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ORIGINAL PAPER

Parental Divorce, Familial Risk for Depression, and Psychopathology in Offspring: A Three-Generation Study

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Abstract Research suggests a link between parental divorce and negative child outcomes; however, the presence of parental depression may confound this relationship. Studies exploring the simultaneous effects of depression and parents' divorce on the adjustment of their children are scarce and rarely have a longitudinal design. This is the first three-generation study of the relative effects of depression and divorce on offspring psychopathology, based on data from a 25-year longitudinal study with families at high and low risk for depression. One hundred seventy-eight grandchildren (mean age = 13.9 years) of depressed and nondepressed parents and grandparents were evaluated by raters blind to their parents' and grandparents' clinical status. We found that in both low and high-risk children, divorce had a limited impact on child adjustment over and above familial risk for depression. Divorce had a significant effect on child outcomes only among high-risk grandchildren with a depressed grandparent and non-depressed parents, with this group showing a threefold risk for anxiety disorders. Results support previous findings suggesting that familial risk for depression largely overshadows the effect of parental divorce on child psychopathology. Possible reasons for the lack of association between divorce and child psychopathology among low-risk offspring are discussed.

Keywords Parental divorce · Depression · High-risk · Three-generation · Child outcomes

Introduction

There is more than 30 years of research on the effects of parental divorce on child development. Studies have reported a link between divorce and depression, reduced educational attainment, early assumption of high risk behaviors (i.e., early sexual activity, nonmarital childbirth, and earlier marriage and cohabitation), and an increased risk for suicide attempts (Amato 2001; Amato and Keith 1991; Chase-Lansdale et al. 1995; Donald et al. 2006; Lizardi et al. 2009).

These findings are difficult to interpret, as the effect of divorce and separation on offspring adjustment may not be direct. Research on marital relationships has identified depression as a strong correlate of marital discord (Christian-Herman et al. 2001; Mamun et al. 2009). Findings from family studies have established the relationship between parental depression and a variety of negative child outcomes (for a review see Beardselee et al. 1998; Cummings and Davies 1994; Downey and Coyne 1990; Joormann et al. 2008). Specifically, an association has been demonstrated between depression in parents and depression

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(clinical and subclinical) in their offspring (Cummings and Davies 1994; Goodman and Gotlib 1999; Halligan et al. 2007; Hammen and Brennan 2003; Lieb et al. 2002; Rice et al. 2005; Weissman et al. 2005). Other adverse offspring outcomes of parental depression include suicidality (Brent et al. 1994; Gureje et al. 2010), anxiety disorders (Nomura et al. 2002), substance dependence (Weissman et al. 2006), disruptive behavior problems (Brennan et al. 2002; Silberg et al. 2010), somatic symptoms (Kramer et al. 1998), attentional and cognitive problems (Orvaschel et al. 1988; Hay et al. 2001), impaired psychosocial functioning (Lewinsohn et al. 2005), impaired emotion regulation strategies (Silk et al. 2006), difficult temperament (Hanington et al. 2010) and insecure attachment (Teti et al. 1995).

When depression is studied across three generations, these relationships may be further complicated. Weissman et al. (2005) found that depression in grandparents was a risk factor for psychopathology in grandchildren and that, in the absence of grandparental depression, parental depression did not predict psychopathology in grandchildren. Research suggests that grandchildren with both a depressed grandparent and parent are more likely to have some form of internalizing disorder compared to those with only depressed grandparents (Pettit et al. 2008; Warner et al. 1999).

In this article, we report findings from the Yale "Children at High and Low Risk of Depression" study by Myrna Weissman and colleagues, one of the few high-risk studies for depression that uses a three-generation longitudinal design (Hammen et al. 2004; Weissman et al. 2005). The study design is unique, in that it enables the dual examination of the impact of parental depression and divorce on offspring adjustment by comparing children and grandchildren at high and low risk for depression from divorced and intact families.

Results from a 20-year follow-up of the study by Weissman and colleagues showed that the impact of family discord on offspring adjustment is substantially less powerful when it occurs in tandem with parental depression (Pilowsky et al. 2006). The study included data for the first two generations (grandparents and their offspring): offspring were already adults and no data were available yet for G3. The present study is the first three-generation exploration of the relative effect of depression and divorce on child adjustment. We hypothesized that: (1) among low-risk grandchildren (i.e., children with neither depressed grandparents nor depressed parents), parental divorce would be associated with offspring psychopathology; (2) among high-risk grandchildren (i.e., children with either depressed grandparents or parents, or both), there would be no significant association between parental divorce and offspring psychopathology.

