WHAT ARE THE ODDS: EVALUATING THE IMPACT OF HEALTH, SOCIAL, AND PERCEPTION FACTORS ON DEPRESSION RECOVERY

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Caroline Leszinske

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Abstract

Depression is a serious mental health issue. Much research has been devoted to understanding and treating it. Despite this, we still have limited understanding of how certain factors—such as socioeconomic status, social support, and childhood abuse—affect the likelihood of recovery. Using survey data from the Midlife in the United States series, we develop logistic and tobit models to evaluate the impact of health, social, and perception-based factors on depression severity and the odds of recovering. We stratify our sample by both initial depression severity and partnership status. Our results suggest both depression severity and partnership status influence which factors are significant—and insignificant—in determining who recovers from depression.

KEYWORDS: (Depression, Mental Health, Recovery, Childhood Abuse, Gender, Chronicity, Race, Social Support)
JEL CODES: (H13, D1, D6)

ON MY HONOR, I HAVE NEITHER GIVEN NOR RECEIVED
UNAUTHORIZED AID ON THIS THESIS

Caroline Leszinske

Signature

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Lastly, my brother, Will. I do this work for myself as well, but mainly for you. I love you.

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Introduction

Depression is a serious mental health issue that affects a significant portion of the population every year. In 2016 alone, 6.5% of the U.S. adult population—and 12.8% of adolescents—suffered from at least one major depressive episode (Substance Abuse and Mental Health Services Administration, 2017). Depression is a major cause of disability across the globe (World Health Organization, 2018). No two people experience depression the same way, but the symptoms are damaging to an almost universal degree (National Institute of Mental Health, 2017). Symptoms can make daily life functioning anywhere from challenging to impossible (National Institute of Mental Health, 2018).

Treating depression, then, is a serious public health concern. A variety of treatment options are available, including behavioral therapy and antidepressants (World Health Organization, 2018). Depression, however, cannot be treated with a one-size-fits-all approach ("What's Life Like After Depression? Surprisingly, Little is Known," 2018). Extensive research has been conducted to identify depression risks and possible treatment options. The inherent complicated nature of mental health makes this somewhat challenging. People respond to stressors differently. We are able point to specific events as increasing depression risk, but only in the sense that certain things—such as a loss in the family or unemployment—make it more likely that an individual will develop depression (Cohen & Wills, 1985).

In this paper, we explore factors that contribute to depressed affect to investigate to what degree we can predict depression recovery. We use data from the Midlife in the United States survey series, which was conducted in the three waves, beginning with MIDUS 1 1995-1996 and ending with MIDUS 3 2013-2014 (Ryff et al., 2013-2014).

From this sample, we build a depressed subsample and follow it through all three surveys to determine whether individuals recovered from depression and—if they did—whether we can point to any variables that are at least partially responsible for this.

We approach this in two ways, using two dependent variables to better evaluate variable impact. One variable is binary and asks the basic question: "Did the individual recover from depression?" The other measures depression MIDUS 3 depression severity. Both logistic and tobit regression analysis is utilized to this end. We also stratify the sample in two different ways to further examine how specific independent variables create groups with unique depression risks.

In the next section, we provide an overview of the extensive literature surrounding the topic of depression. We first define how depression and recovery is evaluated. Then, we discuss important factors that contribute to depression severity and/or recovery risk.

Survey of the Literature

In developing our model, we turn to economic, medical, and sociological literature to help construct relevant variables, as well as develop criteria for the stages of depression and recovery. We first pin down what symptoms constitute depression, while being cognizant that variability is common within the diagnosis. Moving forward, we define how an individual can recover and what happens if recovery is never achieved. Once we have clear categories for depression and recovery, we then investigate complicating factors for depression.

Diagnosing Depression

Despite an obvious need for consistency across research, the heterogeneous and unstable nature of depression makes setting a required list of symptoms or threshold score for diagnosis difficult. Depression is generally evaluated by looking at changes in mood, thought, or behavior that have taken place for at least two weeks. The Substance Abuse and Mental Health Services Administration defines a major depressive episode as a period of at least two weeks in the past year during which an individual felt depressed or lost interest in things, while also experiencing additional symptoms, such as a change in appetite (Substance Abuse and Mental Health Services Administration, 2016). The Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-V), requires that an individual must have at least five of these symptoms (with at least one being depressed mood or loss of interest) for a two-week period to have a major depressive disorder:

"1. Depressed mood most of the day, nearly every day.

2. Markedly diminished interest or pleasure in all, or almost all, activities most of the

day, nearly every day.

3. Significant weight loss when not dieting or weight gain, or decrease or increase in appetite nearly every day.

4. A slowing down of thought and a reduction of physical movement (observable by others, not merely subjective feelings of restlessness or being slowed down).

5. Fatigue or loss of energy nearly every day.

6. Feelings of worthlessness or excessive or inappropriate guilt nearly every day.

7. Diminished ability to think or concentrate, or indecisiveness, nearly every day.

8. Recurrent thoughts of death, recurrent suicidal ideation without a specific plan, or a suicide attempt or a specific plan for committing suicide" (American Psychiatric Association [APA], 2013).

The DSM, however, is intended for mental health professionals and, as such, self-report depression scales have been developed to aid in diagnosis. Numerous depression scales are in use today, but the majority follow a similar script. Most evaluate an individual's sleep patterns, ability to focus, interpersonal relationships, interest in daily activities and depressed affect.[1] A sample statement is as follows: "I thought my life had been a failure" (Possible responses: "Rarely," "Some/Little of the Time," "Occasionally/Moderately," "Most/All of the Time") (Radloff, 1977). Higher scores indicate higher prevalence of depressive symptoms. Reliability across the different tests has been shown consistently to vary from good-to-excellent (Klein et al., 1994; Klein et al., 1995; Klein, Shankman & Rose, 2008; Pignone et al., 2002). As such, personal preference and convention typically dictate which scale is used for a particular population.

[1] See: CES-D scale (Radloff, 1977), PHQ-9 Scale (Kroenke & Spitzer, 2002), HAM-D (Hamilton, 1960), DASS-21 Scale (Lovibond & Lovibond, 1995)

Using a depression scale necessitates choosing a "cut-off" score, above which an individual is considered to be depressed. This is seen in the DSM-V's criteria, through the requirement that at least five out of the eight symptoms be present for a positive diagnosis (APA, 2013). Reducing the existence (or lack thereof) of depression to a single number creates issues of over/under-diagnosing individuals. As one scale notes in its scoring instructions, a single cut-off score is somewhat arbitrary (Norton, 2007). While recognizing this risk, some researchers have used population demographics to designate a depression cut-off point. Radloff uses scores representing the 85th and 95th percentiles of adults as cutoff points for having depressive symptoms and depression, respectively (Radloff, 1991). In their study of the medical costs of depression in China, Hsieh and Qin follow the same technique (Hsieh & Qin, 2017).

To avoid strict scoring rules, other studies have sought alternative methods to diagnose depression. Simple testing instruments have proven effective. A two-question test that measured the presence of depressed mood and anhedonia—the inability to feel pleasure—for at least two weeks was shown to be a valid method of detecting depression (Pignone et al., 2002; Whooley et al.,1997). The test was determined to be 96% sensitive and 59% specific (Whooley et al., 1997). Sensitivity is the ability of a test to correctly identify individuals with a given condition. Specificity refers to the ability of the test to detect individuals that do not have that condition (depression in this case). In the same study, the CES-D scale was found to be 93% sensitive and 69% specific (Whooley et al., 1997). The two-question instrument has a higher chance of false positives, but a lower chance of false negatives. To lower the likelihood of false positives, asking about other

depressive symptoms—such as trouble sleeping or change in appetite—is recommended (Whooley et al., 1997).

Remission, Recovery, and Relapse

Recovery is the primary interest of our paper. In prominent literature, it is defined as a period lasting at least two months during which an individual experiences almost no depressive symptoms (Keller, Martin et al., 1987; Klein et al., 2006). Remission is a period in which symptoms are also largely absent, but an individual can be considered in remission after as early as three weeks of minimal symptoms (Rush, Kraemer et al., 2006). This shorter period leads to either recovery or relapse. Klein et al. (2006) found that the likelihood of initiating recovery steeply declines after six years has passed since depression onset. Once an individual has recovered, they cannot go back into remission directly; they will either continue to be recovered or relapse. 50-85% of individuals who have experienced a major depressive episode will relapse at least once (Sood, Treglia et al., 2000). After relapse, an individual will either continue to exhibit depressive symptoms or will go into remission again.

Complicating Factors for Depression

Age. Countless studies have found a negative relationship between age and depression symptomology (Wade & Cairney, 2000). One controversial study found that depressive symptoms decrease until age 45, but then begin increasing again, peaking in severity at 80 years of age (Mirowsky & Ross, 1992). This finding has been contested, with many arguing that the pattern is simply a result of including health-related questions on depression scales.[2]

[2] See Wade & Cairney (2000) for discussion

Age of onset is also relevant to depression recovery. Depression onset is usually dichotomized as early-onset (<21 years) or not (Klein, Shankman & Rose, 2008). Early-onset depression is associated with a decreased likelihood of recovery (Judd, Akiskal et al., 1998).

Gender. Women are more likely to develop depression (Jeong & Cooney, 2006; Hsieh & Qin, 2017; Dunlop, Lyons et al., 2004). Increased likelihood of victimization and other adverse conditions faced by women is presented as one explanation for the increased depression risk (Norman, 2004). Others posit that women are socialized in ways that increase depression susceptibility. A study conducted in New York preschools found that teachers instructed male students in ways that promoted independence whereas female students were directed in ways that encouraged more attention-seeking and dependent behaviors. Boys in this study were also given more attention and for longer amounts of time than female students (Serbin, O'Leary, Kent & Tonick, 1973). As Coyne points out in his "Essential Papers on Depression," learned dependent behavior can cause women to fear social rejection and be more self-critical (Coyne, 1986). Golin, Sweeney, and Schaeffer found that negative self-perception can precede depressive symptomatology (Golin, Sweeney & Schaeffer, 1981).

Marriage. The relationship between marriage and depression is greatly dependent on not only spousal relationship quality, but also numerous additional factors including gender. Married persons, as a whole, report less depressive symptoms, even after controlling for other variables, such as gender, age, and race (Pearling & Johnson, 1977). This is especially true for men: married men are less depressed than married women (Radloff, 1975). Marriage has been found to be disproportionately beneficial for men

(Kessler & McRae, 1984). For women, marriage is complicated with regard to mental health. Unmarried individuals are less able to insulate themselves against emotional stressors (Kessler, 1979). Despite this, unmarried women who are the primary breadwinners in their households are less depressed than both married women and unmarried men (Radloff, 1975). Marriage can provide benefits, but also can reinforce behavior—such as avoidance of conflict—that produces a stressful environment over time (Kahn, Coyne & Margolin, 1985**)**. Women are more likely to use such avoidance coping mechanisms (Billings & Moos, 1980). The role of spouse—and its associated expectations—can create frustration that has been found to increase depressive symptoms (Pearlin & Schooler, 1978).

Socioeconomic Status. Financial strain can serve as a lifelong stressor for depression. Link and Phelan found that socioeconomic status is a fundamental cause of mental health issues (Link & Phelan, 1995). Further research has suggested lower socioeconomic status is associated with a higher incidence of major depression (Goldman, Glei & Weinstein, 2018; Ross, 2000). A study of homeless persons in Birmingham found that 59% of their sample had depressive symptoms (La Gory, Ritchey & Mullis, 1990). The results of a study of New Yorkers in the aftermath of the 9/11 terrorist attacks suggest that wealthier individuals did not develop depressive symptoms at the same rates of people with lower incomes, likely due to a lower dependence on local resources (Ahern & Galea, 2006). For individuals with severe depression in adolescence, higher family income predicts better mental health outcomes in adulthood (Contoyannis & Li, 2017).

Education. Both parental and respondent education level have been found significant in depression research. For children with a relatively high depressed affect, a higher level of maternal education increases recovery odds later in life (Contoyannis & Li, 2017). On the other end, less educated individuals are more likely to develop depressive symptoms (La Gory et al., 1990). Another study qualified this finding, though. They found that while important, a lower level of education is not as impactful as a being from a lower socioeconomic background or facing unemployment (Kessler, 1979). The impact of education on mental health can be hard to separate from the effects of co-occurring conditions.

Race and discrimination. Race is often included in research as a way to measure the effects of discrimination on health. Racism on intrapersonal (self-prejudice), interpersonal, and societal levels can all cause depressive symptoms (Cox, Abramson, Devine & Hollon, 2012). Daily experiences of discrimination can have a major impact on mental health. In a study of Latino youth, black-identifying Latinos experienced more depressive symptoms than non-black Latinos because they experience more racial discrimination on a daily basis (Burgos & Rivera, 2009). S. Roxburgh states that race, gender, and lower SES all interact to affect an individual's health; one factor cannot be included without considering the others (Roxburgh, 2009).

Childhood Adversity. Childhood adversity has been well-established as increasing depression risk. Severe economic stress in childhood adversely affects adult mental health (Green, McLaughlin et al., 2010; Hsieh & Qin, 2017). Fraught parental relationships negatively impact the well-being of an individual well into adulthood (Tran, Nguyen et al., 2018; Jeong & Cooney, 2006). A poor maternal relationship in childhood

is especially significant (Klein et al., 2008; Hammen, 2009). Loss of a mother figure can also lead to the later development of depression (Brown & Harris, 1978). Loss of a parent is more prevalent among depressed individuals than the overall population (Leonard, 1964).

Childhood abuse constitutes one extreme form of childhood adversity. Sibling abuse is included in the definition of childhood abuse. Often, sibling abuse is accepted as a common part of family life (Caffaro & Conn-Caffaro, 2005). However, the impact of this type of abuse on mental health can be just as long-lasting as abuse perpetrated by other members of the family, such as parents. Children who experience sibling abuse have been found to develop low self-esteem and maladaptive coping strategies that can put them at risk for depression (Wiehe, 1997). Abuse includes sexual, emotional, and physical behavior. Victims of childhood sexual abuse are more likely to suffer from poor mental health in adulthood (Mullen, Martin et al., 1996; Lewis, McElroy, Harlaar & Runyan, 2016).

Childhood abuse is often experienced in more than one form. In one study, 95% of children who faced sexual abuse also faced another form of abuse, such as emotional or physical (Lewis et al., 2016). This matches other research finding that childhood adversity is highly clustered (Green et al., 2010). Suffering multiple forms of childhood abuse does not have an "additive" effect on mental health (Green et al., 2010). This means a child who has experienced one type of abuse is likely to be just as impacted mentally as a child who has experienced multiple types.

