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EARLY ONSET OF MAJOR DEPRESSIVE DISORDER AND ITS CONSEQUENCES FOR RECURRENCE AND CO-MORBIDITY: CONTRASTING THE EXPERIENCES OF SINGLE AND MARRIED MOTHERS

Carolyn S. Coppens
Western University

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EARLY ONSET OF MAJOR DEPRESSIVE DISORDER AND ITS CONSEQUENCES
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CONTRASTING THE EXPERIENCES OF SINGLE AND MARRIED MOTHERS

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by

Carolyn S. Coppens

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The University of Western Ontario
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Supervisor

_____
Dr. William R. Avison

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_____
Dr. Kathy Speechley

Examiners

_____
Dr. Ross Norman

_____
Dr. Cheryl Forchuk

_____
Dr. James Robertson

The thesis by

Carolyn Sylvia Coppens

entitled:

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Date_____

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<u>Abstract</u>

The purpose of this study was to determine whether the association of an early onset of major depressive disorder with the risk for recurrence of depression and psychiatric comorbidity is magnified among single mothers in contrast to married mothers. The data for this study were collected as part of a three-wave cohort study of 518 single and 502 married mothers in London, Ontario. The women were interviewed with the Michigan version of the Composite International Diagnostic Inventory. Results indicate that an early onset of depression was significantly associated with recurrence, but only modestly associated with other psychiatric comorbidity. Examined separately for single and married mothers, we found that being a single mother with an early onset of depression puts a woman at the highest risk of a psychiatric morbidity.

Keywords: Early onset, Depression, Recurrence, Comorbidity, Family Structure, Single Mothers

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Table of Contents

List of Tables

List of Abbreviations

MDD	Major Depressive Disorder
DSM-IV-TR	Diagnostic and Statistical Manual Version IV
YLD	Years of Life Lived with a Disability
DALY	Disability Adjusted Life Years
EOD	Early Onset of Depression
LOD	Adult Onset of Depression
GAD	Generalized Anxiety Disorder
SES	Socioeconomic Status
CIDI	Composite International Diagnostic Inventory

Chapter 1: Literature Review

1.1 Introduction and Objectives

Current evidence suggests that an early onset of major depressive disorder (EOD) is associated with an elevated risk for a recurrence of depression (Lewinsohn, Hops, Roberts, Seeley, & Andrews, 1993; Rao et al., 1995) as well as an increased risk of developing a comorbid disorder (Kessler & Walters, 1998). Specifically, an onset of major depressive disorder (MDD) before adulthood increases the risk of experiencing comorbid dysthymia (Klein, Schwartz, Rose, & Leader, 2000), generalized anxiety disorder (GAD) (Kessler, Avenevoli, & Ries Merikangas, 2001; Parker et al., 1999) and panic disorder (Alpert et al., 1999; Kessler et al., 2006). When multiple psychiatric disorders are present the symptoms are more severe, which can lead to complications with treatment and recovery (Lewinsohn, Rohde, Seeley, & Hops, 1991; Moffitt et al., 2007).

There is also a body of literature suggesting that certain social factors are also associated with the likelihood of experiencing EOD. Evidence shows a strong inverse relationship between socioeconomic status and mental health outcomes (Brown & Moran, 1997; Lorant et al., 2003; Muntaner, Eaton, Diala, Kessler, & Sorlie, 1998). There is also an association between marital status and MDD (Avison, 1997; Brown & Harris, 1993; Cairney, Boyle, Offord, & Racine, 2003). Single mothers are more likely to experience MDD than are their married counterparts. In particular, there is some evidence that being a single mother is more highly associated with EOD (Davies, Avison, & McAlpine, 1997).

These previous findings suggest that there may be an interaction of family structure and EOD with psychiatric outcomes. Specifically, the association of EOD with recurrence and comorbidity is expected to be more pronounced among single than married mothers.

It is the objective of the current study to determine whether the association of EOD with recurrence and comorbidity is magnified among single mothers in contrast to married mothers. A secondary objective is to replicate previous research that EOD is associated with recurrence and comorbidity.

1.2 Major Depressive Disorder

Major depressive disorder (MDD) is classified in the Diagnostic and Statistical Manual Version IV (DSM-IV-TR) under the category of mood disorders, which also includes dysthymia and bipolar disorders. This group of disorders has a large impact in Canada today, as they are the most common mental disorders affecting the general population (Health Canada, 2002). Women in particular were found to be more affected by MDD, reporting higher prevalence rates than those of men at all stages of their lives (American Psychiatric Association, 2000). This chapter reviews the literature on the psychiatric outcomes associated with a diagnosis of early onset depression, focusing specifically on women. The first section introduces major depressive disorder. Section two delves into the characteristics of an early onset of major depressive disorder and associated negative outcomes. The final section addresses the relationship between MDD and single motherhood.

For a diagnosis of major depressive disorder to be made, the Diagnostic and Statistical Manual requires the individual to have experienced a period of at least two weeks during which they had either a depressed mood or a loss of interest or pleasure in nearly all activities. Symptoms must also include the presence of at least four of the following: changes in appetite or weight; changes in sleeping pattern; decreased energy; feelings of worthlessness or guilt; difficulty thinking, concentrating or making decisions; recurrent thoughts of death and suicide ideation, suicide plans or attempts (American Psychiatric Association, 2000).

Although it is possible to be diagnosed with depression at any age, on average individuals are diagnosed in their mid-20s. The occurrence of MDD also has trends that follow gender lines. In childhood, both boys and girls are diagnosed with depression at relatively similar rates (Birmaher, Ryan, Williamson, & Brent, 1996). Into adolescence and adulthood these rates change and MDD becomes up to two times more likely for women than men. (American Psychiatric Association, 2000; Birmaher et al., 1996)

Major depressive disorder was identified as the leading cause of years of life lived with a disability (YLD) as well as ranking fourth worldwide as a major cause of disability adjusted life years (DALYs) (Health Canada, 2002). The negative impact of depression was often found to be intensified by high rates of comorbid disorders. Comorbidity means that there is a second or third coexisting disorder in addition to a primary diagnosis of MDD. It follows that these additional disorders led to an increased number of simultaneous negative symptoms (Lewinsohn, Rohde, Seeley, & Hops, 1991). Some of the most common disorders comorbid with MDD are: dysthymia; anxiety disorders (including generalized anxiety disorder (GAD) and panic disorder); substance use

disorders; anorexia; bulimia; and borderline personality disorder (American Psychiatric

Association, 2000).

Individuals with a major depressive disorder were also more likely to have

experienced pain and an increased number of physical illnesses on a daily basis, than

individuals without MDD (American Psychiatric Association, 2000). The high rates of

these physical symptoms were due largely to comorbidity with other mental illnesses,

which increased the number of negative symptoms associated with the original disorder.

Depression was also strongly associated with decreased physical, social and role

functioning, which had a direct impact on an individual's quality of life. MDD was also

associated with increased mortality rates and an associated suicide rate of 15 percent,

with a fourfold increase in individuals over 55 years of age (American Psychiatric

Association, 2000).

1.3 Early Onset Major Depressive Disorder

1.3.1 History of Early Onset of Major Depressive Disorder

Initially, both the research community and the general population believed that it

was impossible to diagnose depression in children and adolescents, or alternatively, that

cases of depression were too rare to be worthy of large exploratory studies. Adolescence

in particular was seen as a time of natural distress and moodiness; symptoms of

depression were considered a normal part of development (Kessler & Walters, 1998). In

the 1960s studies began to emerge, addressing these misconceptions. Both clinical and

community samples revealed that about one percent of children and seven to ten percent

of all adolescents had MDD. Additionally, studies showed that adolescents diagnosed

with MDD reported a greater number of negative symptoms and poorer social outcomes than their peers who did not have depression. More in-depth studies of early onset mood disorders began in the 1970s and led to the current growing field of research (Kessler & Walters, 1998).

1.3.2. Definition of Early Onset of Major Depressive Disorder

An early onset depression, although not specifically recognized by the DSM-IV-TR, is defined in the literature as a major depressive disorder occurring before adulthood (American Psychological Association, 2000). Based on a brief review of the literature, the exact age cutoff appeared to vary widely, and was reported as anywhere from 14 to 30 years of age, often depending on the sampling limitations of the research. Many studies focused solely on depression in children or depression in adolescents.

1.3.3 Lifetime Prevalence of the Early Onset of Depression

Because there is no officially recognized definition of EOD, most prevalence rates were reported separately with respect to either childhood or adolescent depression. The lifetime prevalence of major depression in children was found to be approximately two percent (Kaufman, Martin, King, & Charney, 2001). With regard to adolescent depression, Kessler, Avenevoli and Ries (2001) reported lifetime prevalence estimates that ranged from a low of four percent to a high of 25 percent. Birmaher et al. (1996) found a narrower range, with lifetime rates of depression in adolescence that were between 15 and 20 percent.

Lewinsohn, Rohde and Seeley (1998) reported lifetime rates of unipolar depression (which included both MDD and dysthymia) among a community sample of adolescents of approximately 20 percent and nearly 80 percent of these individuals

reported MDD alone. Based on this sample of high school students, it was estimated that 28 percent would have an episode of MDD by the age of 19 and this number increased to approximately 35 percent when females were considered alone.

Kessler, McGonagle, Nelson et al. (1994) estimated a lifetime prevalence of depression of 14 percent based on a community sample of adolescents 15 to 18 years old. In accordance with these results, Kessler and Walters (1998) reported a lifetime prevalence rate of 15.3 percent for adolescents between the ages of 15 and 24 with a lifetime history of MDD.

Overall these studies provided supporting evidence for a lifetime prevalence of depression between 15 to 20 percent for adolescents. High prevalence rates, coupled with the negative health outcomes associated with depression underscore the need for further study of EOD.

1.4 The Early Onset of Depression and Recurrence

While the goal of treatment for any mental illness is most certainly a complete recovery, there is a significant risk of recurrence with MDD. Recurrence is defined in the literature as the occurrence of a new episode of MDD after a full recovery from a previous episode. Patients are considered to be fully recovered if a period of six months has passed without experiencing more than two symptoms of depression. Should there be another episode of depression before the 6-month mark, it is considered a relapse and not a recurrence (Hart, Craighead, & Craighead, 2001).

According to the DSM-IV-TR, after a single episode of major depression there is a 60 percent chance of recurrence. After two episodes, there is a 70 percent chance of

recurrence, and after three episodes there is a 90 percent chance (American Psychiatric Association, 2000). Evidence from the literature in both clinical and community samples suggested that EOD led to a greater likelihood of a recurrence of depression than did adult-onset depression (Rao, Hammen, & Daley, 1999).

Rao et al. (1995) reported that individuals with recurrent episodes of depression had lower relative levels of education than controls with no disorder, even after adjusting for differences in socioeconomic status. They also scored higher on rates of impairment compared to both controls and individuals with MDD who experienced no further episodes. They often showed impairment in social functioning, such as in relationships with friends, satisfaction with life and overall global functioning. Individuals with depression who had not experienced a recurrent episode did not differ significantly from controls on any of the measures of social functioning. These findings support the hypothesis that a recurrent course of depression can have an effect beyond the realm of depression scores to have a negative impact on many aspects of an individual's life.

