

WELFARE PARTICIPATION AND DEPRESSION AMONG
YOUTH AND YOUNG ADULTS IN THE UNITED STATES AND CHINA

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ABSTRACT

SHIYOU WU: Welfare Participation and Depression
Among Youth and Young Adults in the United States and China
(Under the direction of Dr. Mark W. Fraser)

Globally, depression is one of the most common mental disorders among youth and young adults, occurring at similar rates in countries with dissimilar cultures, such as the United States and China. Despite cultural differences, both the United States and China have systems of public welfare that create a social safety net and provide at least a minimal standard of living. Although many studies have documented the prevalence of mental health issues among adult welfare recipients, little empirical research has examined the prevalence of depression among youth and young adults who were raised in welfare recipient families. To address this gap in the knowledge, this dissertation uses welfare participation as a marker of low socioeconomic status with the aim of creating a nuanced understanding of the relationship between welfare participation and youth depression in the United States and China.

The first paper presents a systematic review of 15 reports that evaluated the relationship of welfare participation with the prevalence of youth depression in the United States. Results from four descriptive studies had mixed findings, whereas the remaining comparison studies consistently showed an association between welfare participation and elevated risk of depression.

The second paper used the U.S. Add Health data to investigate the relationship between childhood welfare participation and depression during young adulthood. Results

showed childhood welfare participation to be positively related to self-reported depression score in young adulthood. However, no significant relationship between childhood welfare participation and clinical diagnoses of depression was observed. Additionally, subgroup analyses (i.e., by poor, near-poor, and non-poor groups and by gender) indicated that the higher depression scores were significant only for the poor group, whereas only the near-poor group had a significantly higher probability of being diagnosed with depression. Moreover, female young adults raised in families that received welfare had significantly higher depression scores.

The third paper used data from a national survey conducted in China to examine the relationship between participating the *Dibao* welfare program and depression among Chinese youth. Results showed that Dibao-recipient youth had significantly higher depression scores compared to non-recipient youth. Moreover, subgroup analyses showed significantly higher depression scores among 4 groups of Dibao-recipient youth: those living in rural areas, those with a child, females with a child, and rural female with a child.

Overall, the findings presented across these 3 papers are consistent and suggest youth from welfare recipient families have a higher vulnerability to depression. Each of the papers includes a discussion of the implications for social work practice and future research.

To Mom and Dad, my four sisters, Qi, Kairui, and Kaixi.

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LIST OF ABBREVIATIONS

Add Health	National Longitudinal Study of Adolescent to Adult Health
AFDC	Aid for Families and Dependent Children
BSI	Brief Symptom Inventory
CBHSQ	Center for Behavioral Health Statistics and Quality
CDI	Children's Depression Inventory
CES-D	Center for Epidemiologic Studies Depression scale
CFPS	China Family Panel Studies
CHIP	Children's Health Insurance Program
CMS	Centers for Medicare & Medicaid Services
DAWBA	Development and Well-Being Assessment Inventory
DHHS	Department of Health and Human Services
DIS	Diagnostic Interview Schedule
DSM	Diagnostic and Statistical Manual of Mental Disorders
HSCD	Hopkins Symptom Checklist Depression
ICD	International Classification of Diseases
MAR	Missing at Random
MDE	Major Depressive Episode
MHS	Military Health System
NLSY	National Longitudinal Survey of Youth
NSDUH	National Survey on Drug Use and Health
OLS	Ordinary Least Squares
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PSM	Propensity Score Matching
SDH	Social Determinants of Health

SES	Socioeconomic Status
SLE	Systemic Lupus Erythematosus
SNAP	Supplemental Nutrition Assistance Program
SSI	Supplemental Security Income program
TANF	Temporary Assistance for Needy Families
VA	Department of Veterans Affairs
WHO	World Health Organization
WIC	Women, Infants, and Children

INTRODUCTION

WELFARE PARTICIPATION AND DEPRESSION AMONG YOUTH AND YOUNG ADULTS IN THE UNITED STATES AND CHINA

Internationally, about 6% of adolescents are affected by depression (Dolle & Schulte-Körne, 2014). Increasingly, depression among the younger population of children, youth, and young adults is becoming a serious public health issue and social problem in many countries. For example, in the United States, nearly 3.6 million youths and young adults (ages 18 to 25 years; about 10.3% of this age sector population), had a major depressive episode within the past year that met the criteria of the *Diagnostic and Statistical Manual of Mental Disorders* (4th edition; American Psychiatric Association, 1994; Center for Behavioral Health Statistics and Quality, 2016). Similar rates of depression have been reported in China, where the prevalence of depression among children and youth was estimated at 15.4% of the youth population (Li, Chen, Zhao, & Xu, 2016). Depression is a leading cause of youth suicide in China, with suicide ranking as the top reason for premature mortality by injury (Zhang et al., 2010).