Violence. Violence experienced past childhood also poses a risk for depression. In Vietnam, researchers found having an emotionally or physically abusive partner

increased the likelihood of post-natal depression for women (Tran et al., 2018). Another study that looked at interpersonal violence victimization experiences and suicide—considering suicide to be a form of physical violence—found that both increase the likelihood of behavioral health issues (Cramer, Johnson et al., 2018).

Comorbidity. Comorbidity is the existence of one or more diseases/disorders in addition to a primary disease/disorder—depression in our research—that an individual has at one time. It complicates both life satisfaction and depression recovery. Illnesses that cause physical limitations, especially arthritis, are associated with a large increase in depression risk (Dunlop, Lyons et al., 2004). Depression has previously been looked at as a cause of cardiovascular disease, but a recent paper has suggested that opposite causality might exist as well (Rahman, Humphreys et al., 2013). Individuals with diabetes were found more likely to suffer from comorbid anxiety and depression disorders (Smith, Pedneault & Schmitz, 2015). Psychiatric comorbidity—being diagnosed with anxiety and depression, for example—is associated with more severe depressive symptoms and a lower quality of life (Baune, McAfoose, Leach, Quirk & Mitchell, 2009).

Family History. Family history is a large factor accounting for depression incidence. A family history of depression greatly increases an individual's likelihood of becoming depressed (Klein et al., 2008). Having a depressed parent can increase a child's depression risk by 2-4 times (Hammen & Brennan, 2001). A history of maternal depression greatly increases depression risk (Hammen, 2009). General parental maladjustment (history of criminal activity, mental health issues, violence, and/or substance abuse issues) is a prevalent factor as well (Green et al., 2010).

Social Support. Strong relationships with both family and friends have been established as beneficial for mental health. Social support acts in two ways: it directly has a positive effect on an individual's mood and indirectly acts as a buffer against stressors (Cohen & Wills, 1985; Almeida, Subramanian, Kawachi & Molnar, 2011; Zhang, Yan, Zhao & Yuan, 2014). Increased social support is associated with better mental health (Holahan & Moos, 1981). A study of firefighters found that those with greater perceived social resources were able to experience life changes with less negative health effects (Clark & Innes, 1983). On the other end, worse social relationships are associated with increased depressive symptomology (Herman-Stahl & Petersen, 1996).

Severity. Depression severity—perhaps unsurprisingly—impacts recovery. If an individual has a higher baseline depression score, they are less likely to recover and, even if they do so, will improve at a slower rate (Rush, Kraemer et al., 2006). Severity is also associated with the chronicity of depression. Previously, having a major depressive episode (non-chronic) was considered more severe than having mild-to-moderate chronic depression, but chronic depression is now viewed as more severe from a longitudinal perspective (Klein et al., 2006). The same study also found that chronic depression has lower odds of recovery and a higher prevalence of relapses (Klein et al., 2006).

Medication. Antidepressants have been found to be more effective than placebos in aiding recovery from depression, but medication to treat depression is often ineffective (Meyers, Sirey & Bruce, 2002). This often has to do with prescription methodology. Research has shown that antidepressant prescriptions often do not meet adequate dosage and/or length of time (Sood et al., 2000). A massive study of the Veteran's Hospital Association found that individuals less than 65 years of age and of a non-white

background were much less likely to receive both an adequate amount of antidepressants and quality care, which in turn decreases the likelihood of recovery (Charbonneau, Rosen et al., 2003). In another study, only 45% of participants were found to be receiving adequate pharmacotherapy (Meyers et al., 2002). Moreover, theoretical adequacy of dosage/length in no way guarantees the individual will respond to the treatment. Within the category of antidepressants, there are over five subtypes that act in different ways in the body and affect people in different ways (Mayo Clinic, 2017). It is not uncommon for doctors to switch or combine medications on a patient-to-patient basis to treat depression.[3]

[3] See: Mulder, Frampton, Luty & Joyce, 2009; Joyce & Paykel (1989) contains extensive discussion of depression medication

Theory

Previous depression research conducted by economists has often been concerned with the overall impact of depression on productivity and GDP. The cost/cost-effectiveness of depression and its treatment is a recent popular area of research (See: Mohit, 2018; Hsieh & Qin, 2018; Andlin-Sobocki, Jönsson, Wittchen & Olesen, 2005; Lee, Gao, Dear, Titov & Mihalopoulos, 2017). Such research is valuable, but often only tells of the importance of providing adequate mental health care, not what and who depression (and recovery) looks like. That is usually a topic left for medical research. We turn to medical and sociological research to develop a econometric model that incorporates a variety of relevant demographic, personal experience, personal perception, and health variables. We use survey data collected over two decades from the same individuals, which allows us to look at answers to questions that span a wide range of personal experience, including childhood and life satisfaction.

This section begins with the formation of our depressed subgroup from the overall sample. Then, we generate a base model that incorporates our variables. We provide the intuition behind each variable's inclusion and their expected impact on depression recovery. From there, we develop our final model.

Creating Depressed Sample from MIDUS 1

In devising our subsample, we are faced with the challenge of determining what constitutes depression. Following Norton (2007), we seek to avoid cut-off diagnosis scores. Instead, we follow the two-question instrument validated by Pignone et al. (2002) and Whooley et al. (1997), among others. We use two questions evaluating depressed mood and anhedonia to create a subgroup of possibly depressed individuals. Once this

group is formed, we then follow Whooley et al. (1997)'s recommendation, considering the presence of additional depressive symptoms to remove likely false positives.

Base Model

The previous work of Solomon, D. A., Leon, A. C., Coryell, W., Mueller, T. I., Posternak, M., Endicott, J., and Keller, M. B. focused on a goal identical to that of our research: predicting recovery from depression (Solomon, Leon, Coryell, Mueller, Posternak, Endicott & Keller, 2008). Like our research, they collect data over a long time horizon (twenty years) and base their research on an observational study (NIMH Collaborative Depression Study in their case). However, they are primarily interested in how psychosocial impairment affects the likelihood of depression recovery (Solomon et al., 2008). This is where our interests differ, but we build our model using some of the ideas put forth in their research. In their model, the researchers use a logistic regression model with recovery as their binary dependent variable (Solomon et al., 2008). We follow a similar approach, but incorporate an additional dependent variable.

Dependent Variable. We construct our initial model by selecting our first dependent variable. We seek to evaluate depression recovery, so we use a recovered/not-recovered binary to indicate whether an individual still has depression at the time of the last survey—MIDUS 3.

Our data comes from individuals who were interviewed three times over a span of around twenty years. The gaps between follow-up interviews range from 8-11 years. Due to this, we do not possess the necessary information to evaluate whether an individual has maintained a state of being recovered from one survey period to the next. This could potentially pose issues when diagnosing whether an individual has recovered

permanently. However, six years after depression onset, the likelihood of initiating recovery is low (Klein et al., (2006)). Thus, if an individual still has depressive symptoms twenty years after their onset, it is not likely the individual has recovered.

Note on variable evaluation. As mentioned, ultimately we are interested in whether an individual recovers (or not) from depression. Individuals with more severe depression—greater symptomology—are less likely to recover from depression (Rush et al., 2006). Thus, any factor that increases depressed affect should be considered for its impact on recovery, not just its depression risk. Our sample is composed of individuals who are already depressed at the time of MIDUS 1. When we speak of specific variables increasing depressed affect or increasing depression risk, then, we view this in the context of making recovery more difficult, not making depression more likely.

Age. Moving on, we select our left hand side variables. We begin with a variable to account for age. Mirowsky finds that depression and age have a negative linear relationship only until 45 (Mirowsky, 1994). However, due to pushback against this result,[4] we do not seek to incorporate this into our model. We include age without any modifications.

Gender. It has already been established that women are more likely to develop depression. The reasons for this, however, remain contentious. It has been suggested that the socialization of women is responsible for creating a susceptibility to depression (Radloff & Monroe, 1978). If we accept this, then we must assume that such learned

[4] See: Wade & Cairney (2000) for discussion

traits would make recovery from depression more difficult as well.[5] Therefore, we include gender in our model, expecting that recovery will be found less likely for women.

Socioeconomic Status. Socioeconomic status has been shown to affect depression incidence for a few reasons. Financial issues can serve as a life-long source of stress and anxiety impacting mental health. Ahern and Galea find that greater wealth is tied with less dependence on local resources (Ahern & Galea, 2006). Greater personal resources help buffer against negative effects of traumatic events. Additionally, from Bernard, Banthin & Encinosa (2009), we know wealthier individuals usually have better quality health care. Lower income individuals generally have less access to health care, and are more likely to develop chronic conditions as a result (Bindman et al., 2006). Comorbidity can increase depressive symptoms, making recovery more challenging. (Dunlop, Lyons et al., 2004; Rahman, Humphreys, et al., 2013; Baune et al., 2009). All of this suggests socioeconomic status should be an important factor to incorporate, but we must decide how to evaluate it. Measuring socioeconomic status in terms of a yearly income does not capture the full picture. At the very least, it ignores regional differences in living costs. For example, the cost of living in Houston, TX, a major city, is at least 23% lower than it is in New York City, NY (Council for Community and Economic Research, 2018). While previous research has linked lower income to depression, most of these studies were conducted in a single area or similar areas. Ahern and Galea's work focused on just New Yorkers (Ahern & Galea, 2006). Bindman et al. used hospital data from urban areas in California (Bindman et al., 1995). The region of the United States (the focus of MIDUS) is too diverse for this approach to work. We thus

[5]Socialized behaviors have an innate public pressure to be maintained. Thus, changing depression risk-increasing would be more difficult, making depression recovery more challenging to achieve.

look to the literature for other methods of income measurement. Wade and Cairney controlled for region when evaluating socioeconomic status (Wade & Cairney 2000). This idea has merit, but MIDUS data only provides the overall regional spread of respondents, not individual participant locations (Brim et al., 1995-1996). Additionally, our sample size (450 individuals) is too small to allow for meaningful analysis of income by region. To compare the impact of socioeconomic status then, we abandon this yearly income measure for a perception-based measure: financial well-being. MIDUS survey data allows us to evaluate responses to questions such as "how would you rate your financial situation these days?" (Scale: 0-10) (MIDUS 1, Question A1SJ1) (Brim et al., 1995-1996). Through this type of question, we ground income in a way that allows us to see how that income is actually felt by the individual. From there, we can then analyze whether greater perceived financial strain makes recovery more difficult. We expect this should be the case.

Education. We do not include an individual's education in our analysis. However, we do include maternal education level. Contoyannis and Li find that, for depressed adolescents, higher maternal education makes recovery more likely (Contoyannis & Li, 2017). In line with this, we incorporate the highest level of education attained by the respondent's mother or the childhood female head of household.

Race and Discrimination. Numerous studies have found a link between identifying as non-white and increased depressive symptomology, largely due to greater experienced discrimination.[6] We include a binary variable measuring non-white self-identification. Additionally, we generate a measure of experienced discrimination. We

[6] See: Cox, W., Abramson, L., Devine, P., & Hollon, S., 2012; Burgos, G., & Rivera, F., 2009

seek to separate out the effect of racism from race. Our survey data allows us to incorporate multiple forms of discrimination, as well as their frequency for each individual. From the research of Noh, Beiser, Kaspar, Hou, and Rummens, we expect that increased discrimination should be associated with higher depression levels (Noh, Beiser, Kaspar, Hou & Rummens, 1999). Resultingly, we believe recovery should be less likely for individuals who experience more severe discrimination.

Childhood Abuse. Countless studies have shown the negative impact childhood abuse has well into adulthood.[7] Experiencing childhood abuse should, then, make recovery more difficult. Our model includes two separate measures evaluating two types of childhood abuse: emotional abuse and severe physical abuse. Sexual abuse is not included in the model. The Midlife in the United States series does not contain the necessary questions for us to identify and evaluate childhood sexual abuse. This is somewhat of a limitation, but we know that suffering multiple forms of childhood abuse is not more impactful on mental health than experiencing only one form (Green et al., 2010). Therefore, we do not worry about variable exclusion causing an overestimate of the effects of emotional and physical abuse on depression outcomes.

Comorbidity. In accordance with Dunlop, Lyons et al. (2004), we recognize that physically-limiting chronic conditions can negatively impact mental health. Anxiety, heart conditions, or diabetes co-occurring with depression also are positively related to depression severity (Baune et al., 2009; Smith, Pedneault & Schmitz, 2015; Rahman, Humphreys et al., 2013). We measure the presence of most of these chronic conditions under one binary measure. We separate out anxiety from this variable, though, because its

[7] For just a few examples, see: Wiehe, 1997; Mullen, Martin, et al., 1996; Lewis, McElroy, Harlaar, Runyan, 2016

severity must be considered. Anxiety, like depression, can vary greatly in felt effects depending on severity (Newman, Llera, Erickson, Przeworski & Castonguay, 2013). We incorporate anxiety through a separate continuous variable that allows us to account for differing severities.

Social Support. The protective effects of social support systems have been shown numerous times.[8] This includes both family and friend networks. Current research focuses on the perceived quality of those relationships. Higher quality relationships help protect against the symptoms of depression (Clark & Innes, 1983). Thus, better social support should aid in recovery as well by both lessening risk of relapse and lowering depressed affect in individuals.

Medication. Medication for depression is only as effective as the prescription is accurate (Sood et al., 2000; Charbonneau, Rosen et al., 2003). While our data tells us whether an individual is taking medication for depression, we have no method to investigate how appropriate the dosage and length of prescription are. This is one limitation of our data. Due to this, medication is not included in our model.