In prospective studies of adolescents recurrence rates were reported to be 17 percent after one year (Lewinsohn, Hops, Roberts, Seeley, & Andrews, 1993) and 69 percent after seven years (Rao et al., 1995). Lewinsohn et al. collected data for the Oregon Adolescent Depression Project from high school students aged 14 to 18. After one year, the reported rate of relapse for MDD was 17.9 percent for the total sample (21.11 percent for females and 9.09 percent for males). After a five year follow-up period, the rate of relapse increased to 45 percent of the total sample, which resulted in recurrence rates of approximately 9 percent per year over the duration of the study. The individuals who were never depressed experienced an onset of new depression at a rate of

only 3.7 percent, which showed a clear contrast between a new onset of the disorder and a recurrence (Lewinsohn, Rohde, Klein, & Seeley, 1999).

Hart et al. (2001) studied 18 year-old undergraduate students from the University of Colorado. The participants had been previously diagnosed with MDD, but were not currently depressed at the time of entry into the study. During the 18-month follow-up period, 27 of the 65 participants in the study (41.5 percent of the sample) were diagnosed with a new episode of MDD which in this case would be considered a lifetime recurrence.

Dunn and Goodyer (2006) examined the recurrence of depression in adolescents selected from both a community sample and a clinical sample. They reported that 48 percent of the community sample had a recurrence of depression during the study's 36-week follow-up period. The clinical sample had a recurrence rate of 35 percent. It was noted that the lower rate of recurrence in the clinical sample may have been due to the greater number of participants whose depression lasted the duration of the study, 22 percent, as opposed to the eight percent of the community sample who reported an enduring depression.

Rao et al. (1995) studied a sample of 28 individuals with depression and 35 controls with no history of previous mental illness, all of whom had an average age of 15 years. During the seven year follow-up period, the group with depression reported a 69 percent rate of recurrence which was significantly different from the 18.2 percent reported for the control group. Of all the studies presently being reviewed, this study by Rao et al. had the longest period of follow-up, and subsequently reported the highest rate of recurrence.

Fergusson and Woodward (2002) began surveying a birth cohort in New Zealand in 1977. The participants were studied at birth, four months and one year, then annually until the age of 16 and again at the ages of 18 and 21. By the time the surveys were conducted for subjects aged 16 to 21, 33.5 percent of this cohort met the DSM-IV criteria for MDD. When those who had depression in adolescence (ages 14 to16) were compared to those with depression in early adulthood (ages 16 to 21), a statistically significant odds ratio of 4.5 was found for the continuity of MDD into adulthood. Even after adjusting for confounders, the odds ratio remained significant at 3.5.

A greater risk for recurrence was also found when comparing EOD to later or adult onset of depression (LOD). In a study by Giles, Jarrett, Biggs, Guzick, and Rush (1989), of the 30 adults considered successfully treated for major depression, six (20 percent of the sample) had an early onset of depression. The participants were followed monthly for 36 months, and during that period, 17 individuals (56.7 percent of the sample) had a recurrent episode of depression. The chi-square analysis revealed that early onset (i.e. an onset before the age of 20), was significantly associated with an increased likelihood of a recurrence of depression compared to the group that reported an adult onset of depression.

Gollan, Raffety, Gortner, and Dobson (2005) recruited participants into a randomized controlled trial to test the effectiveness of various cognitive behavioral therapies on outpatients with depression. Both the group with EOD (defined as having an onset of depression before the age of 20) and the group with LOD were composed of 31 people. The groups were followed every six months for two years after which 51.6 percent of those with EOD had suffered a relapse compared to 29 percent of the group

with LOD. Gollan et al. also reported that the individuals with EOD had a faster time to relapse than those with LOD.

Klein et al. (1999) studied 289 outpatients diagnosed with chronic major depression, drawn from a study comparing the efficacy of different drug treatments on acute and chronic depression. The group with EOD (defined as having an onset at or before the age of 21) had significantly higher rates of recurrent major depressive episodes (71.2 percent) than the group with later onset depression (42.7 percent).

Although few studies reported specifically on recurrence rates of MDD in children, the study by Kovacs, Feinberg, Crouse-Novak, Paulauskas and Finkelstein (1984) was an exception focusing on children aged eight to thirteen recruited from an outpatient clinic. Within the first two years of an initial diagnosis of MDD, these children had a 40 percent chance of experiencing a recurrence, this risk increased to 72 percent in the first five years following diagnosis. One important limitation is that this study considered a child to have recovered if they were without symptoms for two months, as opposed to the standard six months used in other studies.

Fombonne, Wostear, Cooper, Harrington and Rutter (2001) selected children from a database of patients who attended the child psychiatry department at the Maudsley Hospital in London, England between 1970 and 1983. These children were chosen specifically because they met the criteria for a diagnosis of MDD. They were then followed up approximately 20 years later and were found to have a lifetime recurrence rate of 62.6 percent.

Gilman, Kawachi, Fitzmaurice and Buka (2003) found that compared to adult depression (onset after the age of 21), participants with an onset of depression in

childhood (under 14 years of age) had a greater likelihood of experiencing a recurrence. They also found that the risk of a recurrence was significantly lower for those who had an onset of depression in adolescence (between the ages of 15 and 20).

Overall, the literature showed that MDD is associated with a high risk for recurrence. In particular, the onset of MDD in adolescence is associated with increasing rates of recurrence associated with the length of the follow-up period. In addition, rates of recurrence between groups with EOD and LOD imply a greater risk of recurrence associated with depression that has an earlier onset.

1.5 Comorbid Disorders

1.5.1 Comorbidities in General

Comorbidity is a complication commonly associated with psychiatric disorders. When comorbidity (i.e., multiple disorders) is present, the disorder is more severe and persistent than for a pure case (i.e., a single disorder) because patients are contending with a broader range of negative symptoms that can lead to complications with both treatment and recovery (Lewinsohn et al., 1991; Moffitt, Harrington et al., 2007). A diagnosis of MDD with an associated comorbid disorder typically resulted in a more severe form of MDD and led to an increased risk for recurrent depression, a longer duration of the depressive episode, increased suicide attempts or suicidal ideation, decreased functional outcome, and an increase in the utilization of mental health services (Birmaher et al., 1996).

Major depressive disorder has many commonly associated comorbidities. Kessler and Walters (1998) found that more than 75 percent of individuals with lifetime cases of MDD reported having had at least one comorbid disorder, while 46 percent of the sample

reported two or more comorbidities. Major depression was the secondary diagnosis in the majority of cases, meaning that an individual was diagnosed with a primary disorder such as generalized anxiety disorder (GAD) initially, and later received a second diagnosis of MDD. The exceptions to this were substance abuse disorders which were generally preceded by a previous diagnosis of MDD (Kessler & Walters, 1998).

The evidence shows that an early onset of depression has an even higher rate of associated comorbidity when compared to depression in general. In a study by Biederman, Faraone, Mick and Lelon (1995), a sample of children was recruited through referrals to a pediatric psychopharmacology clinic. From this sample, 97 percent of the children with severe depression and 96 percent of those with mild depression were diagnosed with at least one comorbid disorder. More than 80 percent of individuals in both groups, those with mild and severe depression, also had two or more comorbid disorders compared to the control group with no psychiatric illness.

Alpert et al. (1999) studied 391 adults aged 18 to 65 who were currently experiencing a depressive episode and discovered that 75 percent of the individuals in the sample who had a major depressive disorder also had a comorbid Axis I disorder. Those who had an onset of MDD in childhood or adolescence reported a greater number of comorbid disorders than did individuals with a later onset. The childhood onset sample (i.e. children under the age of 12) had the highest rate, with 87 percent having one or more comorbid disorders. The group with an onset during adolescence (i.e. youth between the ages of 12 and 18) was quite similar with a rate of 85 percent comorbidity. These results were contrasted with the 71.2 percent rates of comorbidity in individuals who reported an adult onset (i.e. aged 18 and over).

1.5.2 Comorbid Dysthymia

Dysthymic disorder or dysthymia is a type of mood disorder that is characterized by a feeling of sadness or depression on more days than not for a period of at least 2 years. This definition is slightly modified for children and adolescents who can be diagnosed after only one year of symptoms (American Psychiatric Association, 2000).

Dysthymia is often observed in conjunction with MDD. During the dysthymic period symptoms may suddenly worsen and the individual then meets the criteria for MDD, a phenomenon known as 'double depression' (Klein, Shankman, & Rose, 2006). Biederman et al. (1995) found that individuals with severe MDD had comorbid dysthymia in 16 percent of cases and those with mild MDD had comorbid dysthymia in 12 percent of cases. Both of these populations had significantly higher rates of comorbidity than did controls without any psychiatric illness. Rao et al. (1995) found results similar to those by Biederman et al., in a seven year follow-up study; in the group with MDD, 27 percent subsequently developed dysthymia compared to the healthy controls who did not develop a single case of dysthymia. While these results were significant, their importance was limited by the size of the sample as it referred to only 7 of the 27 total individuals who participated in the study.

Studies that examined dysthymia as the primary diagnosis also reported higher rates of comorbid MDD. Klein, Schwartz, Rose and Leader (2000) conducted a longitudinal prospective study of dysthymic disorder with a group of patients followed-up at 30 and 60 months. Of the 84 participants who entered the study, 84 percent had comorbid dysthymia and MDD while the remaining 16 percent had dysthymia alone. The

researchers also found that during the course of the study 76.9 percent of the individuals with pure dysthymia developed comorbid MDD during the follow-up period.

There was a higher prevalence of comorbid dysthymia in cases of EOD than in cases with an onset of depression in adulthood. Lewinsohn et al. (1991) reported that in adolescents, comorbidity between MDD and dysthymia in the past year was approximately 20 times greater than expected by chance and the lifetime comorbidity was over three times greater. Among adults, the comorbidity of MDD and dysthymia was also significant; they reported an OR of 4.4 for current comorbidity and an OR of 1.6 for lifetime comorbidity. In the 23 adolescents who experienced episodes of both MDD and dysthymia, 91.3 percent were first diagnosed with dysthymia and subsequently with MDD.

1.5.3 Comorbid Generalized Anxiety Disorder

Generalized anxiety disorder (GAD) is defined as excessive worry or anxiety on more days than not for a period of at least six months, which the person also finds difficult to keep under control. The worry is not typically focused on one specific area or topic but encompasses a broad range of events or activities (American Psychiatric Association, 2000).

Generalized anxiety disorder is the disorder most highly comorbid with MDD; up to three quarters of adolescents with depression have a history of at least one anxiety disorder (Kessler et al., 2001). Anxiety disorders, in general, as reported in a meta-analysis by Angold and Costello (1993) were 2 to 26 times more likely in children with MDD than in children without the disorder.

Using sample data collected from the National Comorbidity Study, which examined the presence of psychiatric disorders in the United States, Kessler and Walters (1998) reported GAD as the strongest predictor of MDD, with an odds ratio of 5.1. Generalized anxiety disorder was the only comorbid disorder that remained significant throughout the course of their analysis.

Generalized anxiety disorder was more highly associated with an early onset of depression than a later onset. Parker, Wilhelm and Asghari (1997) found that EOD (25 years of age or less) was predicted by a lifetime episode of any anxiety disorder and that GAD was a stronger and more consistent predictor than any of the other anxiety disorders examined (i.e. panic disorder, agoraphobia, social phobia or simple phobia).