Although a large body of research has examined various risks and causes of depression, only recently have researchers begun to examine the links between welfare participation and youth depression. Social science researchers routinely use welfare participation as a marker for low socioeconomic status (SES) because eligibility for welfare programs indicates a poverty-level income, which usually means the recipients also live in neighborhoods frequently characterized as having poor-quality housing, high rates of safety problems, and limited access to services. Despite the immediate benefits afforded by

participating in public welfare programs, a growing number of studies suggest that welfare participation is related to a variety of negative mental health outcomes (e.g., Auerbach & Beckerman, 2011; Cheng, 2007; Gao, 2017; Gibson et al., 2009; Lehrer, Crittenden & Norr, 2002). For example, about 1 in 4 low-income persons who qualify for Medicaid also suffer from a mental health or behavioral health disorder (Centers for Medicare & Medicaid Services, 2017). Pavetti and colleagues (2010) examined data from the 2003 Medicaid eXtract files of female Medicaid recipients (19 to 64 years) and found these welfare recipients had an extremely high rate of depression. Specifically, 32% of Medicaid recipients who also qualified for the Supplemental Security Income program (SSI; $N = 65,303$) and 30% of these who also received income support through the Temporary Assistance for Needy Families (TANF; $N = 22,691$) reported a mental disorder such as major depression, affective psychoses, or other depressive disorders (e.g., bipolar disorder, psychotic depression, or seasonal affective disorder).

Similarly, research conducted in China with recipients of Dibao showed that welfare recipients reported lower subjective well-being and were more likely than non-recipients to be unhappy about their life situation (Gao, 2017). In addition, Chinese children from Dibao welfare recipient families generally had a higher psychological burden (e.g., feeling pressure or stressed; Han, 2012; Li & Walker, 2016).

However, the literature has primarily focused on the overall population of welfare recipients, and little research has examined the relationship between welfare participation and depression among the younger population. Therefore, to fill this research gap, this dissertation sought to examine the relationship between welfare participation and depression among youth and young adults, specifically focusing on the United States and China.

Organization of the Dissertation

This dissertation uses a three-paper format to examine the relationships between welfare participation and depression. The first paper “Welfare Participation and Depression Among Youth in the United States: A Synthesis of the Evidence,” is a systematic review of peer-reviewed journal articles and gray literature published between January 1, 1997 and March 1, 2017. The literature search identified 15 reports (four descriptive studies, 11 comparison studies) relevant to welfare participation and the prevalence of youth depression. The four descriptive studies reported mixed findings regarding the prevalence of depression among youth. However, the remaining comparison studies showed consistent findings that participation in welfare programs was associated with a higher vulnerability for depression.

The second paper, “Exploring the Relationship Between Welfare Participation in Childhood and Depression in Adulthood in the United States” examines the relationship between welfare and young adult depression in the context of the United States. This study used Wave I and Wave IV Add Health data to examine the relationship between participating in welfare programs during childhood (before age 18 years) and experiencing depression during young adulthood (24 to 34 years). The study used propensity score matching to reduce the potential of selection bias. Results showed childhood welfare participation was related to significantly higher depression scores as self-reported by young adults; however, no statistically significant relationship was found between childhood welfare participation and clinical diagnoses of depression. In addition, results of the subgroup analyses showed that only the lowest income group (i.e., the study’s *poor* group) had significantly higher depression scores, whereas only the near-poor group had a significantly higher probability of being diagnosed with depression. Moreover, the results showed differences by gender, with

significantly higher depression found for the female subgroup of young adults from welfare participant families.

The third paper, “Exploring the Relationship Between Welfare Participation and Depression Among Youth in China,” examines the welfare-depression relationships in the context of the Chinese Dibao welfare system. This study used survey data from the 2012 China Family Panel Studies to examine the relationship between Dibao participation and occurrence of depression among youth (16 to 24 years) in China. This study used a propensity score matched sample to test the robustness of the main analytic results.

Additionally, nine subgroup analyses were conducted to provide nuanced understanding of the relationship between welfare receipt and youth depression. Results showed that youth from Dibao-recipient families had significantly higher depression scores than their non-recipient counterparts. Results from the subgroup analyses showed that rural Dibao youth, Dibao youth with a child, female Dibao youth with a child, and rural female Dibao youth with a child had significantly higher depression scores.