Base Model Form. The inclusion of these variables, along with our dependent variable, gives us the basic model:

$$REC_i = \beta_0 + \beta_1 AGE_i + \beta_2 GEN_i + \beta_3 PFIN_i + \beta_4 MEDU_i + \beta_5 RACE_i + \beta_6 DISCR_i + \beta_7 EMA_i + \beta_8 PHYA_i + \beta_9 CHRON_i + \beta_{10} ANX_i + \beta_{11} FAM_i + \beta_{12} FRND_i + \varepsilon_i \quad (3.2.1)$$

Where:

- REC: binary, value of "1" indicates individual is recovered from depression at time of MIDUS 3

[8] See: Cohen & Wills, 1985; Holahan & Moos, 1981; Almeida, Subramanian, Kawachi & Molnar, 2011; Zhang, Yan, Zhao & Yuan, 2014; Clark & Innes, 1983

- AGE: continuous
- GEN: binary, value of "1" indicates self-identification as female
- PFIN: continuous, higher value indicates higher perceived financial well-being
- MEDU: continuous, highest level of education attained by mother/woman who raised respondent
- RACE: binary, value of "1" indicates self-identification as non-white
- DISCR: continuous, higher value indicates more numerous experiences of discrimination
- EMA: binary, value of "1" indicates individual experienced emotional abuse during childhood
- PHYA: binary, value of "1" indicates respondent experienced severe physical abuse during childhood
- CHRON: binary, value of "1" indicates respondent had heart trouble, a bone or joint disease, diabetes or high blood sugar, or a stroke within twelve months of MIDUS 3
- ANX: continuous, higher values indicate greater severity of depression
- FAM: continuous, higher scores indicate higher perceived quality of relationship with family
- FRND: continuous, higher scores indicate higher perceived quality of relationship with friends

Refining/Modifying Variables

Childhood abuse measures. Some of our theoretical variables must be modified due to results from our data. Specifically, we must modify our childhood physical and

emotional abuse variables. MIDUS 1 asks if an individual has experienced certain forms of physical and emotional abuse "rarely," "sometimes," "often," or "never" (Brim et al., 1995-1996). Initially, EMA and PHYA were conceived as binary measures where we dichotomized responses according to whether they experienced abuse at all. However, 86.22% of our depressed subgroup, and 77.00% of the overall survey group, has experienced some form of emotional abuse in childhood at least "rarely" (Generated by author). 54.67% of our depressed subgroup—and 48.16% of all MIDUS 1 respondents—reported experiencing severe physical abuse at least once (Generated by author). A full breakdown of responses is provided in our data section. Previous literature has evaluated childhood abuse severity based on frequency experienced.[9] Following this, we include childhood abuse—emotional and physical—as a scale, with higher scores indicating a higher frequency.

Adding a dependent variable. REC is an useful response variable for measuring how certain factors increase/decrease the likelihood of recovery. Crucial to this analysis is the idea that certain factors improve/worsen depressed affect, which in turn determines whether an individual has minimal enough symptoms to be considered recovered. This means we are also interested in how certain variables directly impact depression severity. To this end, we create another regression equation to be analyzed in addition to our initial model, with a depressive symptom scale (at the time of MIDUS 3) as our dependent variable. This model takes an almost identical form to the first one, with the same independent variables:

[9] See: Straus, Hamby, Boney-McCoy, & Sugarman, 1995; Dube et al., 2005

$$C1PDEPRE_i = \beta_0 + \beta_1 AGE_i + \beta_2 GEN_i + \beta_3 PFIN_i + \beta_4 MEDU_i + \beta_5 RACE_i + \beta_6 DISCR_i + \beta_7 EMA_i + \beta_8 PHYA_i + \beta_9 CHRON_i + \beta_{10} ANX_i + \beta_{11} FAM_i + \beta_{12} FRND_i + \varepsilon_i \quad (3.3.2.1)$$

C1PDEPRE measures the severity of depression symptoms at the time of MIDUS 3, taking on values from 0 to 7. The independent variables are unchanged (childhood abuse variables take on discussed modification), so, for the sake of brevity, we do not redefine them here.

Stratifying the Sample

Once we have our base models, we divide our depressed sample into smaller groups to provide additional insight. We look at how different variables impact depression outcomes based on the initial severity of the depression. We also look at how our independent variables affect partnered and not-partnered individuals differently.

Initial Severity. Increased depression severity is associated with lower recovery odds (Rush et al., 2006; Klein et al., 2006). We then expect that if a certain variable impacts the recovery of individuals with lower depressed affect, that does not guarantee the same will be true for individuals with more present depressive symptoms. Recent research provides weight to this hypothesis. In their analysis of adolescent depression, Contoyannis and Li find that variables had differing impacts on health outcomes depending on the initial severity of the adolescent's depression (Contoyannis & Li, 2017).[10] Therefore, we divide our sample according to A1PDEPRE, a variable that measures the initial severity of depression symptoms analogously to C1PDEPRE, but

[10] CES-D score quantiles were used to evaluate relative depression severity

with data from the MIDUS 1 survey. Scores range from 1-7.[11] We create two subgroups according to these values: one group with scores ranging 1-5 and the another with scores ranging 6-7. Initial conceptions of the model involved dividing the sample into five groups according to scores. However, this would make meaningful analysis difficult. Certain variables—such as RACE and DISCR—would have to be excluded due to insufficient data. Our dataset is not large enough for analysis to be conducted at each score or even a smaller range of scores. The mean score is 5.07.[12] As such, we divide our group as close to the mean as possible—between values of 5 and 6—and end up with similarly-sized groups for analysis.

Romantic Partnership. Marriage has been shown to be more beneficial for men than women (Radloff, 1975; Kessler & McRae, 1984). However, on the whole, married people report lower depressed affect than unmarried people (Pearling & Johnson, 1977). A partner can help buffer against negative experiences (Kessler, 1979). We suggest, then, that partnered and not-partnered individuals might experience/react to certain variables differently. We expect that these partnerships should act as protection against some depression risk factors, decreasing overall depressed affect. Accordingly, we create two groups from our depressed dataset, those with a significant other/spouse and those without. We change from a married/not-married to a partnered/not-partnered dichotomy for a few reasons. The first is practical: our dataset asks whether an individual has a significant other/partner, not whether they are married. Thus, we cannot distinguish between those partnered versus those married. And, finally, when the survey was first

[11] A1PDEPRE for the entire MIDUS 1 dataset ranges from 0 to 7, but since all individuals in our sample are depressed, there are no severity scores of 0.

[12] See Data section for A1PDEPRE summary statistics

conducted, same-sex couples were unable to marry. Same-sex marriage only became legal in all 50 states in 2015 (NPR, 2015). The first MIDUS survey was conducted in the late '90s (Brim et al., 1995-1996). We do not seek to place a value judgment on heterosexual vs. non-heterosexual relationships, or on married vs. long-term unmarried partnerships. Dividing based on marital status thus feels inappropriate and we use our modified dichotomy instead.

Once we divide our sample, we add an additional independent variable for our partnered sample: a spouse/partner score (SPSCORE in our regression). Based on a series of survey questions, we develop a scale to evaluate the perceived quality of one's relationship with their significant other. From Kahn, Coyne, and Margolin (1985), we expect a lower spousal "quality score" to increase depressive symptomology.

Final Model

Our final model is divided into two sections according to the sample stratification. The first section of the model looks at variable effects based on initial depression scores. We have four regression equations:

Scores 1-5 subgroup:

$$REC_i = \beta_0 + \beta_1 AGE_i + \beta_2 GEN_i + \beta_3 PFIN_i + \beta_4 MEDU_i + \beta_5 RACE_i + \beta_6 DISCR_i + \beta_7 EMA_i + \beta_8 PHYA_i + \beta_9 CHRON_i + \beta_{10} ANX_i + \beta_{11} FAM_i + \beta_{12} FRND_i + \varepsilon_i \quad (3.5.1)$$

$$C1PDEPRE_i = \beta_0 + \beta_1 AGE_i + \beta_2 GEN_i + \beta_3 PFIN_i + \beta_4 MEDU_i + \beta_5 RACE_i + \beta_6 DISCR_i + \beta_7 EMA_i + \beta_8 PHYA_i + \beta_9 CHRON_i + \beta_{10} ANX_i + \beta_{11} FAM_i + \beta_{12} FRND_i + \varepsilon_i \quad (3.5.2)$$

Scores 6-7 subgroup:

$$REC_i = \beta_0 + \beta_1 AGE_i + \beta_2 GEN_i + \beta_3 PFIN_i + \beta_4 MEDU_i + \beta_5 RACE_i + \beta_6 DISCR_i + \beta_7 EMA_i + \beta_8 PHYA_i + \beta_9 CHRON_i + \beta_{10} ANX_i + \beta_{11} FAM_i + \beta_{12} FRND_i + \varepsilon_i \quad (3.5.1)$$

$$C1PDEPRE_i = \beta_0 + \beta_1 AGE_i + \beta_2 GEN_i + \beta_3 PFIN_i + \beta_4 MEDU_i + \beta_5 RACE_i + \beta_6 DISCR_i + \beta_7 EMA_i + \beta_8 PHYA_i + \beta_9 CHRON_i + \beta_{10} ANX_i + \beta_{11} FAM_i + \beta_{12} FRND_i + \varepsilon_i \quad (3.5.2)$$

The second section of the model looks at the partnered/not-partnered dichotomy. Within this section, we have the following four regression equations:

Partnered subgroup:

$$REC_i = \beta_0 + \beta_1 AGE_i + \beta_2 GEN_i + \beta_3 PFIN_i + \beta_4 MEDU_i + \beta_5 RACE_i + \beta_6 DISCR_i + \beta_7 EMA_i + \beta_8 PHYA_i + \beta_9 CHRON_i + \beta_{10} ANX_i + \beta_{11} FAM_i + \beta_{12} FRND_i + \beta_{13} SPSCORE_i + \varepsilon_i \quad (3.5.3)$$

$$C1PDEPRE_i = \beta_0 + \beta_1 AGE_i + \beta_2 GEN_i + \beta_3 PFIN_i + \beta_4 MEDU_i + \beta_5 RACE_i + \beta_6 DISCR_i + \beta_7 EMA_i + \beta_8 PHYA_i + \beta_9 CHRON_i + \beta_{10} ANX_i + \beta_{11} FAM_i + \beta_{12} FRND_i + \beta_{13} SPSCORE_i + \varepsilon_i \quad (3.5.4)$$

Not-partnered subgroup:

$$REC_i = \beta_0 + \beta_1 AGE_i + \beta_2 GEN_i + \beta_3 PFIN_i + \beta_4 MEDU_i + \beta_5 RACE_i + \beta_6 DISCR_i + \beta_7 EMA_i + \beta_8 PHYA_i + \beta_9 CHRON_i + \beta_{10} ANX_i + \beta_{11} FAM_i + \beta_{12} FRND_i + \varepsilon_i \quad (3.5.1)$$

$$C1PDEPRE_i = \beta_0 + \beta_1 AGE_i + \beta_2 GEN_i + \beta_3 PFIN_i + \beta_4 MEDU_i + \beta_5 RACE_i + \beta_6 DISCR_i + \beta_7 EMA_i + \beta_8 PHYA_i + \beta_9 CHRON_i + \beta_{10} ANX_i + \beta_{11} FAM_i + \beta_{12} FRND_i + \varepsilon_i \quad (3.5.2)$$

For clarity, we include a table providing an overview of our regressions:

Table 3.5.1: Regression Overview

	Subcategory			
Dependent Variable	Score: 1-5	Score: 6-7	Partnered	Not-partnered
REC =	RHS	RHS	RHS + SPSCORE	RHS
C1PDEPRE =	RHS	RHS	RHS + SPSCORE	RHS

Source: Generated by Author

RHS signifies the right-hand side is exactly the same as our model after its initial modifications. For "Partnered," the RHS variables are all included, but an additional

variable measuring partner relationship quality is included. This gives us a total of eight regressions that will be summarized in our results section.

Data

In this section, we provide an overview of how our depressed subset was formed from the MIDUS dataset. All our variables are generated from survey data collected during MIDUS 1, 2, and 3. Most of the variables were generated by coding responses to a number of questions, and then developing binary or continuous variables accordingly.

Language note

When referencing specific survey questions, the question identification number (i.e.: C1PA73), as well as which survey the question is pulled from (M1, M2, or M3) will be included. A question referenced that comes from MIDUS 1 would be cited in the form "M1-QUESTIONID#," and so on for each of the MIDUS surveys.

Dataset

MIDUS series. Our dataset is generated from selected survey questions from the Midlife in the United States Survey (MIDUS) series. MIDUS 1 was conducted from 1995-1996 with the goal of understanding how a variety of factors (including mental and physical health, childhood, etc.) account for the experiences and lives of middle-aged Americans (National Institute on Aging, 2011). All participants were between 20 and 75 years old at the time of the first interview. A total of 7108 individuals were successfully interviewed by phone, with most completing a self-administered questionnaire as well (86.8%) (Brim et al., 1995-1996) In total, there are 1,812,540 observations in MIDUS 1.[13] The majority of our variables are derived from this dataset.

Around nine years later, all MIDUS 1 subjects were asked to participate in MIDUS 2, which included both follow-up questions on MIDUS 1 responses, as well as

[13] Calculated by author based on MIDUS 1 survey data; Brim et al., 1995-1996.

neuroscience, biomarker, and cognitive assessments of select participant subsamples (Brim et al., 2004-2006). Of the original 7108, 4963 people (69.82%) participated in MIDUS 2 (Brim et al., 2004-2006).

From 2013 to 2014, MIDUS 2 respondents were contacted for a third wave of MIDUS interviews and questionnaires. 66.4% of MIDUS 2 individuals participated in MIDUS 3, giving an overall MIDUS 3 response rate for MIDUS 1 participants of 46.3% (Brim et al., 2013-2014).

Depression subset. For our research, we are interested in a subset of the MIDUS population: individuals depressed at the time of MIDUS 1. We then narrow this group further by including only those who successfully completed all the MIDUS surveys (1, 2, and 3). Individuals were identified as depressed through their answers to a series of questions addressing feelings of sadness, loss of interest, and other depressive symptoms. We first begin with two preliminary questions: "During the past 12 months, was there ever a time when you felt sad, blue, or depressed for two weeks or more in a row?" and "During the past 12 months, was there ever a time lasting two weeks or more when you lost interest in most things like hobbies, work, or activities that usually give you pleasure?" (M1-A1PA57 and M1-A1PA69 respectively) (Brim et al., 1995-1996). All responses were coded as "yes", "no," "don't know," "refused/missing," or "inappropriate" (Brim et al., 1995-1996). Pignone et al. (2002) found that a patient answering of "no" to both of these questions is associated with a very low likelihood of depression. As such, we remove all survey participants who did not answer "yes" to at least one of the questions. Though the likelihood of missing an individual with depression is low, the two-question instrument comes with a higher risk of false positives (Whooley

et al., 1997). They recommend incorporating additional questions that measure the prevalence of other depressive symptoms, such as issues sleeping, appetite changes, and feeling of worthlessness. We adopt this approach in our analysis.