Parker et al. (1999) also found that anxiety disorders generally preceded an early onset of depression. Patients in this study were recruited consecutively from an in-patient and out-patient Mood Disorders Unit as well as other psychiatric practices; all had a current diagnosis of a major depressive episode. The group with EOD had a 58 percent chance of being diagnosed with a comorbid anxiety disorder in their lifetime. In contrast, the group with LOD only had a 43 percent chance of comorbidity. Moffit et al. (2007) reported findings that were in agreement with Parker et al. (1999); the group with adult comorbid GAD and MDD were characterized as having the earliest onset of both MDD and GAD. Pine, Cohen, Gurley, Brook, and Ma (1998) reported that an onset of MDD in adolescence often led to a subsequent onset of GAD in adulthood. When all confounding factors were adjusted for, GAD remained the only disorder significantly associated with EOD.

<u>1.5.4 Comorbid Panic Disorder</u>

Panic disorder is defined as the presence of recurrent, unexpected panic attacks that are followed by at least one month of persistent concern about having another panic attack, worry about the possible consequences of another attack, or a significant change in behaviour as a result of previous panic attacks (American Psychiatric Association, 2000).

According to the National Comorbidity Study Replication (Kessler et al., 2006), the lifetime rates of panic disorder in the general U.S. population were approximately 4.7 percent while the 12-month prevalence rate was 2.8 percent. Panic disorder was also commonly found to be comorbid with MDD (American Psychiatric Association, 2000).

Kessler et al. (2006) reported that comorbid panic disorder and MDD were present in 34.7 percent of the sample respondents, which resulted in a statistically significant odds ratio of 2.0. In an earlier study, Kessler and Walters (1998) determined that panic disorder was a strong predictor of the first onset of MDD, with a statistically significant odds ratio of 3.3. Sanderson, Beck and Beck (1990) found that panic disorder combined with agoraphobia was comorbid with MDD in seven percent of cases. Panic disorder without agoraphobia was comorbid with MDD in three percent of cases. Agoraphobia alone was comorbid with MDD in only two percent of cases. In almost all cases, the diagnosis of panic disorder was secondary to that of MDD.

Although some studies in the literature have shown an association of panic disorder with depression, the evidence did not convincingly document increased rates of panic disorder among individuals with EOD. Alpert et al. (1999) reported that there was no significant difference in the prevalence of panic disorder between the onset of MDD in

childhood (14.9 percent), adolescence (15.8 percent) and adulthood (13.7 percent).

Similarly, Parker et al. (1997) reported that 41 percent of the group with EOD (aged 26

years or under) had a comorbid panic disorder compared to 25 percent of the group with

LOD. While there was no significant difference between the two groups, the researchers

noted the appearance of a trend towards significance. The results may not have reached

significance due to the small sample sizes of the groups.

1.6 Risk Factors for Major Depressive Disorder

Research revealed that there are specific social factors that affect the probability

of suffering from MDD. Socioeconomic Status (SES) and marital status were found to be

two important social risk factors that had an impact on mental health outcomes.

1.6.1 Socioeconomic Status

The literature has shown a strong inverse relationship between mental health and

socioeconomic status (Muntaner et al., 2004). Low SES consistently had a strong

association with high rates of MDD and an increased risk for the persistence of a

depressive disorder (Aneshensel & Phelan, 1999; Brown & Moran, 1997; Byrne et al.,

1998; S. E. Gilman, Kawachi, Fitzmaurice, & Buka, 2002; Lorant et al., 2003; Lorant et

al., 2007; Muntaner, Eaton, Diala, Kessler, & Sorlie, 1998; Zimmerman & Katon, 2005)

The National Comorbidity Study (NCS), reported results that clearly illustrated

the relationship between SES and mental illness. This study used two standard methods

for assessing SES and both revealed the inverse relationship that was predicted. Using

years of education as a measure of attainment, individuals in the lowest category (i.e.,

zero to 11 years of education) reported a 1.79 times greater rate of affective disorder than

those in the highest category (i.e., 16 or more years of education). Examining each successive category revealed that, as years of education increased, the rate of depressive disorder decreased. Similar results were found when using income as a measure of SES. The group with the lowest household income (i.e., zero to nineteen thousand dollars per year) reported a rate of depressive disorder 1.73 times that of the group with the highest household income. Similar to the gradient seen with years of education, the more household income reported, the lower the rates of affective disorder (Kessler, McGonagle, Zhao et al., 1994).

With the goal of expanding the definitions of SES as applied to community studies, Muntaner et al. (1998) examined the associations between mental health and SES using data from the NCS and the Epidemiologic Catchment Area studies. Rates of mental illness, including mood disorders (depression and dysthymia), were inversely associated with levels of SES. The traditional measures of SES - years of education, occupational status and level of household income - were used. As well, a fourth measure of wealth was created specifically for this study: having financial and physical assets. Data from the NCS revealed strong, consistent associations of all four measures of SES with MDD. Having fewer years of education, a lower status occupation (e.g., laborer), a low household income, and few financial and physical assets significantly increased the likelihood of having a mood disorder.

Gilman et al. (2002) studied a sample of 1,132 adult offspring of mothers previously enrolled in the Rhode Island perinatal project between 1959 and 1966. They were followed between the ages of 18 and 32. The lifetime rate of depression among respondents from the highest socioeconomic background was 17.1 percent compared to

rates of between 24.9 and 27.1 percent among the other four categories of parental occupation. After controlling for childhood variables, lower parental occupation levels remained significantly associated with the onset of depression.

Lorant et al. (2007) analyzed data from the Belgian Households Panel Survey from 1992-1999. They observed a clear relationship between deteriorating socioeconomic circumstances and depression. They found that increased financial strain was associated with a statistically significant increase in both depression score and the number of cases of depression; an increase that was greater among women than men.

In a study of adolescents, Rao et al. (1995), found that the group with depression reported a significantly lower mean score on the Hollingshead-Redlich two-factor scale of socioeconomic status than the control group who did not have a psychiatric illness. The group with recurrent depression also reported a significantly lower mean SES score than the group with a non-recurrent course. None of the demographics, including SES, predicted a new onset of depression in the control subjects, supporting the findings by Lorant et al. (2007) that SES had a stronger association with the duration of MDD than with the onset of new cases.

1.6.2 Family Structure

Research revealed that single mothers had higher rates of nearly all psychiatric disorders, including MDD, when compared to married mothers. Women who had experienced certain stressful life events such as a separation, divorce or being widowed, had a higher risk of developing MDD than those who had never been married (Avison, 1997; Brown & Harris, 1993; Brown & Moran, 1997; Cairney, Thorpe, Rietschlin, & Avison, 1999; Cairney, Boyle, Offord, & Racine, 2003; Cairney, Pevalin, Wade,

Veldhuizen, & Arboleda-Florez, 2006; Davies, Avison, & McAlpine, 1997; Samuels-

Dennis, 2006) .

Brown and Moran (1997) reported that single mothers were twice as likely to

develop depression as married mothers (16.0 percent vs. 7.9 percent). Despite finding an

association between poverty and MDD in this study, single mothers were at an increased

risk for depression whether or not they had experienced financial hardship. The onset of

depression was 14.6 percent for the group of single mothers who had experienced

hardship compared to 17.0 percent for those without any significant financial strain. In

contrast, financial hardship appeared to play a more significant role in predicting an

initial onset of depression in married mothers.

According to Davies et al. (1997), single mothers were approximately four times

more likely to have experienced depression in the past 12 months than were married

mothers (19 percent vs. 5 percent). The prevalence of negative life experiences was also

higher for single mothers, whether separated, divorced, widowed or never married, than

for the group of married mothers. Odds ratios, after controlling for basic demographic

factors, showed that never-married mothers were 3.1 times more likely than their married

counterparts to have ever experienced major depression while separated or divorced

mothers had 4.6 times the risk.

Using data from the National Population Health Survey, Cairney et al. (2003)

found that single mothers had significantly lower levels of education (26 percent had less

than a high school diploma vs. 16 percent), less income (49 percent in the lowest income

category vs. 12 percent), and were less likely to be employed than married mothers.

Single mothers also had a significantly higher 12-month prevalence of depression than

did married mothers (15 percent vs. 7 percent). After adjusting for income, maternal education, age, and household composition, the odds ratio was 2.4, which reflected only a slight decrease in significance from the crude model. Thus, single motherhood resulted in a higher risk for major depression when compared to married mothers and this higher rate could not be accounted for by differences in SES.

Not only were single mothers at an increased risk for depression when compared to their married or cohabiting counterparts, but they also had worse mental health outcomes, including an increased number of comorbid disorders. Lipman, Offord and Boyle (1997) analyzed data from the OHSUPP, a subset of the Ontario Health Survey, collected between 1990 and 1991. The single mothers reported a significantly higher rate of lifetime psychological disorders, which included a higher rate of lifetime affective disorders (20.8 percent vs. 9.4 percent) than the married mothers. Cairney et al. (2006) found similar patterns using data from the National Comorbidity Survey (1992-1993). When married mothers were compared to groups of separated, divorced, widowed and never-married mothers, the married mothers were found to have significantly lower rates of psychiatric disorders. The single mothers reported higher rates of affective disorders (specifically MDD and dysthymia); substance use disorders; comorbid affective disorder and anxiety disorder; and comorbid affective disorder and substance use disorder.

There was strong evidence in the literature to support the hypothesis that low SES and single motherhood are risk factors for psychiatric disorders, yet there is relatively little research addressing how these social risk factors are associated with EOD. The study by Davies et al. (1997) found that single mothers were more likely than their

married counterparts to report an onset of depression before adulthood. More studies

are needed in this area to address this important research question.

1.6 Summary

The review of the literature clearly indicated that EOD was a risk factor for

recurrent depression and for elevated rates of psychiatric comorbidity. There was a strong

association between EOD and higher rates of dysthymia, GAD and panic disorder.

Additionally, there was strong evidence for an association between MDD and social risk

factors such as SES and marital status.

The onset of MDD in adolescence was associated with increased recurrence rates

directly related to the length of the follow-up period. Findings ranged from 17 percent

recurrence after a year of follow-up to 69 percent after 15 years. Studies of the onset of

depression in childhood also found increased rates of recurrence compared to individuals

with an onset of depression in adulthood. Overall, when rates of recurrence were

compared between individuals with EOD and LOD, it becomes clear that there was a

greater risk of recurrence associated with an early onset of depression.

The presence of a comorbid psychiatric disorder led to the possibility of

experiencing a more severe and persistent case of MDD as patients were forced to

contend with a broader range of negative symptoms. Some comorbid disorders

commonly associated with MDD included: dysthymia, GAD and panic disorder.

Comorbid dysthymia and MDD, also known as double depression, was found to

be common in individuals diagnosed with both mild and severe depression. Comorbid

dysthymia was also found in individuals with an early onset of depression.

Not only was GAD associated with MDD, but there was also a much higher risk of having comorbid GAD when an individual had been diagnosed with EOD. A history of GAD was also a good predictor of future MDD, as a diagnosis of GAD tended to precede MDD.

Overall, panic disorder appeared to be associated with comorbid MDD. In particular, the disorder often preceded MDD, following the same pattern as anxiety disorders, such as GAD. While evidence for the association of comorbid panic disorder with EOD was not strong, there was a trend toward significance that could be further explored using larger sample sizes.

There were specific risk factors that increase the likelihood of developing MDD. SES was consistently found to have an inverse relationship with mental health and MDD in particular. As levels of household income, years of education or measures of wealth decreased in a population, there was a marked increase in the rates of MDD.

Single motherhood, whether because the woman had never been married or as the result of separation, divorce or widowhood resulted in an increased risk of MDD and other comorbid mental disorders. Single motherhood was found to be a crucial risk factor for MDD.