Methods

This analysis uses data from the Yale "Children at High and Low Risk of Depression" study which was initiated in 1982. Data collection procedures for wave 1 (baseline), wave 2 (2-year follow-up), wave 3 (10-year follow-up), wave 4 (20-year follow-up) have been described in detail elsewhere (Weissman et al. 1987, 1992, 1997, 2005). The data collected in wave 5 (25-year follow-up) include: (1) the probands (grandparents), referred to as generation 1 (G1); (2) the offspring of the probands (parents), referred to as G2; and (3) the offspring of G2 (grandchildren of the original cohort), referred to as G3. The study was approved by the Institutional Review Board at New York State Psychiatric Institute/Columbia University, and informed consents were obtained from the subjects or their parents.

Sample

Grandparents (G1)

Subjects were recruited from an outpatient research clinic at Yale University. The control probands were selected from a community survey that was conducted in New Haven, CT, and were interviewed to rule out lifetime history of psychiatric illness.

Parents (G2)

Those with at least one depressed G1 parent were defined as high-risk; those without a depressed G1 parent were defined as low-risk. Previous work examining the effect of divorce on 182 of the original 220 G2 (125 G2 with one or more depressed G1 parent and 57 G2 with neither G1 parent depressed) has been published elsewhere (Nomura et al. 2002; Pilowsky et al. 2006).

Grandchildren (G3)

Ten G3 offspring who were determined to not be biologically related to G1 were eliminated from the analysis. Of the 188 G3 offspring eligible for participation in the study (age 5 or older), 178 (94.6%) were assessed at waves 3, 4, or 5.

Assessments

The full details of assessments at waves 1, 2, 3, 4, and 5 have been described previously (Weissman et al. 1982, 1992, 1997, 2005). G1 were interviewed at each wave except at waves 4 and 5 because by then they had passed the age of risk of the first-onset of MDD (Weissman et al. 1997).

Psychiatric Diagnoses

Adult psychiatric diagnoses were obtained using a semi-structured diagnostic interview (Schedule for Affective Disorders and Lifetime Version for Adults; Mannuzza 1986). Children aged 5–17 years were assessed using the Schedule for Affective Disorders and Schizophrenia for School-Age Children (Orvaschel et al. 1982). At waves 4 and 5, the Schedule for Affective Disorders and Schizophrenia–Present and Lifetime Version for Children was used (Kaufman et al. 2000).

Divorce or Separation

G1 and G2 were categorized as divorced if they endorsed "divorced" or "separated" as their current legal marital status at waves 3, 4, or 5. Those who were remarried or living with a partner as though married at these time-points were not included in the divorced group.

Interviewers and Best-Estimate Procedures

Trained doctoral and master's degree level mental health professionals administered all diagnostic assessments (for details of the training, see Weissman et al. 1997). Based on the best-estimate procedure (Leckman et al. 1982, as described in Weissman et al. 2005), final diagnosis of all generations was assigned independently by two experienced clinician reviewers, blind to the diagnostic status of the previous generation or prior assessments; their inter-rater reliability scores were good to excellent (Weissman et al. 1997, 2005). Lifetime diagnoses using DSM-IV criteria at the definite level were cumulative across data wave collections.

Statistical Analysis

Associations between sample characteristics (e.g., age, sex) and rates of depression and divorce were examined. *T* tests were used for the comparison of means between two groups, whereas the association between two categorical variables was explored using χ^2-tests.

We explored see whether the effect of G2 divorce on G3 psychopathology was modified by parental depression, as previously assessed at wave 2 (Nomura et al. 2002) and wave 3 (Pilowsky et al. 2006). In addition, we examined whether the effect of G2 divorce on G3 psychopathology was modified by G1 depression. In doing so, we stratified our sample based on both G1 and G2 depression, and conducted a multivariate analysis using proportional hazards to examine differences in diagnoses between offspring with and without separated/divorced parents. Cox proportional hazards models adjust for differences in follow-up time among grandchildren. G3 age was entered as a continuous variable, G2 socioeconomic status was entered as a categorical variable, and G2 sex and lifetime history of substance use disorders were entered as dichotomous variables. G3 age and sex and G2 socioeconomic status were considered a priori to be potential confounders, and were controlled for statistically in the multivariate analysis. To evaluate the magnitude of G3 children's risk for depression, anxiety, or a substance use disorder, a hazard ratio (HR) was calculated based on family risk for depression and/or divorce. We controlled for potential violations of the independence of observations, due to more than one offspring in the same family, using the approach of Lin and Wei (1989).