If an individual answered "yes" to the first question (M1-A1PA57), we then look at their responses to the following questions:

- M1-A1PA60: "During those two weeks, did you lose interest in most things?"
- M1-A1PA61: "Think about those same two weeks, did you feel more tired out or low on energy than is usual for you?"
- M1-A1PA62: "During those same two weeks, did you lose your appetite?"
- M1-A1PA62A: "Did your appetite increase during those same two weeks?" (Note: Answering "yes" to PA62 causes interviewer to skip this question)
- M1-A1PA63: "Did you have more trouble falling asleep than you usually do during those two weeks?"
- M1-A1PA64: "During that same two week period, did you have a lot more trouble concentrating than usually?"
- M1-A1PA65: "People sometimes feel down on themselves, no good, nor worthless. During that two weeks period, did you feel this way?" (Brim et al., 1995-1996).

The "two weeks" referenced in the questions is the two or more weeks of feeling sad, blue, or depressed the individual has experienced in the past year (from the initial question). The possible responses to these questions are the same as the preliminary questions (Brim et al., 1995-1996). We create a dummy binary variable, DBIN, for which a value of "1" indicates an affirmative answer to any of the supplementary questions listed above.

Next, we look at individuals who answered affirmatively to M1-A1PA69 (losing interest in things). Following the previous path outlined, we look at responses to similar questions about the period the individual felt a loss of interest in things:

- M1-A1PA72: "During those two weeks, did you feel more tired out or low on energy than is usual for you?"
- M1-A1PA73: "During those same weeks, did you lose your appetite?"
- M1-A1PA73A: "Did your appetite increase during those same two weeks?" (Note: Interviewer skipped question if affirmative answer to PA73)
- M1-A1PA74: "During those same two weeks, did you have more trouble falling asleep than you usually do?"
- M1-A1PA75: "During those two weeks, did you have a lot more trouble concentrating than usual?"
- M1-A1PA76: "People sometimes feel down on themselves, no good, or worthless. Did you feel this way during that two week period?" (Brim et al., 1995-1996).

Once again, a dummy binary variable was created, LSBIN, with a value of "1" indicating a positive response to any of these questions.

Finally, we create another dummy binary variable, M1DIAG. If an individual has a DBIN value of "1," a LSBIN value of "1," or both, M1DIAG will have a value of "1." For the purposes of our research, this is a positive depression diagnosis. The depressed individuals form the basis of our Depression Subset, which is the primary group of interest for this paper. This is a total of 1097 individuals. However, we must eliminate those who did not complete all three surveys, leaving us with a subgroup composed of

450 individuals, which constitutes 13.7% of the overall sample that completed all three MIDUS surveys (Calculated by author; Ryff et al., 2013-2014).

Demographic differences between samples. We consider some differences in age, gender, response rate, etc., between all MIDUS survey respondents and individuals depressed at the time of MIDUS 1. For this analysis, we include all individuals who tested positive for depression, not just those who completed all three surveys. In the following table, we label our depressed subgroup as "Depressed Group" and the entire MIDUS sample as "Overall Group."

Table 4.2.3.1: Comparison Statistics between Depressed and Overall Groups

Category	Depressed Group	Overall Group
Mean Age (M1) (Years)	43.16	46.38
M2 Participation (%)	65.00%	69.83%
M1-M3 Participation (%)	41.02%	46.34%
M1 Female (%)	59.43%	51.10%
M3 Female (%)	66.22%	54.95%

Source: Generated by Author

Depressed individuals in our sample are, on average, younger, more likely to be female, and less likely to have completed all three MIDUS surveys. Of those who completed all three surveys, for depressed individuals, the percentage is highly female-identifying (66.22%), which slants our depressed subgroup away from the gender population distribution for the U.S.—which is 51% female (Kaiser Family Foundation, 2019). However, it matches the gender distribution of depression, which, based on depression incidence levels for men and women, was 64.22% female near the time when MIDUS 1 was conducted (Patten et al., 2006).

Dependent Variables

REC. Our first dependent variable, REC, attempts to quantify whether an individual has recovered from depression. We do this by evaluating depressive symptoms at the time of MIDUS 3, the last survey conducted. REC is binary, with a value of "1" indicating that an individual has recovered from depression.

To evaluate whether an individual has recovered, we first look at an individual's response to the following two questions: "During the past 12 months, was there ever a time where you felt sad, blue, or depressed for two weeks or more in a row?" and "During the past 12 months, was there ever a time lasting two weeks or more when you lost interest in most things like hobbies, work, or activities that usually give you pleasure?" (M3-C1PA60 and M3-C1PA72 respectively) (Ryff et al., 2013-2014). Note that these are phrased identically to the initial depression questions from MIDUS 1. A negative response to both questions indicates an individual has recovered from depression. If an individual answers "yes" to either question, we then look at our additional questions to see if there are additional symptoms present. These questions are the same as those asked in MIDUS 1. In our dataset, the questions are M3-C1PA63:66, M3-C1PA67:68, M3-C1PA75:77, M3-C1PA78, and M3-C1PA79 (Ryff et al., 2013-2014). The full text of each question is located in Appendix A for reference. If an individual responded "no" (or a question was non-applicable due to individual answering "no" to C1PA60 or C1PA72) to all of these questions, they were also considered recovered. A positive response to any of the questions indicates the individual has not recovered, and generates a REC value of "1" for that individual.

C1PDEPRE. Our other dependent variable measures the severity of depression at the time of MIDUS 3. This variable was constructed by the MIDUS 3 survey based on

the work of Wang, Berglund, and Kessler (Ryff et al., 2013-2014; Wang, Berglund & Kessler, 2000). It is a continuous variable with values ranging from 0 to 7, with higher scores indicating greater depressed affect. Each value is generated by analyzing responses to questions M3-C1PA63:69, M3-C1PA75:80 (Ryff et al., 2013-2014). This includes some of the same questions we used to develop REC. Questions ask about symptoms such as loss of appetite and trouble sleeping. Appendix A contains the full text of each question.

Below, we include the summary statistics for both response variables:

Table 4.3.2.1: Summary Statistics for REC and C1PDEPRE

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
REC	450	0.677777778	0.467847694	0	1
C1PDEPRE	450	1.7022222	2.614887043	0	7

Source: Generated by Author

Stratification of the Data

As mentioned in the previous section, we subdivide our depressed sample two ways for analysis. The first subdivision is done according to each individual's initial depression severity. The other separation is done through a partnered/not-partnered dichotomy.

Initial Depression Severity. We measure MIDUS 1 depressed affect using the variable A1PDEPRE, which was constructed by the MIDUS 1 survey team (Brim et al., 1995-1996). It was created in the exact same way as C1PDEPRE: responses from MIDUS 1 are just used instead of MIDUS 3 ones. In MIDUS 1, the range of questions is M1-A1PA60:66, A1PA72:77 (Brim et al., 1995-1996). See Appendix A for the questions in their entirety. As is the case with C1PDEPRE, A1PDEPRE uses findings of Wang,

Berglund, and Kessler as a guide for scoring depressed affect (Brim et al., 1995-1996; Ryff et al., 2013-2014; Wang, Berglund & Kessler, 2000). Scores can theoretically range from 0 to 7, but all individuals in the depressed subsample have a measured initial depressed affect that is greater than zero.

Table 4.4.1.1: Summary Statistics for A1PDEPRE

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
A1PDEPRE	450	5.06	1.478411837	1	7

Source: Generated by Author

With a mean greater than 5, our sample is weighted toward higher scores. This is made obvious when we consider the number and percentage of respondents for each score:

Table 1.4.1.2: Complete breakdown of initial depression severity

Depression Severity Score	# of Respondents	% Respondents
1	9	2.00%
2	23	5.11%
3	33	7.33%
4	74	16.44%
5	116	25.78%
6	118	26.22%
7	77	17.11%

Source: Generated by Author

This complicates the issue of dividing respondents into groups based on scores. We end up grouping scores 1-5 together into one group, scores 6-7 into another. This gives us a final result of two groups:

Table 4.4.1.3: Breakdown of Initial Depression Severity by two ranges

Depression Severity (Ranges)	# of Individuals	% of Depressed Sample
1-5	255	56.67%
6-7	195	43.33%

Source: Generated by Author

Partnered/Not-partnered. Besides depression severity, we are interested in how a romantic partnership impacts recovery. Accordingly, we separate our sample based on whether they have a partner/spouse. We do this through the MIDUS 1 variable A1PPARTN (M1-A1PPARTN) (Brim et al., 1995-1996). A1PPARTN is a binary variable with a value of "1" indicating the respondent is either married or living with a steady romantic partner (Brim et al., 1995-1996). All individuals in our depressed group with a A1PPARTN value of "1" form our partnered subgroup. All remaining individuals are considered "not-partnered" and form the other subgroup accordingly.

Table 4.4.2.1: Summary Statistics for A1PPARTN

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
A1PPARTN	450	0.626666667	0.484227854	0	1

Source: Generated by Author

The majority of our sample is married, but a smaller majority than is the case for the overall MIDUS 1 sample. Out of the entire MIDUS 1 sample, 70.69% is married, compared to only 62.67% of the depressed sample.[14] This provides additional weight to previous studies' findings that found married people are less likely to become

[14] Calculated by author, using data from MIDUS 1; Brim et al., 1995-1996

depressed.[15] Through this division, we end up with a partnered subgroup with 282 individuals and a not-partnered sample of 168 individuals.

Independent Variables

Next, we move into our RHS variables. After providing a brief reminder of each variable's purpose, we go through the construction of each, as well as provide summary statistics.

AGE. AGE measures participants' ages. Age is taken from the MIDUS 1 survey, which was determined through two methods. First, in initial phone screenings, someone of the household provided a "stated" age of the participant. After this, participants themselves were asked to provide their birthdate (Brim et al., 1995-1996). When these contradicted each other, the initial stated age was changed only if the two ages given differed by more than five years (Ryff et al., 2004-2006). Ages are rounded down to the nearest whole number (i.e. 35 instead of 35 ½).

Table 4.5.1.1: Summary Statistics for AGE

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
AGE	450	43.14	10.10569753	20	74

Source: Generated by Author

GEN. GEN is our binary gender variable, constructed using C1PRSEX, a MIDUS 3 variable (Ryffet al., 2013-2014). From this, we generate our dummy variable, with a response of female coded as "1." In reviewing the data, there were instances of gender self-identification switching from one survey to the next. This could be due to a variety of factors, including an individual change in gender identification or simply data input error.

[15] See: Pearling & Johnson, 1977

192 participants had gender identification that changed from MIDUS 1 to MIDUS 3.[16] This is 2.7% of our sample. The prevalence of transgender individuals in the population is estimated at 0.7% of young adults, and 0.6% of adults aged 25 to 64 (Flores, Herman, Gates & Brown, 2016). It is likely, then, that MIDUS 1 has some recording inaccuracies. As such, we use the most recent self-identification, sourced from MIDUS 3, in our analysis. One limitation of this approach is that it ignores the unique experiences of transgender individuals. However, our data will not allow us to distinguish between accidental misidentification and intentional change in identification.

Table 4.5.2.1: Summary Statistics for GEN

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
GEN	450	0.662222222	0.473478757	0	1

Source: Generated by Author

PFIN. PFIN measures an individual's perceived financial well-being. We evaluate this using the Consumer Financial Protection Bureau's (CFPB) definition of financial well-being. According to the CFPB, financial well-being involves the following elements:

- Having control over financial situation
- Being able to meet financial needs
- Being able to pay bills on time
- Being on-track for financial well-being in the future (Consumer Financial Protection Bureau, 2015)

[16] Calculated by author using MIDUS 1-3 data; Brim et al., 1995-1996; Ryff et al., 2004-2006; Ryff et al., 2013-2014

We look at six MIDUS 1 survey questions that attempt to quantify this: M1-A1SJ1, A1SJ3:7. These questions ask:

- M1-A1SJ1: "Using a scale from 0 to 10 where 0 means 'the worst possible financial situation' and 10 means 'the best possible financial situation,' how would you rate your financial situation these days?"
- M1-A1SJ3: "Looking ahead ten years into the future, what do you expect your financial situation will be like at that time?" (Responses on a scale from 0 to 10)
- M1-A1SJ4: "Using a 0 to 10 scale where 0 means 'no control at all' and 10 means 'very much control,' how would you rate the amount of control you have over your financial situation these days?"
- M1-A1SJ5: "Using a 0 to 10 scale where 0 means 'no thought or effort' and 10 means 'very much thought and effort,' how much thought and effort do you put into your financial situation these days?"
- M1-A1SJ6: "In general, would you say you (and your family living with you) have more money than you need, just enough for your needs, or not enough to meet your needs?"
- M1-A1SJ7: "How difficult is it for you (and your family) to pay your monthly bills?" (Responses: "Very difficult," "Somewhat difficult," 'Not very difficult," "Not difficult at all") (Brim et al., 1995-1996).

M1-A1SJ1, M1-A1SJ3 and M1-A1SJ4 responses were coded on a scale from 0-10, and then each weighted by 1/10. M1-A1SJ5 was also coded on a scale from 0-10 and then weighted by 1/10, but scores were reversed by subtracting each score from 10. That way, we ensured higher scores indicate better financial health. M1-A1SJ6 answers took on

values 1-3 (“3” = “More money than you need”), with each response then weighted by 1/3. M1-A1SJ7 responses were evaluated on a 1-4 scale, with “Not very difficult” as the highest score: 4. These responses were then weighted by 1/4. This provides a weighted value ranging from 0-1 for each question. Finally, for each individual, all the individual question scores were averaged to provide a number ranging from 0 to 1, with a higher number indicating higher perceived financial health.

Table 4.5.3.1: Summary Statistics for PFIN

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
PFIN	422	0.554811743	0.153413212	0.1638889	0.933333333

Source: Generated by Author

MEDU. MEDU is the highest level of education achieved by the respondent’s mother/childhood female head of household, coded as a value ranging from 1-12. This variable was compiled by the MIDUS 1 survey under the variable M1-A1PC8 according to the following schooling categories:

- 1: No school/some grade school
- 2: Eighth grade/junior high school
- 3: Some high school
- 4: GED
- 5: Graduated from high school
- 6: 1 to 2 years of college, no degree yet
- 7: 3 or more years of college, no degree yet
- 8: Graduate of 2 year college or vocational school, or associate’s degree
- 9: Graduate of 4 or 5 year college or bachelor’s degree
- 10: Some graduate school

- 11: Master's degree
- 12: PH.D, ED.D, MD, DDS, LLB, LLD, JD or other professional degree (Brim et al., 1995-1996)

Table 4.5.4.1: Summary Statistics for MEDU

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
MEDU	435	5.117241379	2.442434331	1	12

Source: Generated by Author

RACE. Race/ethnicity was determined by asking individuals whether they identified as white. The following question was asked: "What are your main racial origins -- that is, what race or races are your parents, grandparents, and other ancestors?" Researchers then coded responses. An answer of "white" is coded as "yes" to question M1-SSA6_1 ("What are your main racial origins -- that is, what race or races are your parents, grandparents, and other ancestors? – WHITE") (Brim et al., 1995-1996). From this, we create our dichotomous race/ethnicity variable. A value of "1" indicates an individual does not identify as white.