This review of the literature suggests that there is a strong link between EOD and various psychiatric outcomes. We know that in women with EOD there were higher rates of recurrence of depression and an association with several comorbid disorders. One potential link between EOD and recurrence appears to be single motherhood Davies, Avison and McAlpine (1997) found that women who were exposed to early adversities were at higher risk for EOD and were also more likely to be single mothers. We

hypothesized that single mothers would demonstrate higher rates of EOD than married mothers because of an increased exposure to stressful life events. A key example is the fact that single mothers were more likely to have lower SES than married mothers, which can increase stress and in turn elevate women's risk for depression. With the understanding that single mothers experience more life stressors than married mothers the primary objective of the current study was to determine whether the associations between EOD and both recurrence and comorbidity were greater among single mothers than married mothers. To date there has been little research examining the interaction between EOD and family structure and it is important that this area of research not be overlooked. The secondary objective of the current study is to replicate the previously documented effects of EOD on psychiatric outcomes among a large sample of mothers adding to the existing body of knowledge in the area of early onset of psychiatric disorders.

Chapter 2: Methods

2.1 Study Design

This thesis is a secondary analysis of an existing data set. The data for this thesis were collected as part of a three-wave cohort study of single and two-parent families in London, Ontario (Avison et al., 2007). Participants were both single and married mothers with at least one child under the age of 17. A single mother was defined as a woman who was either never married, separated, divorced or widowed and was not currently cohabiting with a partner at the time of the baseline interview. A married mother was defined as a woman living with her husband or cohabiting partner at baseline. The first wave of the study was implemented in 1991, with a follow-up interview 18 months later. The women were located again and re-interviewed after another 14 years. The diagnoses for the psychiatric disorders were determined during the interview process using the Michigan version of the Composite International Diagnostic Inventory (CIDI), a structured interview schedule that allowed for the creation of DSM-III-R diagnoses. All of the women who completed both Waves 1 and 3 of the study were included in the analysis for this thesis project.

2.2 Study Sample

2.2.1 Wave 1 (1990-91)

The initial sample for this study was selected using a stratified sampling strategy to ensure an equal representation of female-headed single parent families from all areas in the city of London, Ontario. The sampling frame was generated from the 1989 London Municipal Assessment File, which provided an enumeration of every household in the city of London. This list initially generated 4,078 households headed by single mothers

with at least one child under the age of 17. All of the single parent households were stratified into 13 geographic areas that reflected the differences in household incomes across the city of London. This was done to ensure a broad distribution of socioeconomic statuses across the entire sample of women.

The comparison sample of married or cohabiting mothers was randomly selected from the same 13 geographic areas across London, using the Municipal Assessment File. These women were matched to single mothers based on the mother's age and the age and sex of her oldest child under the age of 17. This stratified sampling procedure was done to ensure an accurate representation and comparison between the samples of single and married mothers.

Once the sampling frame was completed, each household was contacted and the mothers were invited to participate in the study. Of those contacted, 518 single mothers and 502 married mothers completed interviews, a response rate of 71.6 percent among single mothers and 60.2 percent among married mothers, for an overall rate of 65.5 percent. With regard to the families who refused to participate, Ali and Avison (1997) and Davies et al. (1997) assert that there were few biases due to non-response as no one geographic area had a significantly higher rate of refusal and there were no differences between responders and nonresponders in maternal age or in the age or sex of the oldest child.

2.2.2 Wave 2 (1992-93)

Eighteen months after the completion of the initial interviews, the second wave of the study was implemented and participants were contacted for a follow-up interview. Avison and his colleagues were able to successfully re-interview 472 of the original 518

single mothers and 476 of the 502 married mothers which is a retention rate of 91.1

percent and 94.8 percent, respectively. Attrition analyses between Waves 1 and 2 did not

reveal any substantial differences between respondents interviewed and those who did

not participate in the second wave.

2.2.3 Wave 3 (2005-2008)

Approximately 14 years later, attempts were made to contact and re-interview the

1,020 mothers who had originally participated in Wave 1 and Wave 2 for an additional

third wave of the project. This process began in 2005 and data collection was completed

in early 2008. Re-interviewing was successfully completed for 349 (69.4 percent) of the

original sample of single mothers as well as for 430 of the original sample of married

mothers, which was a success rate of 85.7 percent.

2.3 Measurement

Data used for this study were collected through two-hour interviews conducted by

trained, paid interviewers. These in-person interviews were conducted in the mothers'

homes or in an alternate venue of their choosing. The only exception was in Waves 2 and

3 for respondents who lived more than 200 km outside of the London area. For these

women, the interviews were administered by telephone, although this was a rare

occurrence (less than 10 cases were interviewed by telephone) and should not impact the

reliability of the data collection. During the Wave 1 interview the entire process was

completed using a paper and pencil survey while the Wave 3 interviews were conducted

using a computer program. The interview covered a range of topics including

demographic characteristics and measures of mental health.

A major focus of the study was to determine the presence of psychological disorders. The Composite International Diagnostic Interview (CIDI) was administered to assist in making diagnoses (World Health Organization, 1990). The CIDI was initially developed as a collaboration between the World Health Organization and the National Institute of Mental Health. Responses to the CIDI corresponded to DSM-III-R diagnoses of psychiatric disorders for various periods throughout a person's lifetime. Participants' ages were identified at the first onset of symptoms, at the most recent episode, and at the worst lifetime episode. There was substantial evidence documenting the inter-rater reliability (Cottler et al., 1991; Wittchen et al., 1991), test-retest reliability (Wacker, Battegay, Mullejans, & Schlosser, 1990) and validity of the CIDI (Farmer, Katz, McGuffin, & Bebbington, 1987; Farmer, Jenkins, Katz, & Ryder, 1991; Janca, Robins, Cottler, & Early, 1992; Wittchen, Burke, Semler, & Pfister, 1989). Research has shown that the CIDI is a valid measure of psychological disorders in the general population in both the U.S. (Kessler, McGonagle, Nelson et al., 1994) and Canada (Wade & Cairney, 1997). The Wave 1 interview assessed the presence of MDD and dysthymia. During the Wave 3 interview the range of disorders evaluated was expanded significantly. Modules of the CIDI were used to assess major depressive disorder, dysthymia, generalized anxiety disorder, panic disorder as well as information on substance use disorders.

2.3.1 Early Onset of Major Depression

Responses to the CIDI during Wave 1 of the study allowed for DSM-III-R diagnoses of MDD for various time periods. Age of onset of first depressive episode was also obtained for all respondents who met criteria for MDD. Respondents who reported onset before the age of 18 were categorized as experiencing early onset.

2.3.2 Recurrence of Depression in the Past Year

Recurrence of depression in the past year was evaluated using the responses for occurrence of MDD in the past year. Of those who met criteria for MDD at Wave 1, respondents with MDD within the year preceding Wave 3 interviews were classified as having an episode of recurrence.

2.3.3 Comorbid Disorders

Presence of comorbidities in the past year and over a participant's lifetime were determined using CIDI diagnoses for MDD, dysthymia, GAD and panic disorder. Participants were reported as having a comorbid disorder if they were found to have two or more of these disorders in the past year or alternatively over the course of their lifetime.

2.3.4 Family Structure

Single mothers included women who were either never-married, widowed, separated or divorced at Wave 1. Married mothers included women who were married or currently cohabiting with a common-law partner at Wave 1.

2.4 Analytic Design and Methods

Using only the women who participated in both the Wave 1 and 3 interviews left 215 women who reported a lifetime diagnosis of depression. In order to address the research questions in this study the women who had EOD were compared on a range of different mental health outcomes with those who had an adult onset of MDD. The 16 outcomes measures were: recurrence of depression in the past year; comorbidity in the past year and over the lifetime; depression, dysthymia, GAD, and panic disorder in the

past year and over the lifetime; having any mood disorder or any anxiety disorder in the past year and over the lifetime; and whether there was a group difference in the scores on the Centre for Epidemiologic Studies Depression Scale (CES-D).

In order to assess the effect of family structure on the relationship between EOD and the mental health outcomes, the sample was further divided by family type, separating them into a group of single mothers and a group of married mothers. The same outcome variables were then analyzed to determine the impact of family type on mental health outcomes.

A regression analysis was conducted for each of the 16 mental health outcomes. The first unadjusted model contained only the EOD variable. The second model controlled for two confounders, the mother's age and years of education. The third model took into account whether or not the individual was a single mother. The last model accounted for an interaction term. It was used to explore an interaction between EOD and single motherhood.

Chapter 3: Results

      This chapter summarizes the findings of univariate, bivariate and multivariate analyses of the impact of early onset of depression (EOD) on psychiatric outcomes among single and married mothers. The univariate analysis reported the means and standard deviations for the socio-demographics of the sample as well as the frequencies for specific outcome variables of interest. The bivariate analysis used a Pearson chi-square to determine whether there was association between EOD and the various psychiatric outcome variables of interest. The sample was examined first as a whole and then separately for single and married mothers. Last, the multivariate analyses employed binary logistic regression to determine whether the relationship between EOD and the psychiatric outcomes were affected by confounding factors. Interaction effects between EOD and single parent status were also examined.

3.1 Description of Study Respondents

      The total sample consisted of 778 women who participated in both Waves 1 and 3 of the interview process. From this sample, 215 women in Wave 3 reported ever having depression. There were 73 women with EOD and 142 who reported an onset of depression in adulthood (LOD), after the age of 18. The sample was also divided based on marital status at the Wave 1 interview. Of the 215 women in Wave 1 who reported ever experiencing depression, 152 were single mothers and 63 were married mothers.

      3.1.1 Analysis of Sample Attrition

      During Wave 1 of the Family Structure, Stress and Mental Health study in 1991, 1,020 mothers were successfully interviewed; 518 were single and 502 were married. The Wave 3 follow-up study took place 14 years later and resulted in completed interviews

for 779 mothers. There were 349 single mothers, (a retention rate of 69.4%) and 430

married mothers (a retention rate of 85.7%). An attrition analysis was done to determine

if there were any significant differences between the women who participated in Wave 3

of the study and those who did not.

The first step in conducting an attrition analysis was to compare the entire sample

on seven variables: family type, lifetime history of depression, early onset of depression,

CES-D scores, age, number of years of education and household income. The sample was

then divided based on marital status, and the seven variables were analyzed again,

looking for differences accounted for by family type.

The final step was a regression analysis to determine whether some of the

significant differences found between the groups could be accounted for by confounding

factors. Four different regression models were computed for single and married mothers

separately. The first model accounted for age, household income and years of education.

The second model controlled for age, household income, education and CES-D scores.

The third model accounted for age, household income, education and depression over the

lifetime. The fourth and final model accounted for age, household income, education and

EOD.

The results of the bivariate analyses, which can be found in Appendix A, for the

total sample showed a strong and significant association ($p < .001$) of the attrition

variable with all seven comparison variables from Wave 1 (i.e. Family type, EOD, MDD,

age, years of education, household income and CES-D scores). The sample was then

divided by family type. Among single mothers, there were significant associations for

five of the variables, including EOD ($p= 0.008$), years of education ($p< .001$), household

income (p< .001), age (p< .001) and CES-D scores (p= 0.025). For married mothers,

there were fewer significant associations with the attrition variable than among single

mothers. These included years of education (p< .001), household income (p= 0.009) and

CES-D scores (p= 0.004).