Results

Sample Characteristics

The demographic characteristics of the total sample of G1 and G2 have already been described (Pilowsky et al. 2006). Our study sample consisted of a total of 176 G3; 53 were from families where neither G1 nor G2 was depressed; 14 from nondepressed G1 but at least one depressed G2; 71 from at least one depressed G1 but nondepressed G2, and 38 from families where at least one G1 and one G2 were depressed. 53.4% were female and 46.6% were male, with a mean age at last interview of 13.9 years (SD = 5.4). No sex or age differences were found between G3 with depressed and nondepressed G1. Age and sex of grandchildren did not vary by parental depression status. Divorce rates in G2 did not vary by their depression diagnosis ($\chi^2 = 3.36$, $p = .12$). There was also no statistical difference in divorce rates between G1 and G2 ($\chi^2 = 0.82$, $p > .05$).

Offspring Psychiatric Disorders by Grandparental and Parental Depression Status

Results of the multivariate analysis showed that among G3 whose parents and grandparents had no lifetime diagnosis of depression, there was no significant association between parental divorce and grandchild psychopathology. Likewise, among G3 whose parents and grandparents had a lifetime diagnosis of depression, there was no statistically significant association between G2 divorce and G3 psychopathology. G2 divorce was associated with significantly increased risk for an internalizing disorder (OR = 2.6; $p = .05$) and threefold increased risk of anxiety disorder among G3 whose grandparents but not parents had a lifetime diagnosis of depression (see Table 1). Although causality cannot be inferred, a temporal relationship was found between parental divorce and offspring anxiety. In all but

Table 1 G3 Diagnoses by G1 MDD, G2 MDD and G2 divorce or separation

	G1 MDD No ($n = 53$)	G2 MDD No		G1 MDD No ($n = 14$)	G2 MDD Yes		G1 MDD Yes ($n = 71$)	G2 MDD No		G1 MDD Yes ($n = 38$)	G2 MDD Yes	
	G2 Divorcwe			G2 Divorcwe			G2 Divorcwe			G2 Divorcwe		
	$N = 41$	$N = 12$		$N = 10$	$N = 4$		$N = 54$	$N = 17$		$N = 24$	$N = 14$	
G3 diagnoses	No	Yes	HR	No	Yes	HR	No	Yes	HR	No	Yes	HR
N (%)	N (%)	N (%)	(95% CI)	N (%)	N (%)	(95% CI)	N (%)	N (%)	(95% CI)	N (%)	N (%)	(95% CI)
Intern	10 (28.6)	2 (16.7)	0.67 (0.19, 2.3)	3 (33.3)	1 (25.0)	1.3 (0.29, 5.5)	10 (20.4)	8 (53.3)	2.6 (1.0, 6.7)*[a]	18 (72.0)	6 (50.0)	0.97 (0.59, 1.6)
MDD	3 (8.6)	0 (0.0)	0 (0, 0)	0 (0.0)	0 (0.0)	–	3 (6.1)	3 (20.0)	2.6 (0.39, 17.7)	7 (28.0)	2 (16.7)	0.91 (0.21, 3.8)
Any Mood	6 (17.1)	1 (8.3)	1.4 (0.44, 4.1)	3 (33.3)	0 (0.0)	0 (0, 0)	6 (12.2)	5 (33.3)	1.6 (0.49, 5.1)	11 (44.0)	5 (41.2)	1.1 (0.54, 2.3)
Anxiety	9 (25.7)	2 (16.7)	0.79 (0.24, 2.7)	3 (33.3)	1 (25.0)	1.3 (0.31, 5.6)	9 (18.4)	8 (53.3)	3.0 (1.2, 7.6)**[b]	16 (64.0)	5 (41.7)	1.1 (0.99, 1.2)
Extern	6 (17.1)	0 (0.0)	0 (0, 0)	3 (33.3)	2 (50.0)	0.84 (0.45, 1.6)	5 (10.2)	0 (0.0)	0 (0, 0)	12 (48.0)	3 (25.0)	0.87 (0.42, 1.8)
Substance[†]	2 (5.7)	0 (0.0)	0 (0, 0)	1 (11.1)	1 (25.0)	3.5E…	2 (4.1)	2 (13.3)	1.2 (0.31, 4.6)	6 (24.0)	2 (16.7)	1.7 (0.37, 7.8)
Disruptive	6 (17.1)	0 (0.0)	0 (0, 0)	3 (33.3)	2 (50.0)	0.84 (0.45, 1.6)	5 (10.2)	0 (0.0)	0 (0, 0)	12 (48.0)	3 (25.0)	0.87 (0.42, 1.8)
Conduct	1 (2.8)	0 (0.0)	0 (0, 0)	1 (11.1)	1 (25.0)	1.1E11…	0 (0.0)	0 (0.0)	0 (0, 0)	4 (16.0)	1 (8.3)	1.1E…