The combination of the three papers presented in this dissertation make an important contribution to understanding the correlates of participating in welfare programs. Using welfare as a poverty marker can help researchers identify vulnerable, at-risk populations, especially those with elevated risk factors associated with depression. In addition, the studies presented fill important gaps in the depression literature regarding the relationship between welfare participation in childhood and depression in later adolescent and young adult stages. This dissertation also discusses the potential implications of the welfare-depression relationship for policy makers, researchers, and social work practitioners in the United States and China.

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PAPER I

WELFARE PARTICIPATION AND DEPRESSION AMONG YOUTH IN THE UNITED STATES: A SYNTHESIS OF THE EVIDENCE

Background: Welfare programs, including health-related programs, play important roles in the lives of vulnerable populations. Income assistance programs often allow those with limited or no income to have access to health care. However, since their inception, welfare programs have been accompanied by contentious debate about their impact on the wellbeing of participants and, hence, about their collective value as a strategy for alleviating poverty. **Objective:** This study uses welfare participation as a marker of lower socioeconomic status to identify and synthesize the relationship between welfare participation and depression among youth. **Method:** A systematic review was undertaken following the PRISMA guidelines, and the review protocol was registered on Prospero (CRD42017056645). Relevant literature published between 1997 and 2017 was identified through a search of 9 electronic databases, and the Google search engine was used to identify the grey literature on relevant topics. Once identified, the literature was screened using a priori eligibility inclusion and exclusion criteria. **Results:** The searches yielded 1,798 citations. After screening the abstracts, 160 reports were retained for a full-text review. Of these, 15 reports met criteria for study inclusion. **Conclusions:** Four descriptive studies reported mixed findings. Of the 11 comparison studies, 10 studies showed consistent findings that participation in welfare programs was associated with a higher vulnerability for depression. However, one study compared welfare recipients with non-welfare recipients among highly vulnerable populations (i.e., homeless youth), and found participating in welfare programs was associated with lower risk for depression, but the difference was not statistically significant at the 95%

level. Discussion includes the effects of stigma related to welfare and mental health treatment, and the implications for policy makers, social workers, and future research.

Welfare Participation and Depression Among Youth in the United States: A Synthesis of the Evidence

Introduction

In most Westernized developed countries, social welfare resources and benefits are primarily controlled by the government, whereas the U.S. social safety network of welfare programs includes federal and private resources (e.g., private agencies as well as social welfare programs managed by government-supported private sector entities; Garfinkel, Rainwater, & Smeeding, 2010; Hacker, 2002). Social welfare programs reflect a nation's attitudes and sense of responsibility to care for its citizens. Moreover, welfare programs, and particularly health-related welfare programs (e.g., the U.S. Medicaid program), play important roles in the lives of vulnerable, low-income population. Health care programs are designed to allow the economically disadvantaged and other vulnerable populations to have access to basic health care.

Health care systems take many forms around the world. Many developed countries (e.g., the United Kingdom, Canada, Australia, and most of the North European countries) have implemented systems of universal access that enable all citizens to access basic medical care. In contrast, U.S. health care is based on a fee-for-services model with payment through a third-party (insurance) or out-of-pocket payment by patients without insurance. Federal health care spending is targeted to low-income persons and older adults. Historically, middle- and working-class Americans relied on health care insurance that was available through their employers (Garfinkel et al., 2010), but the escalating cost of insurance has led many employers to eliminate this benefit. The costs of health care through employer-provided health insurance are considerably higher than the costs of equivalent care through a universal health care system. In fact, although the United States spends more on health care than any other nation, the country has “the trifecta of high cost, unequal access, and often below average outcomes compared to

other highly developed nations” (Boston University, n.d.). The U.S. system of health care has led to high rates of uninsured or underinsured people who have to forego or delay needed medical care because they are unable to afford the cost (Baribault & Cloyd, 1999). Since 2010, the Patient Protection and Affordable Care Act was released to increase health insurance coverage and reduce the costs of medical care, yet still about 8.9% U.S. people (24.3 million) have barriers to access health care (U.S. Department of Health and Human Services, 2016). To ensure all people have access to health care while controlling for reasonable, realistic costs is a complex and difficult issue. Each health care system has advantages and disadvantages. Since the inception of the first social welfare programs in America, the debate among researchers and politicians has not stopped regarding the poverty alleviation functions of social welfare programs.