Table 4.5.5.: Summary Statistics for RACE

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
RACE	450	0.097777778	0.297344512	0	1

Source: Generated by Author

DISCR. DISCR is derived from MIDUS 1 questions that asked respondents to identify how often they experienced certain forms of discrimination. One of these questions is provided below as an example:

- M1-A1SS14A: “How often on a day-to-day basis do you experience each of the following types of discrimination - You are treated with less courtesy than other people?” (Brim et al., 1995-1996).

For each question, the answer choices were “Often,” “Sometimes,” “Rarely,” and “Never.” There are nine questions in total used to generate this variable, M1-A1SS14A:I (Brim et al;, 1995-1996). A full list of the questions is included in Appendix A for reference. “Never” was coded as “0,” “Rarely” as “1,” “Sometimes” as “2” and “Often” as “3.” From there, we derived an average value for each individual. While the study included any experiences of discrimination, including those on the basis of age, race, gender, sexuality, etc., we only include discrimination on the basis of race. This allows us to examine the specific effects of racism, separating that from race. To do this, we look to see if the participant answered “yes” to the following question: “What was the main reason for the discrimination you experienced? (If more than one main reason, check all that apply.) - YOUR RACE?” (M1-A1SS15_3) (Brim et al., 1995-1996). If the answer was “no,” that individual automatically received a zero for their discrimination score. The scores of those who answered “yes” were unchanged.

Table 4.5.6.: Summary Statistics for DISCR

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
DISCR	450	0.086141975	0.31577707	0	2.444444444

Source: Generated by Author

EMA. EMA includes emotional abuse perpetrated against the respondent by immediate family members, as well as by those outside the family. Forms of emotional abuse were described, and then respondents were asked to indicate how often they experienced any of these forms during childhood.

"List of Emotional Abuse: An individual…

- Insulted you or swore at you
- Sulked or refused to talk to you
- Stomped out of the room
- Did or said something to spite you
- Threatened to hit you
- Smashed or kicked something in anger" (Brim et al., 1995-1996)

The specific questions are M1-A1SE17A: E. The possible responses to these questions were: "Never," "Rarely," "Sometimes," and "Often" (Brim et al., 1995-1996). Appendix A contains the full text of the questions. "Never" was recorded as a "0" for EMA, "Rarely" as "1," "Sometimes" as "2," and "Often" as "3." A full breakdown of the emotional abuse responses is provided below, including a comparison with the overall MIDUS 1 population.

Table 4.5.7.1: Breakdown of experienced childhood emotional abuse

Emotional Abuse Experienced During Childhood	% Depressed Group	% Overall Group
Rarely or more	86.22%	77.00%
Sometimes or more	68.89%	55.63%
Often	28.67%	15.55%

Source: Generated by Author

A greater proportion of the depressed group was emotionally abused than that of the overall group, a pattern we'll see repeated with severe physical abuse.

Table 4.5.7.2: Summary Statistics for EMA

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
EMA	450	1.837777778	0.99347288	0	3

Source: Generated by Author

PHYA. PHYA is a measure of childhood severe physical abuse and was generated analogously to EMA. This time, however, participants were asked how often an individual had done anything on List C (MIDUS 1) to them as children.

"List C:

- Kicked, bit, or hit you with a fist
- Hit or tried to hit you with something
- Beat you up
- Choked you
- Burned or scalded you" (Brim et al., 1995-1996).

As with the emotional abuse variable, we generated a variable with values ranging from 0 to 3. A value of "0" represents never experiencing severe physical abuse, "1" represents "rarely," "2" is "sometimes," and "3" is "often." Once again, we include a breakdown of abuse experience, by "rarely," "sometimes," and "often." We provide overall MIDUS 1 sample information for comparison purposes.

Table 4.5.8.1: Breakdown of experienced childhood physical abuse

Severe Physical Abuse Experienced During Childhood	% Depressed Group	% Overall Group
Rarely or greater	54.67%	48.16%
Sometimes or greater	27.33%	20.93%
Often	9.11%	4.28%

Source: Generated by Author

For the depressed group, the incidence of experiencing severe physical abuse "often" is twice that of the overall group.

Table 4.5.8.2: Summary Statistics for PHYA

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
PHYA	450	0.911111111	0.997150109	0	3

Source: Generated by Author

CHRON and ANX. CHRON evaluates whether an individual has a few specific chronic conditions. It is a binary measure, with a value of "1" indicating an individual had been diagnosed with or treated for at least one of the following in the last year: diabetes or high blood sugar, arthritis, rheumatism, or other bone/joint diseases, a stroke, or suspected heart problems. We only include those chronic conditions that have been associated with increasing depressed affect.[17] We look at answers to survey questions M3-C1PA7, M3-C1SA11D, M3-C1A11X, and M3-C1SA11Z, which ask about heart issues, joint/bone disease, diabetes/high blood sugar, and experiencing a stroke, respectively (Ryff et al., 2013-2014). Full text of the questions is provided in Appendix A. We use data from MIDUS 3 in order to get the most up-to-date information on what chronic conditions an individual has. Using MIDUS 1 or MIDUS 2 data might leave out chronic conditions that an respondent experienced more recently.

ANX is a continuous variable that measures the severity of anxiety experienced by each respondent. We use data from the MIDUS 1 constructed variable M1-A1PANXIE, which evaluates responses to survey questions M1-A1PA85A:J to create a 0-10 general anxiety scale (Brim et al., 1995-1996). The source used to create this scale

[17] See Survey of the Literature and Theory Sections of thesis to review

was Wang, Berglund, and Kessler (2000). Appendix A contains the full text of these questions.

Table 4.5.9.1: Summary Statistics for CHRON and ANX

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
CHRON	450	0.484444444	0.50031418	0	1
ANX	450	0.677777778	1.914821907	0	10

Source: Generated by Author

Support Variables: FAM, FRND, and SPSCORE. All three variables measure the perceived quality of a respondent's relationships: FAM focuses on family, FRND on friends, and SPSCORE on a romantic partner. We follow the same method of evaluation for all three variables, based on the work of Cohen and Hoberman (Cohen & Hoberman, 1983). They developed a scale, ISEL, that measures the presence of four types of support—tangible, appraisal, self-esteem, and belonging—to generate "support scores" for college students (Cohen & Hoberman, 1983). We use survey questions looking at those four types of support to create our own scales. For tangible, we look at available material aid (ex: money). "Appraisal" refers to an individual having the ability to talk about their problems with someone. Self-esteem questions ask whether an individual has people that support the development of healthy self-esteem. Finally, belonging support—as one might suspect—is making an individual feel as though they belong to a group (Cohen & Hoberman, 1983). The use of these four categories to evaluate support levels has been validated many times.[18]

We also follow Cohen and Hoberman's convention of wording half of the questions positively and the other half negatively (Cohen & Hoberman, 1983). As a

[18] See: Cohen et al., 1985; Cohen & Wills, 1985; Cyranowski et al., 2013

result, though, we must code negatively-worded questions in the reverse way we code positively-worded ones. That way, higher scores will always indicate higher perceived relationship quality.

For each variable, the questions used are as follows:

- FAM: M1-ASM2:9.
- FRND: M1-A1SM11:18
- SPSCORE: M1-A1SP11:22

Question responses were weighted to have values ranging from 0 to 4 for each question. Responses were then totaled and averaged for each person, with higher scores indicating higher perceived relationship quality. All three variables are continuous, with theoretical ranges of 0-4. As with previous variables, the full set of survey questions used in provided in Appendix A for reference.

Table 4.5.10.1: Summary Statistics for FAM, FRND, and SPSCORE

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
FAM	422	2.835985105	0.427817513	1.5	3.75
FRND	422	3.112192849	0.476294415	1.625	4
SPSCORE	282	3.009536858	0.618573992	1	4

Source: Generated by Author

Note that SPSCORE values are only generated for those who have a partner/spouse.[19]

[19] See: Stratifying Variables section in this chapter for discussion of how partner/not-partnered status is determined.

Results

In this section, we share our research findings. We first go through our method of analysis, including the selection of the regression models, as well as some collinearity-mandated fixes. Following this, we provide and comment on our regression results.

Method of Analysis

Logistic Regression: REC. REC is a binary response variable. This makes logistic regression the clear choice over OLS. Probit regression might also appear an appropriate choice, but we follow previous research and proceed with a logistic regression model[20]. Logistic regression allows us to report on odds ratios for each variable, which we include in our result tables.

Tobit Regression: C1PDEPRE. C1PDEPRE takes on values ranging from 0 to 7, which logistic regression unsuitable. Instead, we use a tobit regression model, setting our upper limit as 7 and our lower limit as 0.

Collinearity. Collinearity must be avoided in our models to prevent inaccurate results. We generate a correlation matrix to check for any two variables that have a correlation of greater than $|\rho| = 0.5$. We provide the correlation matrix below, bolding any correlations that are greater than 0.5. A larger version of the matrix can be found in Appendix B.

[20] See: Solomon, D. A., Leon, A. C., Coryell, W., Mueller, T. I., Posternak, M., Endicott, J., & Keller, M. B, 2008; Dube et al., 2005

Table 5.1.3.1: Correlation Matrix for Independent Variables

Variable	GEN	AGE	A1PDEPRE	PFIN	RACE	DISCR	ANX	CHRON	FAM	FRND	MEDU	EMA	PHYA
GEN	1												
AGE	0.0125	1											
A1PDEPRE	0.0596	-0.1338	1										
PFIN	-0.068	-0.0015	-0.0019	1									
RACE	0.1449	-0.1143	-0.118	-0.1975	1								
DISCR	0.056	0.0783	0.0307	-0.2297	0.4231	1							
ANX	-0.15	0.1215	-0.0028	0.1416	-0.0715	-0.0513	1						
CHRON	0.0189	0.179	-0.0291	0.1728	0.032	-0.0387	0.1383	1					
FAM	0.0363	0.0909	0.1116	-0.0002	0.0579	0.0525	-0.0204	0.175	1				
FRND	0.1641	0.1099	0.0974	0.0257	-0.0292	0.1402	0.2189	0.0791	**0.6157**	1			
MEDU	-0.1134	-0.2297	0.1499	0.0837	-0.0772	-0.1633	-0.0779	0.2451	0.023	0.0183	1		
EMA	-0.0441	-0.1575	0.0176	-0.064	-0.17	-0.1224	-0.1787	0.034	-0.3022	-0.352	0.0208	1	
PHYA	-0.0095	-0.1717	-0.0783	-0.0582	-0.029	-0.1081	-0.0302	0.2135	-0.1128	-0.238	-0.0484	**0.5885**	1

Source: Generated by Author

From the table, there is a clear correlation issue in two cases: FAM & FRND and EMA & PHYA. This makes some intuitive sense. People with strong family relationships are more likely to develop positive friendships (Herman-Stahl & Petersen, 1996). In relation to childhood emotional and physical abuse, we know multiple forms of childhood abuse are often seen together (Lewis et al., 2016; Green et al., 2010). Now comes the issue of fixing it. For both situations, we decide to create new variables, but take two distinct approaches: averaging scores in one case and taking the maximum value in another. For FRND and FAM, we average the scores to create a new variable: FF. Ultimately, what we are seeking to evaluate with these two variables is an individual's perceived amount of social support; both family and friends enter into this. As such, averaging them to form a total "social score" seems acceptable.

For PHYA and EMA, averaging the scores does not seem a viable option. By averaging the scores, more weight would we given to those who had endured both physical and emotional abuse. Experiencing one form of abuse is just as impactful as suffering multiple forms of abuse (Green et al., 2010). Thus, we discard this combination method. Instead, we take the maximum value between PHYA and EMA for a given

individual. We then store all these observations in a new variable, PHEMA. That way, we are able to measure the impact of childhood abuse without disregarding the findings of previous research.

We also consider the variable inflation factor (VIF) and tolerance values for each variable. A VIF value of 10 is often used as a cut-off point to indicate serious multicollinearity issues (Menard, 1995; Hair et al., 1995; Neter et al., 1989; Kennedy, 1992). A tolerance score of less than 0.10 is similarly concerning.[21] We include the results below. VIF values greater than 10 (and tolerance scores < 0.10) are bolded:

Table 5.1.3.2: VIF and Tolerance Values for Initial Model

Variable	VIF	Tolerance
GEN	2.92	0.342967
AGE	**18.11**	**0.055217**
PFIN	**14.64**	**0.068318**
RACE	1.17	0.854556
DISCR	1.19	0.842285
ANX	1.16	0.858878
CHRON	1.96	0.510458
MEDU	5.27	0.189915
FF	**34.65**	**0.028858**
PHEMA	5.16	0.193784

Source: Generated by Author

AGE, PFIN, and FF are all problematic due to their high VIF scores. FF's VIF score is especially high (34.65). Our variables must be adjusted to combat this. To determine which variables must be removed/changed, we regress each variable with a high VIF

[21] Note that tolerance is the reciprocal of VIF. Thus, a score of 0.10 is functionally equivalent to a VIF value of 10

value against the other independent variables. Appendix C contains the full results of these regressions.

From these regressions, we find the following variables significant in determining a given high-VIF variable:

- AGE: MEDU, CHRON, and PHEMA
- FF: ANX, PFIN, and PHEMA
- PFIN: FF

All variables were significant at the 1% level.

For age, we find that maternal education and childhood abuse decrease with initial age whereas chronicity increases with it. Chronic conditions are more common with age (Prasad, Sung & Aggarwal, 2011). Age is likely a factor for depression recovery,[22] so we do not want to simply remove it as an explanatory variable.