Odds ratios adjusted for G3 sex, age, and socioeconomic status; adjusted for correlation within family. G2 MDD includes impairment. G2 divorce/separation does not include people remarried. Not possible to estimate three way interactions i.e., G1 MDD*G2MDD*G3 diagnoses

MDD major depressive disorder, *Intern* internalizing disorders, *Extern* externalizing disorders

[†] Odds ratios adjusted for parents' substance use disorders

* 0.05 G p e 0.10; ** 0.01 G p e 0.05; *** 0.001 G p e 0.01* $p = .05$ ** $p = .01$

[a] R-squared = 0.14

[b] R-squared = 0.13

one case, the onset of anxiety followed parental divorce. In addition, in one case the divorce/separation was before the birth of the child. No interaction was found between G1 depression and parental divorce on internalizing disorders ($p = .10$) or anxiety disorders ($p = .09$). Similarly, there was no interaction between G2 depression and parental divorce on internalizing disorders ($p = .09$) or anxiety disorders ($p = .05$). Analyses controlled for potential confounders discussed previously.

Discussion

We examined the effect of divorce/separation and familial risk for depression on offspring psychopathology using data from a larger three-generation study. Overall, the study shows that divorce and separation have limited impact on child adjustment over and above familial risk for depression. The main findings were: (1) psychopathology in highest-risk grandchildren (i.e., children with depressed parents and grandparents) was not related to parental divorce; (2) divorce had a significant effect on child outcomes only among high-risk grandchildren (those with a depressed grandparent and non-depressed parents): these grandchildren were three times more likely to develop anxiety disorders; and (3) among low-risk grandchildren, divorce had no impact on child psychopathology. Of note, grandchildren have not yet reached the typical age of onset for several psychological disorders, such as depression and substance use, and therefore results should be interpreted with caution.

Highest-Risk Grandchildren: Predominance of Family Risk for Depression

Our results suggest that children with the highest risk for depression are not affected by their parents' divorce. As previous research has shown, the impact of parental divorce/separation is less pronounced in families with a depressed parent (Fendrich et al. 1990; Nomura et al. 2002; Pilowsky et al. 2006). Our findings are consistent with the overall pattern found at these 2-, 10-, and 20- year follow-up studies. Divorce does not seem to have a meaningful impact on offspring's mental health when parental depression is present. Family risk for depression appears to overshadow the effects of divorce; in other words, since offspring of depressed parents are already more likely to have poorer outcomes, divorce alone does not appear to have a significant effect on their psychiatric status. In a previous analysis of the data, Warner et al. (1999) showed that the children who are most affected by familial depression are those who have both a depressed parent and a depressed grandparent. Interestingly, in our study these children were found to be the least affected by parental divorce (OR = 0.7), which may be suggestive of the predominance of family risk for depression as a causal mechanism of child psychopathology. Divorce seems not to have an additive effect, over and above family risk for depression, in this very high-risk population.

High-Risk Grandchildren: Association of Divorce and Anxiety

The only effect of divorce found in high-risk grandchildren was its association with anxiety disorders, and this was true only in grandchildren who had a depressed grandparent but not a depressed parent. This finding raises interesting possibilities.