On the one hand, statistical data from Western countries has shown welfare programs such as old-age pensions and unemployment compensation have been effective in helping some of the most vulnerable to maintain a basic standard of living whether they are too old to continue in the workforce or facing temporary unemployment status (Piven & Cloward, 1993). In the United States, health care-related welfare programs such as Medicaid and the Children’s Health Insurance Program (CHIP) provide health insurance to more than 70 million economically disadvantaged or disabled Americans (Centers for Medicare & Medicaid Services [CMS], 2017). A centerpiece of the 2010 Patient Protection and Affordable Care Act (2010) was the expansion of health coverage through Medicaid and CHIP. Although only 31 of 50 states chose to expand Medicaid, this expansion reduced the percentage of uninsured Americans from 16% in 2010 to 8.9% in 2016 (CMS, 2017). However, the Affordable Care Act is in jeopardy, and if the Congress repeals the Act, millions of Americans who have access to affordable health coverage

through the Medicaid expansion will lose their access to health care.

In addition to health care coverage, welfare programs in different countries provide various types of basic living assistance to recipients ranging from cash to job skills training. For example, cash welfare payments are provided by the Chinese Dibao program, which is also called the Minimum Living Standard Program, whereas some U.S. welfare programs provide food and nutrition service (e.g., the U.S. Supplemental Nutrition Assistance Program [SNAP; formerly Food Stamps]), public housing, and job-skills training (e.g., Work First programs).

Despite the varied types of welfare programs, many researchers have pointed out the failure of welfare programs to bring sustainable solutions to reducing poverty (DiNitto & Johnson, 2016). For example, in the United States, researchers found that although the U.S. government spent in excess of \$1 trillion annually to fund more than 100 welfare programs to fight poverty, the current U.S. poverty rate is one of the highest among developed countries (Organisation for Economic Co-operation and Development, 2017). Indeed, since the 1996 welfare reform efforts, the U.S. poverty rate has not fallen below 11% (Tanner, 2012). In addition, an increasing number of studies have found strong associations between participating in welfare programs and risk factors such as overweight and obesity (Baum, 2011); marginalized and unsafe neighborhoods (Massey, Gross, & Eggers, 1991; Oreopoulos, 2003), and elevated exposure to crime (e.g., high crime rates in public housing units; Oreopoulos, 2003). Therefore, using welfare participation as marker of lower socioeconomic status (SES) helps to identify recipients' risk factors for negative health and mental health outcomes that have significant implications for policy makers and poverty alleviation practitioners.

Mental Health Sequelae of Welfare Participation

Many studies have documented the prevalence of mental health issues (e.g., depression) among welfare recipients, and have examined the relationship between welfare participation and mental health outcomes. This body of research has primarily focused on health care related welfare programs such as the U.S. Medicaid. Notably, about 1 in 4 low-income persons who qualify for Medicaid also suffers from a mental health or behavioral health disorder (CMS, 2017). Overall, Medicaid recipients have significantly higher rates of both schizophrenia and depression than the general population (Berg et al., 2014). Medicaid plays an important role in providing access to mental health services for those who would otherwise be unable to afford treatment. Medicaid is the single largest payer for U.S. mental health treatments, and the Medicaid program is playing an increasing role in providing access to substance-use treatment (CMS, 2017). In addition, Medicaid plays a critical role in maternal and child health by covering half of all U.S. births and helping low-income women access mental health services to help with perinatal maternal depression (CMS, 2017; DiNitto & Johnson, 2016).

Despite the benefits afforded by participating in welfare programs, an increasing number of studies have observed a positive correlation between welfare participation and negative mental health outcomes (e.g., Auerbach & Beckerman, 2011; Cheng, 2007; Dooley & Prause, 2002; Gibson et al., 2009; Lehrer, Crittenden & Norr, 2002; Petterson & Friel, 2001). For example, Pavetti and colleagues (2010) examined data from the 2003 Medicaid eXtract files of female (19 to 64 years) Medicaid recipients and found these welfare recipients had an extremely high rate of depression. Specifically, 32% of Medicaid recipients who also qualified for the Supplemental Security Income program (SSI; $N = 65,303$) and 30% of these who also received income support through the Temporary Assistance for Needy Families (TANF; $N = 22,691$) reported a mental

disorder such as major depression, affective psychoses, or other depressive disorders (e.g., bipolar disorder, psychotic depression, or seasonal affective disorder).