To further explore the significant associations between the attrition variable and

the outcome variables from Wave 1, regression analyses were conducted separately for

the single and married mothers. The regression analysis for single mothers, indicated that

the number of years of education continued to have a significant protective impact for

single mothers (OR= 0.85) when all other variables were held constant. In other words,

the more education the women had increased the likelihood that they would participate in

Wave 3 of the study. For married mothers, a higher household income was significantly

associated with their lower dropout rates (OR= 0.79).

3.2 Univariate Analysis

3.2.1 Description of Socio-Demographic Variables

Table 1 presents the means of the socio-demographic variables for the total

sample as well as separately for single and married mothers. The single and married

mothers had similar mean ages; this is a function of the study design as they were

matched for age upon entry into the study. However, the women differed significantly on

years of education and household income. The women in the total sample had a mean age

of 37.7 years, an average of 13.6 years of education and a mean household income of

10.5, which represents an approximate actual income of $39,500.

Table 1

Social Characteristics of the Sample (Wave 1)

Variables	Total Sample Mean (n=778)	S.D.	Single Mothers Mean (n=348)	S.D.	Married Mothers Mean (n=430)	S.D.
Age	37.66	6.35	37.53	6.75	37.76	6.01
Education[a]	13.64	2.7	**13.18**	2.65	**14.02**	2.69
Household Income[b]	10.45	4.55	**7.11**	3.36	**13.17**	3.44

a Years of Education

b Coded values representing actual income ranges

* Bold text indicates a significant mean difference between single and married mothers

Contrasted by family type, the single mothers reported a mean age of 37.5 years, an average of 13.2 years of education and a mean household income of 7.1, or approximately $24,500. The married mothers had an average age of 37.8 years, an average of 14.0 years of education and a mean household income of 13.2, or approximately $52,000. When compared on these variables, single mothers had significantly fewer years of education ($p< .001$) than married mothers, as well as a significantly lower average household income ($p< .001$).

Section 3.2.2 Description of Outcomes Variables

Table 2 presents the frequencies and percentages of each outcome variable analyzed in this project. Overall, 35.1 percent of the women in this study experienced MDD at some point in their lives and 26.7 percent of those women had an onset of MDD before the age of 18. Half of the reported cases of MDD in the past year were recurrences. Comorbid disorders were experienced by 13.2 percent of the sample at some point in their lifetime. The majority of the comorbidities could be accounted for by mood disorders.

The single mothers reported more psychiatric morbidity than married mothers. This group also had the highest rates of disorder for nearly every variable presented. With 37.9 percent of these women having experienced an early onset of depression, the single mothers had nearly three times the rate of EOD than married mothers. While the rate of

Table 2

Description of Outcome Variables

Variables	Total Sample		Single Mothers		Married Mothers	
	Frequency (n=778)	%	Frequency (n=348)	%	Frequency (n=430)	%
Early onset of depression	73	9.4	55	15.8	18	4.2
Recurrence of depression in the past year	35	16.3	26	7.5	9	2.1
Comorbid disorder in the past year	22	2.8	12	3.4	10	2.3
Comorbid disorder lifetime	103	13.2	60	17.2	43	10.0
Major depression in the past year	65	8.4	33	9.5	32	7.4
Major depression lifetime	273	35.1	145	41.7	128	29.8
Dysthymia in the past year	11	1.4	6	1.7	5	1.2
Dysthymia lifetime	60	7.7	39	11.2	21	4.9
Generalized anxiety disorder in the past year	15	1.9	10	2.9	5	1.2
Generalized anxiety disorder lifetime	46	5.9	25	7.2	21	4.9
Panic disorder in the past year	23	3.0	12	3.4	11	2.6
Panic disorder lifetime	79	10.2	44	12.6	35	8.1
Any mood disorder in the past year	70	9.0	35	10.1	35	8.1
Any mood disorder lifetime	288	37.0	154	44.3	134	31.2
CES-D Cutpoints [c] (Wave 1)	158	20.3	102	29.3	56	13.0
CES-D Cutpoints [c] (Wave 3)	246	31.6	132	37.9	114	26.5

depression in the past year was comparable for these two groups, the single mothers had a much higher lifetime prevalence of MDD.

Section 3.2.3 Description of Sample Comparing the Early and Late Onset of Depression

Table 3 presents the frequencies and percentages of outcome variables this time contrasting the women with EOD to those with LOD. The first column presents the rates of the outcome variable for the all of the women who reported ever having depression during Wave 1. Approximately 71 percent of the women who reported ever having had depression were also single mothers. 16.3 percent had a recurrence of depression in the past year and 31.6 percent of this sample reported ever having a comorbid disorder. Mood disorders were twice as common as anxiety disorders among this group of women.

The women with EOD reported much higher rates of the psychiatric disorders, than those with LOD. While 75 percent of the sample with EOD were single mothers, they also reported nearly twice the rate of recurrence, 3 times the rate of comorbidity in the past year and just under 4 times the rate of panic disorder in the past year. There was a clear difference between these two groups of women as the women with LOD did not report any rates of disorder that exceeded those of the women with EOD.

3.3 Bivariate Analysis

For each measure of psychiatric outcome a Pearson's chi-square was computed to examine the association with EOD. The results of the chi-square analyses are presented in Table 4. The data were analyzed for the entire sample and then repeated separately for

Table 3

Description of Outcome Variables Comparing the Early and Late Onset of Depression

Variables	Ever Depressed (Wave 1)		EOD		LOD	
	Frequency (n=215)	%	Frequency (n=73)	%	Frequency (n=142)	%
Single Motherhood	152	70.7	55	75.3	97	68.3
Recurrence of depression in the past year	35	16.3	17	23.3	18	12.7
Comorbid disorder in the past year	16	7.4	10	13.7	6	4.2
Comorbid disorder lifetime	68	31.6	27	37.0	41	28.9
Major depression in the past year	35	16.3	17	23.3	18	12.7
Major depression lifetime	134	62.3	46	63.0	88	62.0
Dysthymia in the past year	8	3.7	5	6.8	3	2.1
Dysthymia lifetime	43	20.0	21	28.8	22	15.5
Generalized anxiety disorder in the past year	13	6.0	5	6.8	8	5.6
Generalized anxiety disorder lifetime	30	14.0	12	16.4	18	12.7
Panic disorder in the past year	14	6.5	9	12.3	5	3.5
Panic disorder lifetime	45	20.9	20	27.4	25	17.6
Any mood disorder in the past year	39	18.1	19	26.0	20	14.1
Any mood disorder lifetime	142	66.0	50	68.5	92	64.8
Any anxiety disorder in the past year	23	10.7	11	15.1	12	8.5
Any anxiety disorder lifetime	62	28.8	26	35.6	36	25.4

Table 4

Chi-Square Analysis Results Comparing the Association Between the Early Onset of Depression and Psychiatric Outcome Variables Presented by Family Type

Variables	Whole Sample x^2 (n=215)	Single Mothers x^2 (n=152)	Married Mothers x^2 (n=63)
Recurrence:	3.98*	8.73**	1.57
Comorbidity:			
Last Year	6.28*	8.50**	0.27
Lifetime	1.47	4.79*	1.40
Depression:			
Last Year	3.98*	8.73**	1.57
Lifetime	0.02	3.48	7.72*
CES-D Scores:	2.38	2.60	0.03
Dysthymia:			
Last Year	3.02	1.27	2.24
Lifetime	5.31*	4.76*	0.79
Generalized Anxiety Disorder:			
Last Year	0.13	0.89	1.26
Lifetime	0.57	0.96	0.57
Panic Disorder:			
Last Year	6.14*	8.90**	0.27
Lifetime	2.79	3.62	0.01
Any Mood Disorder:			
Last Year	4.63*	7.57**	0.09
Lifetime	0.30	3.00	3.16
Any Anxiety Disorder:			
Last Year	2.21	4.25*	0.46
Lifetime	2.48	3.29	0.03

*** $p<.001$; ** $p<.01$; *$p<.05$

Degrees of freedom = 1 for each chi-square analysis

single and married mothers. These chi-square tests provided an initial indication of any associations between EOD and various psychiatric outcomes.

For the entire sample, six of the 16 variables were significantly associated with EOD. Women with EOD had a higher rate of recurrence of depression in the past year (x^2=3.98; p<0.05) and a greater number of comorbid disorders in the past year (x^2=6.28; p<0.05) than the women with LOD. Other significant associations included a higher lifetime rate of dysthymia (x^2=5.31; p<0.05), a higher probability of panic disorder over the past year (x^2=6.14; p<0.05) and a greater number of any mood disorders in the past year (x^2=4.63; p<0.05).

There were no significant associations found between EOD and CES-D scores, the prevalence of GAD or the presence of an anxiety disorder. Among single mothers, there were significant associations between EOD and eight of the 16 psychiatric outcomes. Among married mothers there was only one significant association. These results show a pattern toward worse mental health outcomes for single mothers with EOD than for those with LOD, and worse overall results for single mothers than married mothers.

Single mothers with EOD had significantly higher rates of recurrence of MDD in the past year (x^2=8.73; p<0.01), as well as higher rates of comorbidity in the past year (x^2=8.50; p<0.01) and over their lifetime (x^2=4.79; p<0.05). They also reported higher rates of depression in the past year (x^2=8.73; p<0.01), panic disorder in the past year (x^2=8.90; p<0.01), dysthymia over the course of their lifetimes (x^2=4.76; p<0.05), any

mood disorder in the past year (x^2=7.57; p<0.01) and any anxiety disorder in the past

year (x^2=4.25; p<0.05). The variable for MDD in the past year was used in the

calculation of the recurrence variable. It is therefore not surprising that the results often

showed very similar outcomes for these two variables. For married mothers, the only

significant association was found between EOD and depression over the course of the

lifetime. Similar to the results for the entire sample, there was no significant association

found for CES-D scores or the presence of GAD, either in the last year or at any time in

the past.

3.4 Regression Analysis

Binary logistic regression models were computed to determine whether EOD was

associated with an array of psychiatric outcomes including mood disorders, such as

recurrence, comorbidity, depression and dysthymia. In each table, model I is the crude

model: an assessment of the association between EOD and the psychiatric outcome in

question, without taking other variables into account. In model II, the possible

confounding variables of age and years of education were added to analysis. Model III

included the variable for single parenthood, taking family type into account. The measure

of household income was excluded from this analysis because it was strongly associated

with single parenthood and the simultaneous inclusion of both variables would have

created difficulties interpreting the regression analyses. The final model included a

possible interaction between EOD and single parenthood.

3.4.1 Regression of Recurrence of Major Depression in the Past Year on the Early
Onset of Depression

Table 5 presents the results of the logistic regression of the recurrence of MDD in the past year on EOD. The results of the first model, were significant ($p<0.05$, OR 2.09) indicating that women with EOD were twice as likely as those with LOD to have had a recurrence. In model II, after the addition of age and education, the OR for EOD was a statistically nonsignificant 1.93. In model III, which included single motherhood, the effects were all nonsignificant. In the final model, the interaction term had a significant ($p<0.05$) OR of 12.79.

3.4.2 Regression of a Comorbid Disorder in the Past Year on the Early Onset of
Depression

As seen in Table 6, the regression of a comorbid disorder in the past year on EOD was significant in model I ($p<0.05$) with an odds ratio of 3.60. In model II, we saw once again that the effects of EOD disappeared after controlling for age and education. There were no significant associations in model II or model III with the addition of single motherhood. The same was found for model IV, where there was no evidence of a significant interaction between EOD and single motherhood, for this outcome.