Anxiety levels, financial well-being, and childhood abuse all appear significant in determining family/friend relationship quality (quantified by FF in our model). We know support networks can help ensure good mental health,[23] but the causality can run the other way as well (Herman-Stahl & Petersen, 1996). As such, higher anxiety or increased stressors such as financial burden or experienced abuse could lead to worse family and friend relationships (Cohen & Wills, 1985). Childhood abuse could very well explain strained family relations. However, social support is still an important variable to be considered in its own right.

To allow us to consider all the variables, we devise three models with the following variables:

[22] See Survey of the Literature for discussion
[23] See Survey of the Literature

- Model 1: GEN, RACE, DISCR, AGE, PFIN, and ANX
- Model 2: GEN, RACE, DISCR, MEDU, CHRON, PHEMA, PFIN, ANX
- Model 3: GEN, RACE, DISCR, FF, MEDU, CHRON

We are able to include GEN, RACE, and DISCR in all our models. For all other variables, we ensure that we do not include any two variables that explain each other within the same model. We then calculate the VIF and tolerance values for each model.

Table 5.1.3.3

	Model 1		Model 2		Model 3	
Variable	VIF	Tolerance	VIF	Tolerance	VIF	Tolerance
GEN	2.84	0.35215	2.74	0.365121	2.86	0.350168
RACE	1.16	0.860105	1.16	0.859586	1.15	0.872086
DISCR	1.15	0.866283	1.19	0.843414	1.17	0.857975
ANX	1.14	0.873919	1.15	0.872697	1.87	0.533954
CHRON	-	-	1.91	0.524162	-	-
MEDU	-	-	4.57	0.219043	5	0.199935
FF	-	-	-	-	6.95	0.143845
PHEMA	-	-	4.72	0.211745	-	-
AGE	9.96	0.100381	-	-	-	-
PFIN	9.37	0.106726	6.16	0.162314	-	-

We no longer have a problem with severe multicollinearity. Thus, we proceed with our analysis.

Regression Results: Sample Separated by Initial Depression Severity

For each depression subsample,[24] we run six regressions: three logit regressions with the dependent variable REC and three tobit regressions with our other dependent variable, C1PDEPRE. For logit regressions, we include the odds ratios for each variable (and the constant). Standard errors are provided in parentheticals. Significance is

[24] Recall we are separating the sample based on the following (ranges of) depression severity scores: 1-5, 6-7

indicated with bolded font and one asterisk at the 10% level, two asterisks at the 5% level, and three asterisks at the 1% level. We do not bold coefficient values for our constants, regardless of their significance level.

Also note that a positive value for a coefficient for the logistic regression (REC) indicates the variable increases recovery odds, while a positive value for the tobit model (C1PDEPRE) indicates the variable likely increases depressed affect.

Comparison of recovery odds. Before launching into our results, we seek to ground our data in an understanding of the differences between the two samples. As such, we highlight some of these differences.

Individuals who had lower initial depression severity are more likely to recover.[25] We see this with our samples. Approximately 75% of those in our Scores 1-5 group recovered from depression at the time of MIDUS 3 (Calculated by author). In contrast, only around 58% of those from the Scores 6-7 groups had done the same (Calculated by author). If depression is more likely for a group, variables are perhaps less relevant to determining recovery as a result. Therefore, we expect a greater number of variables to be significant for the group with higher initial scores. Indeed, this is what our results suggest.

Regression Tables. We first look at the results for our dependent variable, REC. Our table of results is included on the next page. We divide our results by the model, and then by subsample.

[25] See Survey of the Literature for more extensive discussion

Table 5.2.2.1: Logit Regression Results for REC, Depression Severity Score Samples

	Model 1				Model 2			
Dep. Var = REC	Scores 1-5		Scores 6-7		Scores 1-5		Scores 6-7	
Variable	Coefficient	Odds Ratio	Coefficient	Odds Ratio	Coefficient	Odds Ratio	Coefficient	Odds Ratio
Gender	0.2853933 (0.3115485)	1.330285	-0.2097569 (0.3590234)	0.8107813	0.2136839 (0.3160635)	1.238231	-0.0502327 (0.3635364)	0.9510081
RACE	0.8030308 (0.7923888)	2.232296	-0.4115696 (0.8908033)	0.6626094	0.6996727 (0.798351)	2.013094	-0.1218744 (1.038553)	0.8852596
DISCR	0.2157917 (0.583106)	1.240844	**-1.069418**** (0.5487124)	0.343208	0.2302928 (0.5840275)	1.258969	**-1.011855*** (0.5520208)	0.363544
ANX	-0.1169185 (-0.1169185)	0.8896577	**-0.1353935*** (0.079452)	0.8733722	-0.1364281 (0.0935765)	0.8724691	-0.1055644 (0.0848212)	0.8998165
CHRON	-	-	-	-	0.2606722 (0.3137742)	1.297802	0.0897953 (0.3384111)	1.09395
MEDU	-	-	-	-	-0.0601436 (0.0639212)	0.9416293	**-0.1390329**** (0.0708605)	0.8701994
FF	-	-	-	-	-	-	-	-
PHEMA	-	-	-	-	**-0.3499726**** (0.1810057)	0.7047074	-0.2311343 (0.2047521)	0.7936328
PFIN	**2.012517**** (1.0294)	7.482126	0.4000562 (1.065461)	1.491909	**1.821576*** (1.049214)	6.181591	0.6745893 (1.094978)	1.963227
AGE	0.0006626 (0.0153135)	1.000663	**0.0473998***** (0.0173735)	1.048541	-	-	-	-
Constant	-0.252827 (0.9153769)	0.7766022	-1.375521 (1.128624)	0.2527079	0.7893136 (0.853535)	2.201885	1.495154 (0.8920763)	4.460024

	Model 3			
Dep. Var = REC	Scores 1-5		Scores 6-7	
Variable	Coefficient	Odds Ratio	Coefficient	Odds Ratio
Gender	0.2813978 (0.3087213)	1.324981	-0.1079137 (0.3642253)	0.8977051
RACE	0.8425031 (0.7788715)	2.322172	-0.4608014 (0.9869709)	0.630778
DISCR	0.2182312 (0.5998568)	1.243875	**-1.038235 *** (0.5442796)	0.3540792
ANX	-	-	-	-
CHRON	0.1505926 (0.3036926)	1.136269	0.1136867 (.3381265)	1.120401
MEDU	0.8323285 (0.061591)	0.9599712	**-0.1505926**** (.0705977)	0.8601981
FF	0.2254094 (0.3961444)	1.252836	**0.8323285*** (0.4911233)	2.298665
PHEMA	-	-	-	-
PFIN	-	-	-	-
AGE	-	-	-	-
Constant	0.3229966 (1.291243)	1.381261	-0.9997503 (1.51288)	0.3679713

Source: Generated by Author

Next, we look at the results of our other regression with the dependent variable, C1PDEPRE.

Table 5.5.2.2: Tobit Regression Results for C1PDEPRE, Depression Severity Score Samples

	Model 1		Model 2		Model 3	
Dep. Var = C1PDEPRE	Scores 1-5	Scores 6-7	Scores 1-5	Score 6-7	Scores 1-5	Scores 6-7
Variable	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
Gender	**3.884368**** (1.691771)	**4.835225***** (1.737806)	**3.45411**** (1.684603)	**5.260002***** (1.751224)	**3.854247**** (1.742697)	**5.511392***** (1.841859)
RACE	-5.290668 (3.820461)	0.3478144 (3.574395)	-4.956668 (3.819066)	-5.18734 (4.81139)	-5.653277 (3.831144)	-3.953482 (4.800558)
DISCR	-0.0108571 (2.739654)	1.472456 (2.12513)	-0.7743578 (2.856727)	3.515837 (2.333107)	-0.6563963 (2.898561)	3.311717 (2.377312)
ANX	0.3196274 (-0.5062932)	0.2250662 (0.3407947)	0.2372319 (0.5185493)	0.2794362 (0.3562252)	-	-
CHRON	-	-	**2.716055*** (1.594052)	**2.601654*** (1.454848)	**3.041254*** (1.609657)	2.279908 (1.481645)
MEDU	-	-	0.0600441 (0.3232072)	-0.3714757 (0.3060201)	0.0408343 (0.3279305)	-0.4219398 (0.321063)
FF	-	-	-	-	-1.447438 (2.035182)	1.631953 (2.19781)
PHEMA	-	-	0.4629782 (0.8732641)	-0.3009069 (0.8777249)	-	-
PFIN	3.545052 (5.374164)	5.685954 (4.781886)	3.530819 (5.425995)	7.450127 (4.864967)	-	-
AGE	0.0308863 (0.0751205)	0.0260835 (0.0716266)	-	-	-	-
Constant	-10.35803 (4.975765)	-11.01071 (4.34211)	-11.30046 (4.644028)	-9.762392 (4.193856)	-4.405433 (6.731647)	-11.01926 (7.130339)

Source: Generated by Author

Overview of results. Our results suggest that depression severity and our independent variables interact to help determine likelihood of recovery. The two severity groups had distinct variables that were found important in determining recovery chances. Moreover, more variables were significant for recovery in the sample with a higher initial depressed affect.

Scores 1-5 results. We begin with the results from our REC regressions. We find PFIN and PHEMA significant in our logistic regression. This suggest that higher

financial well-being increases the likelihood of recovery. In contrast, experiencing childhood physical and/or emotional abuse decreases this likelihood. This is consistent with our predictions. Experiencing childhood abuse "rarely" makes an individual 65% less likely to recover than someone who has never experienced it. The trend continues as we move up in abuse frequency. We find that an individual who experienced childhood abuse "often" is 25 times less likely to recover than the average person.

All other variables were found insignificant for this range of scores. Gender, race, discrimination, age, anxiety levels, maternal education, and chronic disease do not appear to impact the likelihood of recovery.

Moving on, we investigate the results of our C1PDEPRE analysis. Gender was found significant across all our models.[26] Our results suggest that identifying as female increases depression severity, by at least 3.45 points (on a scale of 0 to 7). We also find that chronicity increases depressed affect in this sample. Having heart problems, a bone/joint disease, diabetes, or a stroke increased depression severity by approximately 2.7 to 3 points.

Scores 6-7 Results. As before, we first discuss our REC results. Discrimination (DISCR) was significant for individuals in all three models. According to our regression, individuals who experience discrimination are much less likely to recover from depression. For each one point increase in severity of experienced discrimination, an individual is an estimated 64-66% less likely to recover.

Anxiety was also found to have a negative impact on recovery chances, but was found significant in only one of the two models that included it. This suggests we should

[26] All were found significant at at least the 5% level

be somewhat cautious in assigning it significance. In the model that found it significant, ANX was found to have a fairly large effect on recovery outcomes. Each digit increase in anxiety severity was associated with a 13% less chance of recovery. Anxiety is measured on a scale. Thus, for those with mild anxiety (lower scores), individuals would not be much less likely to recover over controls. However, for those with severe anxiety (for example, those having a score of 7), recovery odds are greatly diminished.

Age appears to have a positive relationship with recovery. This matches previous research finding that depressive symptoms and age are negatively related.[27] As an individual ages, depressed affect decreases and improves recovery odds.

FF was another variable linked positively with recovery, suggesting that increasing social support makes recovery more likely. A one point increase in perceived relationship quality increases recovery likelihood by about 2.3 times, everything else held constant.

Finally, we find that maternal education impacts depression recovery, but not in the way we predicted. Increased maternal education—in our model—is associated with lower odds of recovery. This was the case for both of the models that included MEDU. In these models, however, age was not included. We know that age and maternal education are negatively correlated. Thus, it might be the case the maternal education is acting as a proxy for age in these models. Age and depression are negatively related, so this would match our predictions.

For C1PDEPRE, the exact same variables are found significant in this sample: GEN and CHRON. Both were found to increase depression severity, though to different

[27] See Survey of the Literature for extended discussion

degrees. Our results suggest gender has a large impact on depression severity, increasing severity scores by an upwards of 5.3 points. Chronicity was found to increase severity by around 2.6 points, but only in one of the two models that included it. In the other model, CHRON was found insignificant. This suggests further research should be conducted to confirm or further develop the found effects of specific chronic conditions on depression.

Comparison of results by score range. As previously discussed, we find that more variables are significant for those who have a higher initial depression severity. Somewhat surprisingly, though, no variables are significant across samples for our first dependent variable, REC. This might suggest that we have some issues with skewed data. If that were the case, we must be very careful in asserting differences in variable impacts across samples. However, we see that this is not the case for C1PDEPRE significant variables. GEN and CHRON were significant for both groups. Moreover, they were the only two significant variables for the two samples. Therefore, we feel confident proceeding with examining initial depression severity's impact on variable significance.

GEN. Identifying as female increases MIDUS 3 depression severity for both samples. However, despite this, we found that gender does not impact the likelihood of recovery. Gender was not found significant in determining REC in any of the models/samples. This suggests that being female can increase depression severity, but is not likely a major factor in whether one will recover or not. This creates an interesting finding: Women are more likely to have severe depressive symptoms, but they are not less likely to recover because of them.

RACE. Race was not found significant for either of the dependent variables in either sample. Previous research has found that ethnicity is often a proxy for differences

in socioeconomic status, opportunities, etc. (Cox, Abramson, Devine & Hollon, 2012). Since we include some of those measures in our model, it makes sense that this connection disappears. We suggest that identifying as non-white in itself does not determine either depression or depression severity.

DISCR. In contrast to ethnicity, discrimination was significant to recovery, though only for those with higher initial depression severity. Experiencing greater discrimination decreases recovery odds. This is further validation that being "non-white" is not a determinant of mental health—associated stressors are. Discrimination scores were not found significant in determining final depression severity, but we do notice a pattern when we look at our two samples. Our sample composed of higher depression severity individuals had an average discrimination score higher than that of our Scores 1-5 sample (Calculated by author). That suggests experiencing greater discrimination is associated with greater depression severity. We suggest further analysis of the entire MIDUS sample to determine to what extent discrimination accounts for higher depressed affect.

ANX. Anxiety decreases the likelihood of recovery for those with initial scores 6-7. Even mild anxiety (a score of 1, on a scale of 0 to 7) is impactful. This is in line with our expectation that psychiatric comorbidity makes depression more severe and harder to recover from. We must take some caution, though, in interpreting anxiety as significant. Only one of the two models found anxiety significant at the 10% level. The model that found anxiety significant also has higher VIF values for some of the factors over the other model (though not above our cut-off score of 10), suggesting that perhaps some of the significance might be attributed to other variables.