The prevalence of depression among various groups, including Medicaid recipients, was also the focus of a comparison study (Gibson et al., 2009) conducted with participants (5 to 54 years) with health care insurance from four major U.S. systems: the military health system (MHS; $n = 2,963,987$), the Department of Veterans Affairs (VA; $n = 2,114,739$), Medicaid recipients ($n = 5,554,974$), and employer-sponsored commercial plans ($n = 5,212,833$). This study found significantly higher rates of severe mental disorders among the Medicaid recipients (10.7%) and VA (10.7%) group as compared with the MHS (2.6%) and commercial plans (2.4%) groups. Gibson et al. (2009) also compared the major depression rates among these four groups and found that VA group had the highest prevalence (10.7%), followed by Medicaid (7.7%), MHS (5.5%), and employer-sponsored commercial plans (4.1%) groups. Auerbach and Beckerman (2011) conducted a similar group comparison, using cross-sectional data collected from patients with systemic lupus erythematosus (SLE, age range from early 20s to more than 60 years, $n = 378$), and found that patients' type of insurance (i.e., Medicaid, Medicare, private insurance, and no insurance) was significantly associated with depression and anxiety. Specifically, uninsured SLE patients had the highest levels of depression and anxiety, followed by the patients with Medicaid, then patients with private insurance, and last, patients with Medicare coverage.

Although these studies have shown higher rates of depression or depressive symptoms among Medicaid participants, that relationship is likely due to the debilitating effects of mental illness, which often make it challenging for a person to maintain employment. Thus, a greater number of people with severe mental illness are likely to be in the low-income strata, making

them eligible to receive Medicaid. What is less clear in the research is the relation of participation in other welfare programs such as TANF with the mental health of recipients.

Cheng's (2007) study shed light on the relationship between participating in TANF and psychological well-being among parents (M age = 36; n = 19,011). His study found that compared with parents never enrolled in TANF (n = 17,207), parents who were current or former TANF recipients (n = 1,804) had higher levels of psychological distress. This finding is consistent with that of Dooley and Prause's (2002) study, which investigated differences in rates of depression between women participating in the Aid for Families and Dependent Children¹ (AFDC; n = 347) and those not participating in AFDC (n = 3,331). Dooley and Prause found participating in the AFDC welfare program (income assistance) was associated with higher scores on a standardized measure of depression (i.e., Center for Epidemiologic Studies Depression scale [CES-D], Radloff, 1977).

Studies have also shown demographic differences regarding prevalence of mental disorders among welfare recipients. For example, females, especially those of childbearing age or pregnant, comprise a high-risk population for depression (Danziger et al., 2001; Orr et al., 2007). In addition, White welfare recipients reported higher levels of depression than African American recipients (dosReis et al., 2001; Richardson et al., 2003). Moreover, people with low SES were found to have higher risk of mental illness than those with higher SES (Gilman et al., 2002; Hudson, 2005).

Given the rich body of empirical studies in this research area, summarizing the available

¹ Aid to Families with Dependent Children (AFDC) was a federal assistance program created in 1935 by the Social Security Act. AFDC provided financial assistance to children whose families had low or no income. The program ended with the 1996 welfare reforms under the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA). The PRWORA reforms replaced AFDC with the assistance program Temporary Aid for Needy Families (TANF) that instituted lifetime caps on program participation and work requirements for recipients.

evidence on the mental health outcomes among welfare recipients can be helpful to generating a better understanding of the relationship of welfare participation with recipients' mental health outcomes. Therefore, this author undertook a systematic review to identify and synthesize the findings regarding the relationships between welfare participation and mental health outcomes and prevalence of mental health disorders. Further, to increase the specificity of this review, the author chose to narrow the focus to the population of youth welfare recipients and mental health outcomes of depression or depressive symptoms.

Methods

This systematic review followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. Before conducting the data search, a systematic review protocol for the current study was developed and published with PROSPERO International (CRD 42017056645), which is a prospective register of systematic reviews hosted at the Centre for Reviews and Dissemination at the University of York in the United Kingdom.

Search Terms and Databases

Based on consultation with a health sciences reference librarian, the following search terms were used to identify studies: (*“welfare*” OR “welfare participation” OR “welfare use” OR “welfare recipients” OR “receive welfare benefits” OR “AFDC” OR “TANF” OR “Food Stamp” OR “Aid to Families with Dependent Children” or “Temporary Assistance for Needy Families” OR “Medicaid” OR “Supplemental Security Income food and nutrition programs”*) NOT (*“Child welfare”*) AND (*“depressi*”*).

Given that this dissertation focused on social welfare and depression and depressive outcomes, social sciences and health related databases were expected to yield the bulk of studies for this review. Therefore, the following nine social sciences and health-related databases were

identified for this search: ASSIA (Applied Social Sciences Index and Abstracts), PsycINFO, Social Work Abstracts, Social Services Abstracts, Sociological Abstracts, SSCI (Social Sciences Citation Index), CINAHL (Cumulative Index to Nursing and Allied Health Literature), Global Health, and PubMed. In addition, a search of the gray literature and unpublished reports was conducted via Google that used “welfare participation depression youth” as the search term.