3.4.3 Regression of a Comorbid Disorder (Lifetime) on the Early Onset of
Depression

The results of the regression of a comorbid disorder during one's lifetime on EOD were presented in Table 7. There was no significant effect in the crude model, nor in models II and III, which accounted for the confounding variables. In model IV, the interaction between single motherhood and EOD was significant ($p<0.05$) and had an

Table 5

The Regression of Recurrence of Major Depresion in the Past Year on the Early Onset of Depression

n=215	I		II		III		IV	
	b	OR	b	OR	b	OR	b	OR
Intercept	-1.93*	2.09	-0.95	0.39	-1.08	0.34	-0.66	0.52
EOD	0.74 *	2.09	0.66	1.93	0.65	1.92	-1.36	0.26
Age			-0.01	0.99	-0.01	0.99	-0.01	0.99
Education			-0.05	0.95	-0.05	0.95	-0.04	0.96
Single Motherhood					0.14	1.15	-0.64	0.53
EOD x Single Motherhood							2.55 *	12.79

*** p<.001; ** p<.01; *p<.05

Table 6
The Regression of a Comorbid Disorder in the Past Year on the Early Onset of Depression

n=215	I		II		III		IV	
	b	OR	b	OR	b	OR	b	OR
Intercept	-3.12**	0.04	0.72	2.06	0.69	2.00	1.19	3.30
EOD	1.28 *	3.60	0.94	2.56	0.94	2.56	-0.46	0.63
Age			-0.04	0.96	-0.04	0.96	-0.04	0.96
Education			-0.19	0.83	-0.19	0.83	-0.17	0.84
Single Motherhood					0.03	1.03	-0.85	0.43
EOD x Single Motherhood							1.91	6.75

*** p<.001; ** p<.01; *p<.05

Table 7

The Regression of a Lifetime Comorbidity on the Early Onset of Depression

n=215	I		II		III		IV	
	b	OR	b	OR	b	OR	b	OR
Intercept	-0.90**	0.41	-.036	0.69	-.023	0.80	0.01	1.01
EOD	0.35	1.42	0.22	1.25	0.23	1.25	-0.71	0.49
Age			-0.02	0.98	-0.03	0.98	-0.03	0.97
Education			0.00	1.00	0.00	1.00	0.01	1.01
Single Motherhood					-0.17	0.85	-0.56	0.57
EOD x Single Motherhood							1.28 *	3.58

*** $p<.001$; ** $p<.01$; *$p<.05$

odds ratio of 3.58 although none of the main effects were significant. This significant

interaction indicated that single mothers with EOD were over 3 times more likely to have

a comorbid disorder in their lifetime than were the married mothers.

3.4.4 Regression of Depression in the Past Year on the Early Onset of Depression

Table 8 presents the results of the regression of depression in the past year on

EOD. Model I (the crude model) was significant ($p < 0.05$) with an odds ratio of 2.09. This

association was no longer statistically significant in model II after accounting for age and

education. Model III, which took single parenthood into account, did not have any

significant results. In model IV the results of the interaction between single parenthood

and EOD were significant ($p < 0.05$) and had an odds ratio of 12.79, indicating that single

mothers with EOD had over 12 times the odds of experiencing MDD in the past year.

3.4.5 Regression of Depression (Lifetime) on the Early Onset of Depression

The regression of depression during one's lifetime on EOD, seen in Table 9, was

not significant in the first three models; the crude model and those accounting for

potential confounding factors. Model IV, on the other hand, showed strongly significant

associations for EOD ($p < 0.05$, OR= 0.21) and single motherhood ($p < 0.01$, OR=0.29), as

well as an interaction between EOD and single motherhood ($p < 0.001$, OR=9.90).

3.4.6 Regression of Dysthymia in the Past Year on the Early Onset of Depression

Table 10 presents the results of the regression of dysthymia in the past year on

EOD. There were no significant associations in any of the four models examined in this

analysis.

Table 8

The Regression of Depression in the Past Year on the Early Onset of Depression

n=215	I		II		III		IV	
	b	OR	b	OR	b	OR	b	OR
Intercept	-1.93**	0.15	-0.95	0.39	-1.08	0.34	-0.66	0.52
EOD	0.74 *	2.09	0.66	1.93	0.65	1.92	-1.36	0.26
Age			-0.01	0.99	-0.01	0.99	-0.01	0.99
Education			-0.05	0.95	-0.05	0.95	-0.04	0.96
Single Motherhood					0.14	1.15	-0.64	0.53
EOD x Single Motherhood							2.55 *	12.79

*** p<.001; ** p<.01; *p<.05

Table 9

The Regression of Depression Lifetime on the Early Onset of Depression

n=215	I		II		III		IV	
	b	OR	b	OR	b	OR	b	OR
Intercept	0.49**	1.63	-0.11	0.89	0.30	1.35	0.73	2.08
EOD	0.04	1.05	0.12	1.13	0.14	1.15	-1.56*	0.21
Age			0.01	1.01	0.01	1.01	0.01	1.01
Education			0.01	1.01	0.01	1.01	0.02	1.02
Single Motherhood					-0.46	0.63	-1.24**	0.29
EOD x Single Motherhood							2.29***	9.90

*** p<.001; ** p<.01; *p<.05

Table 10
The Regression of Dysthymia in the Past Year on the Early Onset of Depression

n=215	I		II		III		IV	
	b	OR	b	OR	b	OR	b	OR
Intercept	-3.84**	0.02	-5.66*	0.003	-5.31	0.005	-5.53	0.004
EOD	1.23	3.41	1.46	4.31	1.50	4.48	1.93	6.91
Age			0.04	1.04	0.04	1.04	0.04	1.04
Education			0.02	1.02	0.01	1.02	0.01	1.01
Single Motherhood					-0.48	0.62	-0.06	0.94
EOD x Single Motherhood							-0.69	0.51

*** p<.001; ** p<.01; *p<.05

3.4.7 Regression of Dysthymia (Lifetime) on the Early Onset of Depression

In the regression of dysthymia on EOD, shown in Table 11, EOD was significant in the crude model ($p<0.05$), with an odds ratio of 2.20. The variable was also significant in models II and III ($p<0.05$), with respective odds ratios of 2.43 and 2.45. The other variables in these models, age, education and single motherhood, were not significant. In addition, none of the variables analyzed in the fourth model were found to be significant. This analysis indicated that women with EOD had nearly twice the odds of experiencing dysthymia during their lifetime.

3.4.8 Regression of Any Mood Disorder in the Past Year on the Early Onset of Depression

As seen in Table 12, the results of the regression of any mood disorder in the past year on EOD were significant in model I ($p<0.05$, OR=2.15). Once the potential confounding variables were taken into account in models II and III, the results of this association were no longer significant. There were no other significant associations in this analysis.

3.4.9 Regression of Any Mood Disorder (Lifetime) on the Early Onset of Depression

Table 13 presents the results of the regression of any mood disorder over the course of a lifetime on EOD. In model I, the crude effect was not significant, nor were the variables of age and education in model II. In models III and IV, single motherhood had a significant association ($p<0.05$, OR=0.51 and $p<0.05$, OR=0.29). The interaction between EOD and single motherhood was also significant in model IV ($p<0.05$), with an odds ratio of 5.58.

Table 11

The Regression of Dysthymia Lifetime on the Early Onset of Depression

n=215	I		II		III		IV	
	b	OR	b	OR	b	OR	b	OR
Intercept	-1.70**	0.18	-2.41	0.09	-2.32	0.10	-2.25	0.11
EOD	0.79 *	2.20	0.89 *	2.43	0.90 *	2.45	0.67	1.96
Age			0.02	1.02	0.02	1.02	0.02	1.02
Education			0.00	1.00	0.00	1.00	0.01	1.01
Single Motherhood					-0.11	0.90	-0.24	0.79
EOD x Single Motherhood							0.32	1.37

*** p<.001; ** p<.01; *p<.05

Table 12
The Regression of Any Mood Disorder in the Past Year on the Early Onset of Depression

n=215	I		II		III		IV	
	b	OR	b	OR	b	OR	b	OR
Intercept	-1.81**	0.16	-1.36	0.26	-1.22	0.30	-0.97	0.38
EOD	0.76 *	2.15	0.75	2.12	0.76	2.14	-0.22	0.80
Age			0.00	1.00	0.00	1.00	0.00	1.00
Education			-0.04	0.96	-0.04	0.96	-0.03	0.97
Single Motherhood					-0.16	0.85	-0.67	0.51
EOD x Single Motherhood							1.36	3.90

*** p<.001; ** p<.01; *p<.05

Table 13

The Regression of Any Mood Disorder Lifetime on the Early Onset of Depression

n=215	I		II		III		IV	
	b	OR	b	OR	b	OR	b	OR
Intercept	0.61**	1.84	-0.26	0.78	0.36	1.43	0.69	1.99
EOD	0.17	1.18	0.28	1.32	0.31	1.36	-1.00	0.37
Age			0.02	1.02	0.02	1.02	0.02	1.02
Education			0.01	1.01	0.01	1.01	0.02	1.02
Single Motherhood					-0.68 *	0.51	-1.25 **	0.29
EOD x Single Motherhood							1.72 *	5.58

*** p<.001; ** p<.01; *p<.05

3.4.10 Regression of CES-D Scores (Wave 3) on the Early Onset of Depression

The final regression analysis, presented in Table 14, examined the regression of the Wave 3 CES-D cutpoints on EOD. The variable representing years of education was significant ($p < 0.05$) in the three models in which it was evaluated, with an odds ratio of 0.87 each time, indicating that education was a protective factor for distress scores. There were no other significant associations in this analysis.

3.4.11 Summary of Regression Analysis

In total, 10 logistic regression analyses were computed to evaluate the association of EOD and a range of psychiatric outcomes. The results of the analysis are summarized in Table 15. For the crude analysis in model I, five out of the 10 regressions were significantly associated with EOD, including recurrence of MDD in the past year; the presence of a comorbid disorder in the past year; the presence of MDD in the past year; the presence of dysthymia at any point in a lifetime; and the presence of any mood disorder in the past year.

Model II in the regression analysis included the potential confounding variables of age and years of education. Age did not have an effect in any of the analyses, while years of education was only significantly associated with Wave 3 CES-D cutpoints. The third model included single motherhood which was significant in two of the 10 analyses: MDD over the course of the lifetime, and any mood disorder over the course of the lifetime. In the final model, a term for the interaction between EOD and single motherhood was significant in five of the models: recurrence of MDD in the past year; a comorbid disorder over the lifetime; MDD in the past year; MDD during the lifetime; and any mood disorder over the lifetime.