CHRON. Chronicity was found to increase final depression severity in both samples. It was not, however, found important in determining depression recovery. This places it in a similar position that we found with identifying as female. We find that having certain specific chronic conditions[28] makes depression worse, but does not make the difference between recovery or sustained depression.

MEDU. Maternal education is perhaps the only surprising finding from our results. For individuals with scores 6-7, increased maternal education is associated with lower recovery odds. Again, we suggest that correlation with age might partly explain this trend.

FF. Increased social support is associated with a higher likelihood of recovery for those with more severe depression. This suggests that focusing on improving relationships can reduce depressed affect. This finding matches previous research (and, thus, our predictions).

PHEMA. Our results confirm previous research finding the negative impacts of childhood abuse on adult mental health. We find that, for those with lower scores, experiencing childhood abuse significantly decreases recovery likelihood. For those with more severe depression, childhood abuse was not found to be a factor in recovery. This suggests that other factors have a greater impact on this subsample.

PFIN. Our results suggest that increased financial well-being increases the chance of recovering from depression in individuals with less severe depression. A point increase in financial well-being makes an individual at least 6 times more likely to recovery. One model found the increased likelihood to be 6.181591 times, and the other model placed

[28] See Survey of the Literature, Theory, or Data sections for review of which conditions we include under this measure.

increased likelihood at 7.482126 times over the control. For those with more severe depression, our results suggest that financial well-being does not enter into recovery odds. We suggest that financial well-being might be a stressor that can cause mild depression, but more severe depression is due largely to other factors. In that case, PFIN's lack of impact is understandable.

AGE. Age impacts recovery odds only for those with more severe depression. For those individuals, age and recovery are positively related; we find that age doesn't impact those with less severe depression. This might perhaps be due to the high percentage of those with lower scores who recover. We theorize that because the overwhelming majority recovers, age is less of a significant factor.

Regression Results: Sample Separated by Partnered/Not-Partnered

Similar to above, we run six regressions for each subsample: three logit and three tobit regressions. For the partnered sample, we include the additional variable SPSCORE in one of our regression models.

Additional VIF Modifications. For this sample, our models must be modified to allow for the inclusion of SPSCORE while avoiding issues of collinearity. Appendix D contains the full results of our VIF tests. To keep VIF values under 10, our new models are as follows:

- Model 1: GEN, RACE, DISCR, ANX, PFIN
- Model 2: GEN, RACE, DISCR, ANX, CHRON, MEDU, PHEMA, SPSCORE
- Model 3: GEN, RACE, DISCR, CHRON, MEDU, FF

Note that we are only able to include SPSCORE in one model. FF and SPSCORE are highly correlated, so SPSCORE and FF cannot be in the same model. Likewise, PFIN

and SPSCORE are also correlated, so we place them in separate models. We are not able to include AGE due to its high correlation with a number of variables. With these modifications, we proceed with our regressions.

Regression Tables. We first include our results for REC, divided according to our partnered/not-partnered samples.

Table 5.3.2.1: Logit Regression Results for REC, Partnered/Not-Partnered Samples

	Model 1				Model 2				Model 3			
Dep. Var = REC	Partnered		Not-Partnered		Partnered		Not-Partnered		Partnered		Not-Partnered	
Variable	Coefficient	Odds Ratio	Coefficient	Odds Ratio	Coefficient	Odds Ratio	Coefficient	Odds Ratio	Coefficient	Odds Ratio	Coefficient	Odds Ratio
Gender	0.0107819 (0.2886835)	1.01084	0.188593 (0.3926266)	1.207549	0.0110088 (0.2960888)	1.01107	0.2639814 (0.4082882)	1.302104	0.0766257 (0.2939016)	1.079638	-0.0246671 (0.3934969)	0.9756346
RACE	0.2972774 (0.6254432)	1.346189	0.6459711 (0.9688156)	1.907839	0.1287642 (0.6529519)	1.137422	1.191478 (1.279184)	3.291944	0.1891174 (0.6275879)	1.208183	1.202259 (1.192667)	3.327625
DISCR	0.0694342 (0.4281241)	1.071901	**-2.266529***** (0.8411742)	0.1036714	0.147066 (0.4564879)	1.15843	**-2.204499***** (0.8770448)	0.1103057	0.1280245 (0.4563193)	1.136581	**-2.407424***** (0.8571218)	0.090047
ANX	**-0.1113662*** (0.0694064)	0.8946111	-0.1676442 (0.1087009)	0.8456546	-0.10067 (0.0726828)	0.9042314	**-0.2234818***** (0.126298)	0.7997295	-	-	-	-
CHRON	-	-	-	-	0.3866402 (0.2842539)	1.472027	-0.3160346 (0.3946995)	0.7290342	0.3448226 (0.2816074)	1.41174	-0.2753797 (0.3851419)	0.7592838
MEDU	-	-	-	-	**-0.1124096**** (0.0578592)	0.8936781	-0.0939077 (0.0798002)	0.9103668	**-0.1066445*** (0.0572198)	0.8988452	-0.0933838 (0.07707)	0.9108438
FF	-	-	-	-	-	-	-	-	**1.13375***** (0.3797825)	3.107286	-0.3171999 (0.5143283)	0.7281852
PHEMA	-	-	-	-	**-0.4772908***** (0.1698276)	0.6204621	-0.0918727 (0.2047521)	0.9122213	-	-	-	-
PFIN	**1.849502**** (0.9111776)	6.356655	**1.929272*** (1.20024)	6.884494	-	-	-	-	-	-	-	-
SPSCORE	-	-	-	-	0.1662918 (0.2295517)	1.180918	-	-	-	-	-	-
Constant	-0.0690506 (0.5605757)	0.9332794	-0.2897631 (0.7167337)	0.7484409	1.161259 (0.9060097)	6.185905	0.5315777 (0.9600332)	1.70165	-2.12249 (1.19093)	0.1197331	2.336935 (1.676404)	10.34946

Source: Generated by Author

Following this, we have our results for our dependent variable, C1PDEPRE:

Table 5.3.2.2: Tobit Regression Results for C1PDEPRE, Partnered/Not-Partnered Samples

	Model 1		Model 2		Model 3	
Dep. Var = C1PDEPRE	Partnered	Not-Partnered	Partnered	Not-Partnered	Partnered	Not-Partnered
Variable	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
Gender	**4.20947***** (1.620627)	**4.403283***** (1.756873)	**4.062546***** (1.586281)	2.273101 (1.487614)	**4.529521***** (1.679082)	**3.914915**** (1.779749)
RACE	-3.279573 (3.374389)	-1.519495 (3.726069)	-3.228775 (3.331811)	**-9.7998*** (5.477993)	-2.989879 (3.396066)	-9.335403 (5.80145)
DISCR	-1.302639 (2.48293)	3.647135 (2.405971)	-1.760664 (2.478802)	**6.241063**** (2.717695)	-1.762858 (2.527136)	**6.361416**** (2.815943)
ANX	0.1988109 (0.3960447)	0.3113445 (0.4263862)	0.1458588 (0.3933895)	0.0794974 (0.3770625)	-	-
CHRON	-	-	**2.996127**** (0.2904791)	**3.123497**** (1.437526)	**3.234495**** (1.483663)	1.903478 (1.63599)
MEDU	-	-	-0.0703042 (0.3232072)	0.036016 (0.2923777)	-0.1149678 (0.3022434)	-0.2329182 (0.3363114)
FF	-	-	-	-	0.9294262 (1.935128)	-1.49252 (2.141966)
PHEMA	-	-	0.2623756 (0.7916605)	-0.2300743 (0.662593)	-	-
PFIN	5.210492 (4.817414)	4.538429 (5.111577)	-	-	-	-
SPSCORE	-	-	0.7766522 (1.147438)	-	-	-
Constant	-10.34385 (3.386513)	-8.400811 (3.497125)	-11.14778 (4.723288)	-5.396604 (2.481069)	-11.52945 (6.464068)	-0.9418892 (7.013672)

Source: Generated by Author

Partnered Sample Results. For our partnered sample, we find PHEMA, PFIN, FF, and MEDU significant in determining REC. PHEMA—childhood abuse—decreases recovery likelihood by over 1.5 times. This is consistent with findings from our Scores 1-5 sample and previous research. Higher maternal education was found, once again, to decrease odds of recovery. Better financial well-being and social support—PFIN and FF—both increase recovery odds for partnered individuals. A one point increase in PFIN increases recovery likelihood by six times, while a point increase in FF improves odds by

three times. This suggests that both variables have a large impact on an individual's ability to recover.

For our other dependent variable, C1PDEPRE, our results suggest ANX, GEN and CHRON are significant variables. All contribute positively to depression severity. Being female increases depression severity more than 4 points on a 7-point scale. Having a chronic condition increases severity somewhat less, averaging around 3 points across the three models. Anxiety increases severity approximately 10% for each point increase on the severity scale.

Not-partnered sample results. Our regression results suggest that DISCR and ANX both decrease the likelihood of depression recovery (REC). PFIN was found to increase this likelihood. Discrimination (DISCR) was significant across all three models. Greater experienced discrimination is associated with 90% decreased chance of recovery for each point increase. A point increase in anxiety (on a 7-point scale) corresponds to about 1.2 times lower odds of recovery. PFIN—financial well-being—was the only significant variable that is positively associated with recovery. For those without partners, we find that better financial health makes recovery more likely.

For our tobit regression, both GEN and CHRON were found to impact depression severity. This mirrors the findings of all previous regressions with C1PDEPRE (as the dependent variable). Women and those with chronic conditions are more likely to develop more severe depression.

CHRON and GEN. For both our samples, we find the same variables significant in determining final depression severity. Women and those with chronic conditions are consistently more likely to have more severe depression. The coefficient for CHRON

across the models/samples is similar, ranging in value from 2.996127 to 3.234495. This suggests that chronic conditions impact the mental health of those with partners and those without equally. From our research, we know that having a significant other can help insulate against stressors, such as loss and financial strain, thus protecting against depression (Pearlin & Schooler, 1978). A partner, however, cannot protect an individual from having a chronic condition. Thus, it makes sense that chronicity impacts the partnered and not-partnered samples to similar degrees.

Our discussion of gender and partnership is more nuanced. We expect that people with significant others as a whole should be less depressed than their non-partnered counterparts. Indeed, the data shows that those in the partnered group were more likely to recover than those in the other group (71.6% recovered vs. 61.3% recovered) (Calculated by author). Despite this, the coefficients for GEN (1=female) are about the same across the samples. This seems to suggest that being a non-partnered woman is just as impactful on depression (negatively) as being a woman in a romantic partnership. We know that having a partner is more beneficial for men than women, mainly because it conveys more protective benefits on men than women (Kessler & McRae, 1984). Our results seem to confirm this, demonstrating that being female is a major factor in depression, regardless of being in a relationship.

RACE. Race was found impactful in one model for our not-partnered sample. In this case, identifying as non-white decreased final depression severity. This is further evidence that although being non-white has been found to increase depression risk (Lesser et al., 2007), it is likely due to it acting as a symptom of underlying stressors—such as discrimination—that can explain depression prevalence to a much better degree.

DISCR. As mentioned above, discrimination is a stressor that can significantly impact depression risk. For our not-partnered sample, experiencing discrimination greatly increased depression severity. This is not the case for our partnered sample, perhaps due to the protective effects of relationships. Discrimination—unlike chronic conditions—is one such category in which a significant other could act as a buffer, safeguarding mental health.

ANX. Anxiety was found to decrease depression recovery odds in both partnered and not-partnered individuals. It has been shown that being in romantic relationships can be an additional stressor for those with maladaptive coping strategies and anxiety (Kahn, Coyne & Margolin, 1985). As such, it makes sense, then, that partnership does not mediate the impact of anxiety on depression.

MEDU. As in our previous models, increased maternal education seems to decrease the likelihood of recovery for individuals. The consistency found across our models/samples suggests that we should investigate our maternal education variable further to determine why this negative association exists.

FF. For partnered individuals, better social support appears to increase recovery odds. A one point increase in social support equates to a three times greater likelihood of recovery. Social support was not found significant for our not-partnered sample. This suggests that social support is more impactful on individuals who have a significant other.

PHEMA. For partnered individuals, experiencing childhood abuse decreases the likelihood of recovery. Childhood abuse was found insignificant for our not-partnered sample. Partnership cannot protect against childhood experiences, so we do not expect to

see a “protective effect” for this variable. Childhood abuse has been associated with relationship issues later in life (Nguyen, Karney & Bradbury, 2017). Individuals who were abused reported being less marital satisfaction and greater depressed affect (Nguyen et al., 2017). Thus, we reason that childhood abuse lessens the protective effects of marriage, making depression more likely.

SPSCORE. SPSCORE was not found significant in our regression. This suggests that better partner relationships do not explain depression severity or recovery to any meaningful degree.

Conclusion

In this paper, we used Midlife in the United States survey data across two decades to evaluate the impact of specific factors on depression recovery and severity. We divided our sample in two distinct ways to analyze how the initial depression severity and having a significant other impact both the likelihood of recovery from depression and the depression severity.

Following previous literature, we run logistic regression models with a binary dependent variable, whether an individual has recovered or not. We introduce an additional dependent variable as well, final depression severity. This allows us to use a tobit model to estimate the effects of our explanatory variables on severity, deepening understanding of how factors interact to affect recovery odds and depression severity in different ways.

We find gender and chronicity to be significant across all samples in determining depression severity. Identifying as female and/or having a chronic condition were found to increase depressed affect.

For our sample separated by depression scores, we find that those with lower initial depression severity (scores 1-5) were impacted by different variables than those with more severe scores. Individuals with scores 1-5 were less likely to recover if they had experienced abuse as a child. On the other end, better financial well-being was associated with higher odds of recovery. For our Scores 6-7 sample, experiencing discrimination was found consistently to decrease recovery odds, suggesting race-related stressors are more impactful on depression than race itself. Increased social support

makes recovery more probable, as well as increased age. Finally, we find higher maternal education decreases recovery odds, which merits further investigation.

Our partnered/not-partnered dichotomy allowed us to analyze the protective effects of romantic partnership on depression. We find that for both groups, anxiety decreases recovery odds, while better financial health increases them. Apart from these two in common, we find different variables significant for each sample. For our partnered sample, childhood abuse and higher maternal education are both found to lower recovery chances. Better social support in the form of family and friends was also significant, but our results suggest it improves recovery odds. Discrimination was the only other variable found significant for our not-partnered sample. This suggests partnership might insulate against the stress associated with discrimination.

Overall, our research suggests that attention should be paid to both depression severity and partnership status. Both appear to influence which factors are significant—and insignificant—in determining who recovers from depression.