Criteria for Considering Studies for this Review

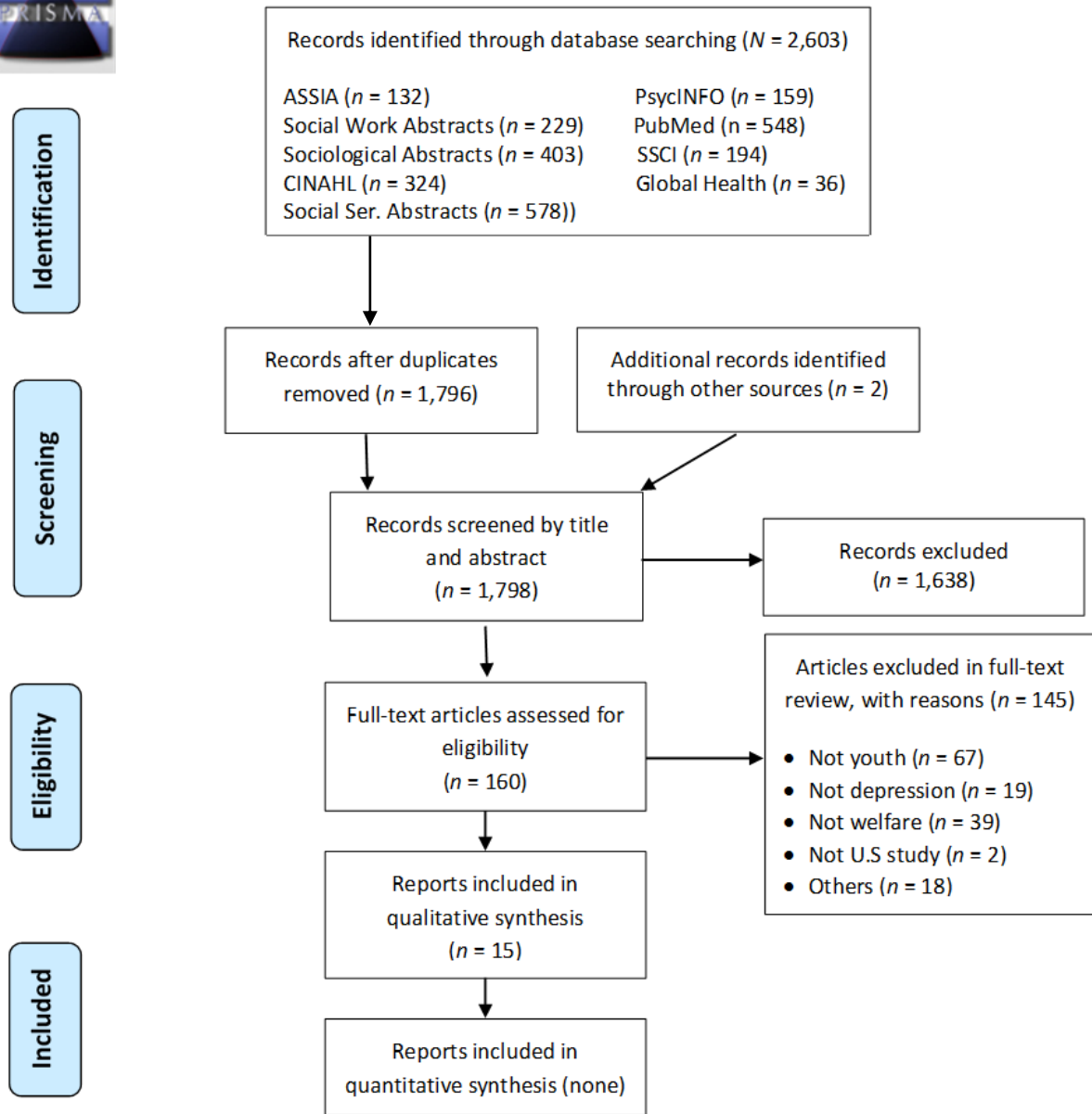
To identify studies addressing the associations between welfare participation and depression outcomes among youth, a priori eligibility inclusion and exclusion criteria were developed to guide the screening process. These criteria were related to the type of study, type of participants, and type of welfare program; each of these criteria is discussed below. Search results were first screened by title and abstract, and studies that clearly did not meet any of the following eligibility criteria were removed.