Table 14

The Regression of CES-D Cutpoints $^{\mathcal{G}}$ (Wave 3) on the Early Onset of Depression

n=215	I		II		III		IV	
	b	OR	b	OR	b	OR	b	OR
Intercept	-0.20	0.82	2.24*	9.40	2.00	7.39	2.06	7.86
EOD	0.45	1.56	0.29	1.33	0.27	1.32	0.01	1.01
Age			-0.01	0.99	-0.01	0.99	-0.01	0.99
Education			-0.14 *	0.87	-0.14 *	0.87	-0.14 *	0.87
Single Motherhood					0.29	1.34	0.18	1.20
EOD x Single Motherhood							0.36	1.43

*** p<.001; ** p<.01; *p<.05

$^{\mathcal{G}}$ CES-D Cutpoints represent a CES-D score of 16 or higher

Table 15
Summary of the Regression Analysis

Outcomes	Crude	Age	Education	SPF	Interaction
Recurrence	✓	X	X	X	✓
Comorbidity (Year)	✓	X	X	X	X
Comorbidity (Lifetime)	X	X	X	X	✓
Depression Past Year	✓	X	X	X	✓
Depression Lifetime	X	X	X	✓	✓
Dysthymia Last Year	X	X	X	X	X
Dysthymia Lifetime	✓	X	X	X	X
Any Mood Disorder Past Year	✓	X	X	X	X
Any Mood Disorder Lifetime	X	X	X	✓	✓
CES-D Cutpoints $^\tau$ (Wave 3)	X	X	✓	X	X

$^\tau$ CES-D Cutpoints represent a CES-D score of 16 or higher

Chapter 4: Discussion

4.1 Discussion of Major Findings

The results of these analyses suggest two conclusions. First, the effect of EOD on subsequent mental health outcomes is more pronounced among single mothers than among married mothers. Second, the analyses presented here are consistent with previous research that documents an elevated risk of recurrence and comorbidity among individuals with EOD.

4.1.1 Findings from the Total Sample

The analyses presented in this thesis revealed that women with EOD had significantly higher rates of recurrence of depression in the past year, comorbid disorders in the past year, depression the past year, dysthymia lifetime, panic disorder in the past year and any mood disorder in the past year. Overall these findings suggest that a diagnosis of MDD before the age of 18 is associated with worse psychiatric outcomes in later life than MDD with an onset in adulthood.

When the total sample was considered, 16.3 percent of the women in this study reported a recurrence of depression in the past year. By contrasting EOD and LOD, we saw that 23.3 percent of the women with EOD reported a recurrence compared to 12.7 percent with LOD. These results were similar to other studies, particularly Lewinsohn et al. (1993), who reported a recurrence rate of 17.9 percent in adolescents with MDD after a one year follow-up. Even more striking was the 21.1 percent recurrence that Lewinsohn et al. reported for the women in the sample. The other studies that reported much higher rates of recurrence had extended periods of follow-up, with rates of recurrence increasing as the length of the follow-up period increased. The results of the analyses presented here

indicate that women with EOD were significantly more likely to experience a recurrence of depression in the past year. These results were similar to previous studies in which EOD was significantly associated with recurrence when compared to a group with an adult onset of depression (Giles et al., 1989; Gollan et al., 2005; Klein et al., 1999).

The significant association between EOD and comorbid disorders in the past year was also consistent with the trend found in the literature. Previous research suggested that women with EOD had significantly more comorbid disorders than those with LOD. In this thesis, the findings differed from the literature most notably in the rates of comorbidity. Alpert et al. (1999) and Kessler and Walters (1998) reported lifetime rates of comorbidity of over 75 percent, with the study by Alpert et al. (1999) reporting the highest rate of 87.2 percent for individuals with an onset of depression in childhood. In the present study, however, the lifetime rate of comorbidity was 13.2 percent for the entire sample and 37.0 percent for the women with EOD. The likely reason for this disparity in reported rates of comorbidity involved the number of individual diagnoses evaluated by each of the previous studies. The current project evaluated the three psychiatric outcomes most commonly found to be comorbid with major depressive disorder (MDD), while Alpert et al. (1999) evaluated all Axis I disorders and Kessler (1998) included all anxiety disorders, addictive disorders, conduct disorder and adult antisocial disorder. Had the current project evaluated more comorbid disorders, the rates of comorbidity may have been higher.

As expected from the literature, the association between EOD and dysthymia over the course of the lifetime was statistically significant. The lifetime rate of dysthymia in the sample of mothers with EOD was 28.8 percent, which was similar to the 27 percent

reported by Rao et al. (1995) and slightly higher than the 12 to 16 percent found by

Biederman et al. (1995) for associations with mild and severe MDD. It is important to

note a trend in the results of the chi-square analyses. Most of the significant findings were

found for an occurrence of the disorder in the past year, whereas dysthymia was the

exception, as EOD was associated with higher rates of lifetime dysthymia. This finding

was likely a result of the clinical definition of dysthymia: feelings of sadness on more

days than not for a period of two years (American Psychiatric Association, 2000).

Because of the specific requirements for this diagnosis, it is less likely that a diagnosis

will have been made in that past year, thus leading to increased the rates of dysthymia

over the course of a woman's lifetime.

While the evidence in the literature did not convincingly demonstrate an

association between EOD and panic disorder, the results of this project may add some

confirming evidence. In this thesis, there was a statistically significant association

between panic disorder in the past year and EOD. Alpert et al. (1999), in their sample

with an adolescent onset of MDD, found a 15.8 percent rate of comorbid panic disorder,

which was comparable to the rate of 12.3 percent found in this study. This significant

association between panic disorder and EOD also indicated that EOD may have a

nonspecific impact on psychiatric outcomes. EOD is not only associated with an

increased risk of developing a mood disorder, but also of developing an anxiety disorder.

It is also important to mention the nonsignificant associations between

generalized anxiety disorder (GAD) and EOD. These results were surprising given that

previous studies found GAD to be the most common comorbid disorder associated with

MDD (Kessler et al., 2001) and that GAD was more strongly associated with EOD than with LOD (Moffitt et al., 2007; Parker et al., 1997).

In this project, the estimate of the relationship between EOD and psychiatric outcomes was adjusted to account for the potential confounders of age and education. The results of the analyses in this thesis indicated that the associations between EOD and the various psychiatric outcomes were no longer significant once the models accounted for these two variables. From previous research, we know that educational attainment was negatively affected by the onset of a mood disorder. For example, Kessler, Foster, Saunders and Stang (1995) found that EOD was significantly associated with a decreased likelihood of graduating from college. As well, Berndt et al. (2000) found that having EOD reduced the likelihood of graduating with a college degree. This finding was particularly significant for women, who were half as likely to graduate from college as women with LOD. Women with EOD were also less likely to seek post-graduate training than women with LOD and they were predicted to earn 10 to 12 percent less than their counterparts (Berndt et al., 2000). Overall, having a mood disorder with an early onset led to an increased likelihood of a woman dropping out of school, or not continuing on to higher education. In turn these trends can lead to negative psychiatric outcomes. Although adjusting for education eliminated the significant relationship between EOD and negative psychiatric outcomes, it may be more appropriate to consider education as a mediating factor in this model rather than a confounder.

4.1.2 Findings for Single and Married Mothers

Contrasting the sample by family type, the chi-square analyses for the single mothers showed significant associations between EOD and a recurrence of depression in

the past year, comorbid disorders in the past year and lifetime, depression in the past

year, dysthymia lifetime, panic disorder in the past year, any mood disorder in the past

year and any anxiety disorder in the past year. For married mothers, the only significant

association with EOD was having had depression over the course of the lifetime. These

findings were reflective of the literature; previous studies found a strong association

between MDD in the past year and single motherhood (Brown & Moran, 1997; Cairney

et al., 2006). In particular, Davies, Avison and McAlpine (1997) found a significant

association between EOD and single motherhood. Davies, Avison and McAlpine reported

that early childhood adversities led to increased rates of EOD, which were then

associated with higher rates of single motherhood later in life. Using the stress process

formulation by Pearlin, Lieberman, Menaghan and Mullan (1981) it was argued that the

stressors accompanying the experience of being a single parent and the absence of

protective resources (i.e., high self-esteem, mastery, or social support) had an adverse

effect on mental health. The effects of adversities were reduced to nonsignificance when

EOD was controlled. This finding suggests that EOD may mediate the pathway between

adversities and depression.

4.1.3 An Interaction Between the Early Onset of Depression and Single Motherhood

Based on the pattern of results from the chi-square analyses, an interaction

between EOD and single motherhood was explored using regression analyses. These tests

for interactions were confirmed; there was a significant interaction term in five of the ten

psychiatric outcomes evaluated. A single mother with EOD was found to be   12 times

more likely to have had a recurrence of depression in the past year than a married mother.

She was 3.5 times more likely to have experienced a comorbid disorder in her lifetime, 10 times more likely to have had depression in her lifetime and five times more likely to have experienced any mood disorder in her lifetime than a woman who was married or had LOD. From this analysis we can see that single mothers with EOD are at the highest risk of experiencing negative psychiatric outcomes. These findings were consistent with the stress process model and the findings of Davies, Avison and McAlpine (1997); single mothers have had more exposure to stress, strain and lower SES than did married mothers, which may account for the interaction.

4.2 Study Limitations

All of the psychiatric outcomes evaluated in this project were assessed using computer or memory-assisted methods as part of the CIDI questionnaire. An exception was the measure for the age of onset of first depression, which relied completely on the recall of the participants. While it would have been ideal to confirm cases using a standard diagnostic tool, it was not possible to apply these retrospective methods in a prospective study. The use of a self-report variable in this case likely resulted in an over-estimation of the number of women with more severe depression and fewer women whose first episode of depression was very mild and more easily forgotten.

The longitudinal design of this study resulted in some loss to follow-up that may have affected the number of cases of EOD in the sample. As seen in the attrition analysis, single mothers were less likely to participate in the follow-up than the married mothers, and yet the single mothers were also the women most at risk for EOD. If more of the single mothers had been retained for the analysis it would likely have added to the sample

and contributed to increasing the robustness of the study findings. Additionally, the findings from the attrition analyses suggested that fewer years of education and a lower household income had more of an impact on the rates of attrition than did a participant's mental health. This leads to confidence in the sample and the subsequent associations with mental health that were found.

The use of secondary data for this project limited the scope of the questions that could be answered and specifically affected the sample size of women with EOD. If the original study had been aimed at answering questions about EOD, women with this disorder would have been targeted during the data collection process. However, for this particular dataset, single mothers were the focus of the original study and therefore the number of women with EOD was limited. Although a larger sample would have been ideal, there were enough women with EOD in the sample to generate statistically significant results during the course of the analysis.

Due to the nature of the data set that was used, it was impossible to address questions of temporality in this project. There was no way to determine whether single motherhood was itself a direct outcome of an early onset of depression or whether it was a result of some other mediating factor, such as education. A future study with more available resources should address these limitations and expand on the questions that were asked in this project.

Canada's 1996 census was the first time a question was included about visible minorities. In the city of London, Ontario, 9.0 percent of the population was a visible minority compared to 16.0 percent for the entire province of Ontario (Statistics Canada, 1997). This population composition was reflected in the study sample in which only 7

percent were members of a visible minority. According to the 2006 census (Statistics

Canada, 2007), 13.8 percent of the population of London, Ontario was a member of a

visible minority group. This figure contrasts with the rate of 22.8 percent for the entire

province of Ontario (Statistics Canada, 2007). Overall, the proportion of visible

minorities in this data sample reflects the population composition of London, Ontario

when the data was collected. However, caution should be used when applying these

findings to a population that does not have a similar composition.

4.3 Study Strengths

The success of this project was due in large part to the high response and retention

rates over the three waves of the study. Although initially these mothers were not asked

to participate in a third wave, 14 years later there was a strong response, particularly

among married mothers, with a retention rate of 86 percent.

A particular strength of this study was the use of the Michigan version of the

Composite International Diagnostic Inventory survey, which allowed for the careful

evaluation of a large number of psychiatric outcomes. The computer-based survey design

and trained interviewers also allowed for minimized missing data during the collection

process.