Appendix A

Full text of questions used to construct variables are included below, separated by variable. For each question, not responding was marked as "Refused/Missing."

DISCR:

Prequestion: "How often on a day-to-day basis do you experience each of the following types of discrimination:"

- M1-A1SS14A: "You are treated with less courtesy than other people?"
- M1-A1SS14B: "You are treated with less respect than other people?"
- M1-A1SS14C: "You receive poorer service than other people at restaurants or stores?"
- M1-A1SS14D: "People act as if they think you are not smart?"
- M1-A1SS14E: "People act as if they are afraid of you?"
- M1-A1SS14F: "People act as if they think you are dishonest?"
- M1-A1SS14G: "People act as if they think you are not as good as they are?"
- M1-A1SS14H: "You are called names or insulted?"
- M1-A1SS14I: "You are threatened or harassed?"

Response Options: "Often," "Sometimes," "Rarely," "Never" (Brim et al., 1995-1996).

EMA:

Prequestion: "Below, and on the next page, are three lists of things that happen to some children. After each list, please indicate how often your parents, siblings, or anyone else did things like this to you. (If a question does not apply because there was no such person in your family when you were growing up, circle 'does not apply'.

LIST A: Insulted you or swore at you; Sulked or refused to talk to you; Stomped out of the room; Did or said something to spite you; Threatened to hit you; Smashed or kicked something in anger."

- M1-A1SE17A: "During your childhood, how often did your mother, or the woman who raised you, do any of the things on List A to you?"
- M1-A1SE17B: "During your childhood, how often did your father, or the man who raised you, do any of the things on List A to you?"
- M1-A1SE17C: "During your childhood, how often did your brothers do any of the things on List A to you?"
- M1-A1SE17D: "During your childhood, how often did your sisters do any of the things on List A to you?"
- M1-A1SE17E: "During your childhood, how often did anybody else do any of the things on List A to you?"

Response Options: "Often," "Sometimes," "Rarely," "Never," "Does Not Apply" (Brim et al., 1995-1996).

PHYA:

Prequestion: "LIST C: Kicked, bit, or hit you with a fist; Hit or tried to hit you with something; Beat you up; Choked you; Burned or scalded you."

- M1-A1SE17K: "During your childhood, how often did your mother, or the woman who raised you, do any of the things on List C to you?"
- M1-A1SE17L: "During your childhood, how often did your father, or the man who raised you, do any of the things on List C to you?"

- M1-A1SE17M: “During your childhood, how often did your brothers do any of the things on List C to you?”
- M1-A1SE17N: “During your childhood, how often did your sisters do any of the things on List C to you?”
- M1-A1SE17O: “During your childhood, how often did anybody else do any of the things on List C to you?”

Response Options: “Often,” “Sometimes,” “Rarely,” “Never,” “Does Not Apply” (Brim et al., 1995-1996).

CHRON:

- M3-C1PA7: “Have you ever had heart trouble suspected or confirmed by a doctor?”
- M3-C1SA11D: “In the past twelve months, have you experienced or been treated for any of the following—ARTHRITIS, RHEUMATISM, OR OTHER BONE OR JOINT DISEASES?”
- M3-C1SA11X: “In the past twelve months, have you experienced or been treated for any of the following—DIABETES OR HIGH BLOOD SUGAR?”
- M3-C1SA11Z: “In the past twelve months, have you experienced or been treated for any of the following—STROKE?” (Ryff et al., 2013-2014).

ANX:

Prequestion: “Some people have physical reactions because of their worry. Thinking about the PAST 12 MONTHS, how often did you have each of the following reactions because of your worry? Include ONLY physical reactions that might have been caused by your worry, not those that were caused by something else.”

- M1-A1PA85A: “WERE YOU RESTLESS BECAUSE OF YOUR WORRY? (Would you say most days, about half the days, less than half the days or never?)”
- M1-A1PA85B: “WERE YOU KEYED UP, ON EDGE, OR HAD A LOT OF NERVOUS ENERGY? (Would you say most days, about half the days, less than half the days or never?)”
- M1-A1PA85C: “WERE YOU IRRITABLE BECAUSE OF YOUR WORRY? (Would you say most days, about half the days, less than half the days or never?)”
- M1-A1PA85D: “DID YOU HAVE TROUBLE FALLING ASLEEP? (Would you say most days, about half the days, less than half the days or never?)”
- M1-A1PA85E: “DID YOU HAVE TROUBLE STAYING ASLEEP BECAUSE OF YOUR WORRY? (Would you say most days, about half the days, less than half the days or never?)”
- M1-A1PA85F: “DID YOU HAVE TROUBLE KEEPING YOUR MIND ON WHAT YOU WERE DOING? (Would you say most days, about half the days, less than half the days or never?)”
- M1-A1PA85G: “DID YOU HAVE TROUBLE REMEMBERING THINGS BECAUSE OF YOUR WORRY? (Would you say most days, about half the days, less than half the days or never?)”
- M1-A1PA85H: “ERE YOU LOW ON ENERGY? (Would you say most days, about half the days, less than half the days or never?)”
- M1-A1PA85I: “DID YOU TIRE EASILY BECAUSE OF YOUR WORRY? (Would you say most days, about half the days, less than half the days or never?)”

- M1-A1PA85J: “DID YOU HAVE SORE OR ACHING MUSCLES BECAUSE OF TENSION? (Would you say most days, about half the days, less than half the days or never?)” (Ryff et al., 2013-2014).

FAM:

Note: They/them refers to members of the individual’s family not including spouse/partner.

Positively-worded:

- M1-A1SM2: “Not including your spouse or partner, how much do members of your family really care about you?”
- M1-A1SM3: “How much do they understand the way you feel about things?”
- M1-A1SM4: “How much can you rely on them for help if you have a serious problem?”
- M1-A1SM5: “How much can you open up to them if you need to talk about your worries?”

Response Options: “A lot,” “Some,” “A little,” “Not at all”

Negatively-worded:

- M1-A1SM6: “Not including your spouse or partner, how often do members of your family make too many demands on you?”
- M1-A1SM7: “How often do they criticize you?”
- M1-A1SM8: “How often do they let you down when you are counting on them?”
- M1-A1SM9: “How often do they get on your nerves?”

Response Options: “Often,” “Sometimes,” “Rarely,” “Never” (Brim et al., 1995-1996).

FRND:

Note: they/them refers to an individual's friends.

Positively-worded:

- M1-A1SM11: "How much do your friends really care about you?"
- M1-A1SM12: "How much do they understand the way you feel about things?"
- M1-A1SM13: "How much can you rely on them for help if you have a serious problem?"
- M1-A1SM14: "How much can you open up to them if you need to talk about your worries?"

Response Options: "A lot," "Some," "A little," "Not at all"

Negatively-worded:

- M1-A1SM15: "How often do your friends make too many demands on you?"
- M1-A1SM16: "How often do they criticize you?"
- M1-A1SM17: "How often do they let you down when you are counting on them?"
- M1-A1SM18: "How often do they get on your nerves?"

Response Options: "Often," "Sometimes," "Rarely," "Never" (Brim et al., 1995-1996).

SPSCORE:

Note: Questions not asked if respondent indicates they do not have a spouse/partner. For those cases, each question is labeled as "inappropriate." He/she refers to the individuals partner/spouse.

Positively-worded:

- M1-A1SP11: "How much does your spouse or partner really care about you?"

- M1-A1SP12: “How much does he or she understand the way you feel about things?”
- M1-A1SP13: “How much does he or she appreciate you?”
- M1-A1SP14: “How much can you rely on him or her for help if you have a serious problem?”
- M1-A1SP15: “How much can you open up to him or her if you need to talk about your worries?”
- M1-A1SP16: “How much can you relax and be yourself around him or her?”

Response Options: “A lot,” “Some,” “A Little,” “Not at all”

Negatively-worded:

- M1-A1SP17: “How often does your spouse or partner make too many demands on you?”
- M1-A1SP18: “How often does he or she make you feel tense?”
- M1-A1SP19: “How often does he or she argue with you?”
- M1-A1SP20: “How often does he or she criticize you?”
- M1-A1SP21: “How often does he or she let you down when you are counting on her?”
- M1-A1SP22: “How often does he or she get on your nerves?”

Response Options: “Often,” “Sometimes,” “Rarely,” “Never” (Brim et al., 1995-1996).

Appendix B

Table 8.1: Correlation Matrix for Independent Variables

Variable	GEN	AGE	A1PDEPRE	PFIN	RACE	DISCR	ANX	CHRON	FAM	FRND	MEDU	EMA	PHYA
GEN	1												
AGE	0.0125	1											
A1PDEPRE	0.0596	-0.1338	1										
PFIN	-0.068	-0.0015	-0.0019	1									
RACE	0.1449	-0.1143	-0.118	-0.1975	1								
DISCR	0.056	0.0783	0.0307	-0.2297	0.4231	1							
ANX	-0.15	0.1215	-0.0028	0.1416	-0.0715	-0.0513	1						
CHRON	0.0189	0.179	-0.0291	0.1728	0.032	-0.0387	0.1383	1					
FAM	0.0363	0.0909	0.1116	-0.0002	0.0579	0.0525	-0.0204	0.175	1				
FRND	0.1641	0.1099	0.0974	0.0257	-0.0292	0.1402	0.2189	0.0791	**0.6157**	1			
MEDU	-0.1134	-0.2297	0.1499	0.0837	-0.0772	-0.1633	-0.0779	0.2451	0.023	0.0183	1		
EMA	-0.0441	-0.1575	0.0176	-0.064	-0.17	-0.1224	-0.1787	0.034	-0.3022	-0.352	0.0208	1	
PHYA	-0.0095	-0.1717	-0.0783	-0.0582	-0.029	-0.1081	-0.0302	0.2135	-0.1128	-0.238	-0.0484	**0.5885**	1

Source: Generated by Author 1

Appendix C

In this appendix, we include the results of our regression done to correct for high VIF values. We bold any variables significant in determining the dependent variable.

Regression 1: Age as dependent variable

Table 9.1.1

AGE	Coefficient	Standard Error	t	P>t
GEN	-0.0650943	1.005473	-0.06	0.948
PFIN	2.608832	3.207975	0.81	0.417
RACE	-2.098356	2.203628	-0.95	0.342
DISCR	-1.440236	1.51421	-0.95	0.342
ANX	0.3580273	0.2753877	1.3	0.194
CHRON	**1.779724**	**0.9644802**	**1.85**	**0.066**
MEDU	**-1.174781**	**0.1941398**	**-6.05**	**0**
FF	2.049626	1.364029	1.5	0.134
PHEMA	**-1.837484**	**0.5557247**	**-3.31**	**0.001**
Constant	44.46478	4.795768	9.27	**0**

Source: Generated by Author

Regression 2: PFIN as dependent variable

Table 9.2.1

PFIN	Coefficient	Standard Error	t	P>t
GEN	-0.002124	0.0157569	-0.13	0.893
RACE	-0.0178673	0.0345618	-0.52	0.605
DISCR	-0.0155661	0.023744	-0.66	0.512
ANX	-0.0049129	0.0043179	-1.14	0.256
CHRON	-0.0187312	0.0151505	-1.24	0.217
MEDU	-4.57E-07	0.0031803	0	1
FF	**0.0796701**	**0.0210591**	**3.78**	**0**
PHEMA	-0.0102037	0.0088137	-1.16	0.248
AGE	0.0006407	0.0007879	0.81	0.417
Constant	0.3278125	0.0812754	4.03	0

Source: Generated by Author

Regression 3: FF as dependent variable

Table 9.3.1

FF	Coefficient	Standard Error	t	P>t
GEN	-0.0026249	0.0369837	-0.07	0.943
RACE	0.0358418	0.0811277	0.44	0.659
DISCR	-0.0202277	0.0557507	-0.36	0.717
ANX	**-0.0335621**	**0.0100096**	**-3.35**	**0.001**
CHRON	-0.045682	0.0355542	-1.28	0.2
MEDU	-0.0021633	0.0074638	-0.29	0.772
PFIN	**0.4388949**	**0.1160126**	**3.78**	**0**
PHEMA	**-0.0845426**	**0.0202805**	**-4.17**	**0**
AGE	0.002773	0.0018455	1.5	0.134
Constant	2.829213	0.1327571	21.31	0

Source: Generated by Author

Appendix D

Model 1

Initial Model 1:

Table 10.1.1: VIF and Tolerance Values, Model 1

Variable	VIF	Tolerance
GEN	3.08	0.32487
RACE	1.15	0.872443
DISCR	1.14	0.873628
ANX	1.13	0.883712
PFIN	17.55	0.056992
AGE	14.9	0.067094
SPSCORE	20.29	0.049288

Source: Generated by Author

We modify the model by removing AGE and SPSCORE to yield the final model:

Table 10.1.2: VIF and Tolerance Values, Final Model 1

Variable	VIF	Tolerance
GEN	2.96	0.338218
RACE	1.13	0.884905
DISCR	1.14	0.879771
ANX	1.1	0.905756
PFIN	3.01	0.331882

Source: Generated by Author

Model 2

Initial Model 2:

Table 10.2.1: VIF and Tolerance Values, Model 2

Variable	VIF	Tolerance
GEN	3.02	0.331227
RACE	1.16	0.865717
DISCR	1.16	0.864557
ANX	1.13	0.883493
CHRON	2.06	0.485241
MEDU	5	0.199959
PHEMA	5.08	0.196993
PFIN	16.23	0.061614
SPSCORE	20.7	0.048299

Source: Generated by Author

We modify the model to get the final model as follows:

Table 10.2.2: VIF and Tolerance Values, Final Model 2

Variable	VIF	Tolerance
GEN	2.92	0.342702
RACE	1.15	0.871804
DISCR	1.15	0.867887
ANX	1.13	0.88379
CHRON	2.05	0.487126
MEDU	5.01	0.199767
PHEMA	5.06	0.197563
SPSCORE	8.32	0.120254

Source: Generated by Author

Model 3

Initial Model 3:

Table 10.3.1: VIF and Tolerance Values, Model 3

Variable	VIF	Tolerance
GEN	3.1	0.322795
RACE	1.14	0.878211
DISCR	1.14	0.875516
FF	27.81	0.035958
MEDU	5.27	0.189858
CHRON	1.99	0.502835
SPSCORE	24.05	0.041572

Source: Generated by Author

We remove SPSCORE and keep our Model 3 as it was originally.

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