Types of studies. All empirical studies describing the effects or correlations of welfare participation on youth depression or depressive symptoms outcomes, or examining the relationships between welfare participation and depression among youth were included in this review. This systematic review included studies in English published between January 1, 1997 (i.e., after the 1996 welfare reform) and March 1, 2017.

Types of participants. This review focused on youth, adopting the U.S. Bureau of Labor Statistics (2016) definition of youth as those between ages 16 and 24 years. These age parameters were used to screen studies given the inconsistent definition of youth across studies, with those within this age range alternately labeled as youth, adolescents, or young adults.



Figure 1.1 PRISMA flow diagram of screening and selection



Types of welfare programs. Public welfare is a broad concept, and therefore, this review considered a wide range of welfare programs (i.e., any form of public assistance) funded by federal, state, or local governmental entities in the United States. These programs ranged from loosely organized, general welfare programs to highly structured, bureaucratic welfare programs

such as TANF, SNAP, and Medicaid.

Data Extraction and Management

As shown in Figure 1.1, the searches of the nine databases yielded 2,603 studies; after removing duplicate studies, 1,796 articles were retained for a title and abstract review via RefWorks (a Web-based software package for reference management). In addition, the Google search yielded two reports from the gray literature. After the initial review, 1,638 records were excluded using the inclusion and exclusion criteria, and 160 articles were retained for a full-text review. Based on the full-text review, 15 research reports were included in the final systematic review.

Study characteristics were extracted from each identified report and data were managed using Microsoft Excel 2013. The following characteristics were collected: research purpose; setting; name of welfare program; measure used to assess depression; depression prevalence; sample description; sample size; participants' age, race/ethnicity, and gender; research dataset; number of data collection waves; analytical strategies; and findings about welfare effects on depression or correlation between welfare participation and depression outcomes.

Results

Characteristics of Studies

Of the 15 studies included in this review (see Table 1.1), two studies used nationally representative samples (Dooley & Prause, 2002; Rhee et al., 2005), five studies included statewide-representative samples (Bachman et al., 2015; Kalil, Born, Kunz, & Caudill, 2001; Olfson et al., 2011; Richardson et al., 2003; Sullivan & DeCoster, 2001). About half of the included studies ($n = 8$; 53%) focused on urban settings (see Table 1.1, column 3), whereas only one study was conducted in a suburban location (dosReis et al., 2001), and one study included

both rural and urban settings (Cook et al., 2004).

Welfare Programs

Of the 17 reviewed reports, four studies reported multiple welfare programs (e.g., Medicaid, SSI, AFDC, or WIC; Bachman et al., 2015; Buckner, Bassuk, Weinreb, & Brooks, 1999; Cook et al., 2004; dosReis et al., 2001). Three studies focused on a general concept of welfare programs (Go, 1998; Knab, Garfinkel, & McLanahan, 2006; Rhee et al., 2005). Two studies examined the relationship of participating in a medical coverage welfare program (e.g., Medicaid) on depression among youth participants (Olfson et al., 2011; Richardson et al., 2003). Similarly, Bachman et al. (2015) studied the association between Medicaid participation and youth depression, but for a specific Medicaid program—the Family Opportunity Act Medicaid Buy-In Program (FOA)—tailored for Louisiana. Notably, only one study examined the relationship between participating in a public housing program and the mental health of youth (Nebbitt et al., 2014).

Five studies documented a relationship between either the AFDC or TANF income assistance welfare programs and youth depression. Of these five studies, three studies focused on the AFDC program, which was in operation from 1935 to 1996 when superseded by TANF (Dooley & Prause, 2002; Kalil et al., 2001; Pande, 2014). One study focused on the relationship between TANF and youth depression (Sullivan & DeCoster, 2001), and one study was conducted during the period of welfare reform, and thus, documented the relationship of both the AFDC and TANF programs to youth mental health (Gavin et al., 2011).

Characteristics of Participants

Shown in Table 1.1, the majority of reviewed studies included a large sample size, with only three studies using a sample of less than 200 participants (Bachman et al., 2015; [$n = 52$];

Gavin et al., 2011; [$n = 173$]; Sullivan & DeCoster, 2001; [$n = 127$]). As mentioned, this review focused on the mental health outcomes of youth 16 to 24 years old. However, the reviewed studies were inconsistent in the age range used to define youth. As shown in Table 1.1, of these 15 studies, youth was broadly defined as spanning ages 12 to 19 years.