First, in families where the risk for depression is less profound, there is an interactive effect of familial risk for depression and divorce on child outcomes. As noted above, Warner and colleagues showed that rates of anxiety disorders are highest in grandchildren for whom both a parent and a grandparent had a lifetime diagnosis of depression. In these grandchildren, it seems that there is a cumulative effect of grandparental and parental depression that masks the impact of divorce. When familial risk for depression is less strong, such as in the case of offspring with depressed grandparents but non-depressed parents, we observe a significant effect of parental divorce on child outcomes. However, such finding was not found in the other high-risk group, i.e. grandchildren with depressed parents and non-depressed grandparents. One possible reason could be the small sample size in this particular subgroup ($n = 14$). An alternative explanation may be that when a parent is depressed the non-depressed grandparents take a more active role in their grandchildren's lives, buffering the adverse effects of parental depression and marital dissolution on offspring adjustment (Silverstein and Ruiz 2006).

Second, our study showed that divorce was associated with increased likelihood for anxiety disorders, but not depression, among high-risk G3 grandchildren. However, it is important to note that the mean G3 age in this study was approximately 14 years, an age lower than the average age of onset for mood disorders (Weissman et al. 1987). Weissman and colleagues showed that children at high risk for depression tend to develop anxiety symptoms as an early sign of psychopathology, which may then develop into depression following the onset of puberty. This could be reflected in our sample, where the elevated anxiety observed in high-risk offspring of divorced parents could be an early, "age-dependent" expression of psychopathology that may later manifest as depression (Weissman et al. 2005). Future data following up on G3 into adulthood will be required to test this hypothesis.

Low-Risk Grandchildren: Lack of Significant Effect of Divorce on Child Outcomes

Low-risk grandchildren of divorced parents did not manifest higher rates of psychopathology. In the 20-year follow-up, two-generation study, Pilowsky et al. (2006) identified family discord, which included divorce, as a risk factor for major depressive disorder and substance use disorders in offspring of nondepressed parents. The fact that these findings were not replicated in the current analysis may be due to the young age of offspring in our sample. The incidence of substance use and depression markedly increases following puberty (Kessler et al. 2005), and follow-up assessment will better allow us to explore the effect of divorce among low-risk kids from G3 of our dataset.

Studies exploring the combined impact of depression and parental divorce on the adjustment of offspring are scarce. The study provides initial data to address this gap in the literature. However, it has a number of limitations. The high-risk probands in our study were recruited from a clinic where they were being treated for depression. Clinical samples tend to have high rates of psychopathology compared to community norms, and as such, the generalizability of our results to the general population may be limited.

Despite the relatively large overall sample, due to the high correlation between grandparental and parental depression, some offspring subgroups had limited sample sizes (e.g., those with depressed parents and nondepressed grandparents; $n = 14$). Additionally, at the 25-year follow-up of the initial probands, most of their grandchildren had not yet arrived at the typical age of onset for the majority of mental disorders (Weissman et al. 1987). This can explain the low incidence of certain conditions, such as substance use disorders.

The design of the study does not allow us to infer the causal influence of family risk for depression and parental divorce on child outcomes. Depression in families might be passed on to successive generations due to genetic vulnerability, as well as exposure to a stressful home environment (e.g., Goodman and Gotlib 1999). This is reflected in our finding that parental divorce is associated with the development of anxiety disorders among children with depressed grandparents but nondepressed parents. One interpretation of this finding is that family risk due to genetic vulnerability gets triggered by an environmental stressor (i.e., divorce). A different explanation is that these children, due to their parents' divorce, became more exposed to their grandparents' depression, since the latter might step into assist in their upbringing. Therefore, it could be the exposure to a depressed caregiver that puts them at higher risk for psychopathology. These interacting influences make it necessary for future studies to assess genetic risk and identify the specific mechanisms by which an adverse social environment affects offspring.

The study relies on a binary operationalization of the construct of divorce (yes/no), which makes it difficult to take into account various contextual features of divorce, such as length and quality of marriage, timing of divorce, family conflict-cohesion before and after the divorce, and financial consequences of the divorce. Future follow-ups of the study should use more comprehensive assessments of family discord to better understand its effect on child adjustment (see Pilowsky et al. 2006).

The study sought to investigate the association between parental divorce and familial risk for depression on children's psychopathology, using a three-generation, high-risk design. Our findings suggest that familial risk for depression overshadows the effect of family divorce on child psychopathology. The stronger the familial risk for depression is—as evidenced by the presence of depression across generations—the less significant divorce appears in predicting poor child outcomes. These findings have important clinical implications. They suggest that the focus of interventions should be on managing depression symptoms in the family before addressing the impact of divorce. Additional follow-up of this three-generation sample may provide evidence for specific child outcomes associated with divorce, such as depression and substance use.

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