4.4 Conclusions

For the past few decades in the psychiatric literature there has been considerable

interest in the link between EOD and comorbid disorders. Much of this research has

focused on the documentation of this association, but little has been done to examine how

aspects of people's social lives might magnify the risk of EOD for comorbidity. In this study, single mothers with EOD were at a much higher risk for a range of comorbid psychiatric disorders than married mothers. This suggests a need for further research to evaluate the ways in which various social factors modify the risk for psychiatric disorders.

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Appendix A

Analysis of Attrition –Tables representing Chi-Square Analyses

Table 1.
Attrition Analysis Using t-tests

Variables	Total Sample t (n=1020)	d.f.	Single Mothers t (n=518)	d.f.	Married Mothers t (n=502)	d.f.
Age	4.07***	375.55	3.8***	334	1.07	88.56
Education	8.07***	407.59	5.63***	337.7	3.93***	97.26
Household Income	10.67***	414.01	7.69***	514	2.67*	92.05
CES-D Scores	-5.15***	101.01	-2.21*	314.74	-2.91**	499.00

*** p<.001; ** p<.01; *p<.05

Table 2.
Chi-Square Analysis of Attrition

Variables	Total Sample x^2 (n=1020)	d.f.	Single Mothers x^2 (n=518)	d.f.	Married Mothers x^2 (n=502)	d.f.
Family Type	48.09***	1				
EOD	10.28***	1	6.95**	1	2.4	1
Ever Depressed	3.66	1	0.84	1	1.97	1

*** p<.001; ** p<.01; *p<.05

Total Sample

Family Type

	Single Mothers	Married Mothers
Participated in Wave 3	348	430
Participated in Wave 1 only	170	72

$x^2=48.09$; $p<0.001$

The Early Onset of Depression

	EOD	LOD
Participated in Wave 3	73	142
Participated in Wave 1 only	45	38

$x^2=10.28$; $p<0.001$

Ever having Depression

	Ever Had Depression	Never Had Depression
Participated in Wave 3	223	555
Participated in Wave 1 only	85	157

$x^2=3.66$; $p=NS$

Single Mothers Only

The Early Onset of Depression

	EOD	LOD
Participated in Wave 3	55	97
Participated in Wave 1 only	38	31

$x^2=6.95$; $p<0.01$

Ever having Depression

	Ever Had Depression	Never Had Depression
Participated in Wave 3	156	192
Participated in Wave 1 only	69	101

$x^2=0.84$; $p=NS$

Married Mothers Only

The Early Onset of Depression

	EOD	LOD
Participated in Wave 3	18	45
Participated in Wave 1 only	7	7

x^2=2.40; p=NS

Ever having Depression

	Ever Had Depression	Never Had Depression
Participated in Wave 3	67	363
Participated in Wave 1 only	16	56

x^2=1.97; p=NS

Table 3.
Regression of Attrition Variables for Single Mothers

n=518	I		II		III		IV	
	b	OR	b	OR	b	OR	b	OR
Age	-0.02	0.99	-0.01	0.99	-.02	0.99	-0.02	0.99
Income	-0.24***	0.79	-0.23***	0.79	-.23***	0.79	-0.23***	0.79
Education	-0.08	0.92	-0.08	0.93	-0.08	0.93	-0.08	0.93
CES-D Score			0.01	1.01	0.01	1.01		
Ever Depressed					-0.19	0.83	-0.17	0.84
CES-D Cutoff at 16							-0.41	0.67

*** p<.001; ** p<.01; *p<.05

Table 4.
Regression of Attrition Variables for Married Mothers

n=502	I		II		III		IV	
	b	OR	b	OR	b	OR	b	OR
Age	-0.01	0.99	-0.01	0.99	-0.01	0.99	-0.01	0.99
Income	-0.06	0.95	-0.04	0.96	-0.05	0.96	-0.05	0.95
Education	-0.18***	0.84	-0.16**	0.85	-0.16**	0.85	-0.16**	0.85
CES-D Score			0.02	1.02	0.02	1.02		
Ever Depressed					0.23	1.25	0.23	1.26
CES-D Cutoff at 16							-0.35	3.30

*** p<.001; ** p<.01; *p<.05

Appendix B

Chi-Square Analysis Results Comparing the Association between the Early Onset of
Depression and Psychiatric Outcomes

Whole Sample

Recurrence of Depression in the Past Year

	Recurrence	No Recurrence
EOD	17	56
LOD	18	124

$x^2=3.98$; $p<0.05$

Comorbid Disorder in the Past Year

	Comorbidity	No Comorbidity
EOD	10	63
LOD	6	136

$x^2=6.28$; $p<0.05$

Comorbid Disorder Lifetime

	Comorbidity	No Comorbidity
EOD	27	46
LOD	41	101

$x^2=1.47$; $p=NS$

Depression Last Year

	Depression	No Depression
EOD	17	56
LOD	18	124

$x^2=3.98$; $p<0.05$

Depression Lifetime

	Depression	No Depression
EOD	46	27
LOD	88	54

$x^2=0.02$; $p=NS$

CES-D Scores

	CES-D Score >16	CES-D Score ≤16
EOD	41	32
LOD	64	78

x^2=2.38; p=NS

Dysthymia in the Past Year

	Dysthymia	No Dysthymia
EOD	5	68
LOD	3	139

x^2=3.02; p=NS

Dysthymia Lifetime

	Dysthymia	No Dysthymia
EOD	21	52
LOD	22	120

x^2=5.31; p<0.05

Generalized Anxiety Disorder Last Year

	GAD	No GAD
EOD	5	68
LOD	8	134

x^2=0.13; p=NS

Generalized Anxiety Disorder Lifetime

	GAD	No GAD
EOD	12	61
LOD	18	124

x^2=0.57; p=NS

Panic Disorder Last Year

	Panic Disorder	No Panic Disorder
EOD	9	64
LOD	5	137

x^2=6.14; p<0.05

Panic Disorder Lifetime

	Panic Disorder	No Panic Disorder
EOD	20	53
LOD	25	117

x^2=2.79; p=NS

Any Mood Disorder in the Past Year

	Mood Disorder	No Mood Disorder
EOD	19	54
LOD	20	122

x^2=4.63; p<0.05

Any Mood Disorder Lifetime

	Mood Disorder	No Mood Disorder
EOD	50	23
LOD	92	50

x^2=0.30; p=NS

Any Anxiety Disorder in the Past Year

	Anxiety Disorder	No Anxiety Disorder
EOD	11	62
LOD	12	130

x^2=2.21; p=NS

Any Anxiety Disorder Lifetime

	Anxiety Disorder	No Anxiety Disorder
EOD	26	47
LOD	36	106

x^2=2.48; p=NS

Single Mothers Only

Recurrence of Depression in the Past Year

	Recurrence	No Recurrence
EOD	16	39
LOD	10	87

x^2=8.73; p<0.01

Comorbid Disorder in the Past Year

	Comorbidity	No Comorbidity
EOD	9	46
LOD	3	94

x^2=8.50; p<0.01

Comorbid Disorder Lifetime

	Comorbidity	No Comorbidity
EOD	23	32
LOD	24	73

x^2=4.79; p<0.05

Depression Last Year

	Depression	No Depression
EOD	16	39
LOD	10	87

x^2=8.73; p<0.01

Depression Lifetime

	Depression	No Depression
EOD	38	17
LOD	52	45

x^2=3.48; p=NS

CES-D Scores

	CES-D Score >16	CES-D Score ≤16
EOD	33	22
LOD	45	52

x^2=2.60; p=NS

Dysthymia in the Past Year

	Dysthymia	No Dysthymia
EOD	3	52
LOD	2	95

x^2=1.27; p=NS

Dysthymia Lifetime

	Dysthymia	No Dysthymia
EOD	16	39
LOD	14	83

x^2=4.76; p<0.05

Generalized Anxiety Disorder Last Year

	GAD	No GAD
EOD	5	50
LOD	5	92

x^2=0.89; p=NS

Generalized Anxiety Disorder Lifetime

	GAD	No GAD
EOD	10	45
LOD	12	85

x^2=0.96; p=NS

Panic Disorder Last Year

	Panic Disorder	No Panic Disorder
EOD	8	47
LOD	2	95

x^2=8.90; p<0.01

Panic Disorder Lifetime

	Panic Disorder	No Panic Disorder
EOD	17	38
LOD	17	80

x^2=3.62; p=NS

Any Mood Disorder in the Past Year

	Mood Disorder	No Mood Disorder
EOD	16	39
LOD	11	86

x^2=7.57; p<0.01

Any Mood Disorder Lifetime

	Mood Disorder	No Mood Disorder
EOD	39	16
LOD	55	42

x^2=3.00; p=NS

Any Anxiety Disorder in the Past Year

	Anxiety Disorder	No Anxiety Disorder
EOD	10	45
LOD	7	90

x^2=4.25; p<0.05

Any Anxiety Disorder Lifetime

	Anxiety Disorder	No Anxiety Disorder
EOD	20	35
LOD	22	75

x^2=3.29; p=NS

Married Mothers Only

Recurrence of Depression in the Past Year

	Recurrence	No Recurrence
EOD	1	17
LOD	8	37

$x^2=1.57$; p=NS

Comorbid Disorder in the Past Year

	Comorbidity	No Comorbidity
EOD	1	17
LOD	3	42

$x^2=0.27$; p=NS

Comorbid Disorder Lifetime

	Comorbidity	No Comorbidity
EOD	4	14
LOD	17	28

$x^2=1.40$; p=NS

Depression Last Year

	Depression	No Depression
EOD	1	17
LOD	8	37

$x^2=1.57$; p=NS

Depression Lifetime

	Depression	No Depression
EOD	8	10
LOD	36	9

$x^2=7.72$; p<0.05

CES-D Scores

	CES-D Score >16	CES-D Score ≤16
EOD	8	10
LOD	19	26

x^2=0.03; p=NS

Dysthymia in the Past Year

	Dysthymia	No Dysthymia
EOD	2	16
LOD	1	44

x^2=2.24; p=NS

Dysthymia Lifetime

	Dysthymia	No Dysthymia
EOD	5	13
LOD	8	37

x^2=0.79; p=NS

Generalized Anxiety Disorder Last Year

	GAD	No GAD
EOD	0	18
LOD	3	42

x^2=1.26; p=NS

Generalized Anxiety Disorder Lifetime

	GAD	No GAD
EOD	2	16
LOD	6	39

x^2=0.57; p=NS

Panic Disorder Last Year

	Panic Disorder	No Panic Disorder
EOD	1	17
LOD	3	42

x^2=0.27; p=NS

Panic Disorder Lifetime

	Panic Disorder	No Panic Disorder
EOD	3	15
LOD	8	37

x^2=0.01; p=NS

Any Mood Disorder in the Past Year

	Mood Disorder	No Mood Disorder
EOD	3	15
LOD	9	36

x^2=0.09; p=NS

Any Mood Disorder Lifetime

	Mood Disorder	No Mood Disorder
EOD	11	7
LOD	37	8

x^2=3.16; p=NS

Any Anxiety Disorder in the Past Year

	Anxiety Disorder	No Anxiety Disorder
EOD	1	17
LOD	5	40

x^2=0.46; p=NS

Any Anxiety Disorder Lifetime

	Anxiety Disorder	No Anxiety Disorder
EOD	6	12
LOD	14	31

x^2=0.03; p=NS