Offspring self-esteem (n = 114)	2.58 (1.38–4.38) **	0.003	2.51 (1.20–5.24) *	0.014
Offspring IQ (n = 111)	1.35 (0.71–2.55)	0.361	1.39 (0.82–2.36)	0.218

All models adjusted for age, sex, and non-independence of observations

* Statistical significance indicated by $p < 0.05$

** Statistical significance indicated by $p < 0.01$

Table 5

Multivariate logistic regression predicting resilient outcome defined by absence of psychiatric diagnosis and consistent high functioning in low-risk offspring from predictors identified as significant in univariate analysis

Predictor (N = 58)	No diagnosis Odds ratio (95 % CI)	<i>p</i>	High functioning Odds ratio (95 % CI)	<i>p</i>
Family cohesion	1.16 (0.69–1.95)	0.587	–	–
Offspring temperament	0.97 (0.41–2.17)	0.916	–	–
Offspring self-esteem	3.11 (1.26–7.68) *	0.014	2.36 (0.90–6.18)	0.079
Maternal affection	–	–	1.17 (0.46–3.00)	0.739

All models adjusted for age, sex, and non-independence of observations

* Statistical significance indicated by $p < 0.05$

** Statistical significance indicated by $p < 0.01$

Table 6

Hierarchical logistic regression predicting resilient outcome in low-risk defined by absence of diagnosis and consistent high functioning

No diagnosis		High functioning					
Model predictors (n = 58)	OR (95 % CI)	p	p > χ^2	Model predictors (n = 58)	OR (95 % CI)	p	p > χ^2
Model 1							
Offspring self-esteem	2.58 (1.38–4.83)**	0.003		Offspring self-esteem	2.51 (0.82–2.36)*	0.014	
Model 2							
Offspring self-esteem	3.22 (1.30–7.98)*	0.012	0.9381	Offspring self-esteem	2.36 (0.90–6.18)	0.079	0.48
Offspring temperament	0.97 (0.43–2.81)	0.938		Maternal affection	1.17 (0.46–3.00)	0.739	
Model 3							
Offspring self-esteem	2.33 (1.25–4.34)*	0.01	0.17				
Family cohesion	1.53 (0.94–2.50)	0.09					

^a All models adjusted for age and sex

* Statistical significance indicated by $p < 0.05$

** Statistical significance indicated by $p < 0.01$

Table 7

Predictors of positive outcome in univariate and multivariate analysis for resilient or competent outcome defined by absence of psychiatric diagnosis or consistent high functioning in high and low risk offspring

Outcome criterion	Risk status	
	High risk	Low risk
No diagnosis		
Univariate	Self-esteem **	Self-esteem **
	Temperament *	Temperament * Family cohesion *
Multivariate	–	Self-esteem *
Hierarchical	Self-esteem **	Self-esteem **
High functioning		
Univariate	Self-esteem **	Self-esteem *
	Maternal overprotection * IQ *	Maternal affection *
Multivariate	Self-esteem *	–
Hierarchical	Self-esteem **	Self-esteem *
	Maternal overprotection *	

* Statistical significance indicated by $p < 0.05$

** Statistical significance indicated by $p < 0.01$