Gender distribution in study samples. Most samples examined in the reviewed studies were composed primarily of female participants. Seven of the 15 studies were gender specific and used female-only samples (e.g., Cook et al., 2004; Dooley & Prause, 2002; Gavin et al., 2011; Kalil et al., 2001; Knab et al., 2006; Pande, 2014; Sullivan & DeCoster, 2001). In the remaining 8 studies, females composed at least half of the study sample.

Across the 15 studies, participants tended to be part of the general population, and a majority studies included samples composed of racially and ethnically diverse groups, including White, Black, Hispanic, and other racial/or ethnic groups. One study focused on immigrant adolescents from Southeast Asia living in California, and identified the Asian subgroups in the sample, including Hmong, Chinese, (Laotian-) Mien, Vietnamese, and Lao/Cambodian (Go, 1998). Only two studies specifically focused on African Americans (Nebbitt et al., 2014; Sullivan & DeCoster, 2001). However, two studies did not report the race/ethnicity of participants (Bachman et al., 2015; Knab et al., 2006).

Table 1.1

Summary of Findings From 15 Studies Included in Systematic Review^a

Source	Study Purpose	- Settings - Welfare Program	Sample	- Sample Size; - Gender (% F) - Race (Total) - Age	- Data - Waves	Analytic strategies	Findings ^b
<i>(a) Descriptive Studies (n = 4)</i>							
1. Cook, et al., 2004	To estimate the prevalence of posttraumatic stress disorder and its treatment in economically disadvantaged pregnant women.	- In 5 counties in rural Missouri and the city of St. Louis - Multiple (Pregnant Medicaid-eligible women at WIC [Women, Infants, and Children], SNAP[Supplemental Nutrition Assistance Program], and Medicaid)	WIC, SNAP enrollment at any point in their pregnancy, included being pregnant, having (or being eligible for) Medicaid coverage of health services, and being able to speak English. Age ≥13.	- 744; - 100%; - 57.5% B; 42.5% W; - M:22; median: 21	- Survey interviews - Cross-sectional; (2/2000-8/2001)	Descriptive statistics; T-test; and χ^2 regression models	11% met major depression criteria; - Most prevalent comorbid diagnoses was major depressive episode (24 of 57, 42.2%). - Pregnant women with PTSD had 5 times the odds of having a major depressive episode than women without PTSD.
2. dos Reis et al., 2001	To determine extent of mental health service use of Medicaid child sample and if service use or psychotropic medication treatments differ with respect to	- Populous suburban county of a mid-Atlantic state during 1996 - Multiple (Medicaid; SSI)	The population of continuous and non-continuous Medicaid enrollees younger than 20 years	- 15,507 (301 Foster care; 775 SSI; 14,422 Other Aid); - Foster care (50%) SSI (64%) Other Aid (65%); - Foster care (35%W; 46%B;	- Population-based, 12-month service claims and related medication files	Descriptive	- Prevalence of depression was 15% in foster care group; 7% in SSI group; and 0.7% in Other Aid grp. - Of Medicaid youth, Whites were 1.9 times more likely to be diagnosed with

Source	Study Purpose	- Settings - Welfare Program	Sample	- Sample Size; - Gender (% F) - Race (Total) - Age	- Data - Waves	Analytic strategies	Findings ^b
	children's Medicaid category of assistance?	(Supplemental Security Income); Other aid [e.g., AFDC (Aid for Families and Dependent Children), WIC])		19%O); SSI (48%W; 18%B; 34%O) - Other Aid (22%W; 43%B; 35%O) - 0-19 (15-19: Foster care 27%; SSI 21%; Other Aid 8%)	- 1-year cross-sectional (1996)		depression than Blacks; but among SSI group, Blacks were 1.7 times more likely to be diagnosed with depression than Whites.
3. Nebbitt et al., 2014	How do African American youths rate their (a) self-efficacy and (b) depressive symptoms?	- New York City; Washington, DC; St. Louis; Philadelphia - Public housing	All African American adolescents residing in public housing developments in the target cities.	- 782; - 48%; - 100% Black - M: 15.5 (11-20)	- Admin. data from local housing authorities in each city - One wave: (2006-2008)	Descriptive statistics and mean comparisons	- Overall, the mean depression score of Black adolescents residing in public housing was 17.4 (cutoff depression scores: >=16). - Male (M=18.5) youth reported significantly higher ($p < .05$) depressive scores than females (M=16.6).
4. Richardson et al., 2003	To determine the prevalence of depression in a statewide Medicaid youth population, and; To explore whether racial or ethnic disparities exist with respect to diagnosis and treatment of	- Washington State - Medicaid	Youth <19 in families with incomes <200% FPL and were continuously enrolled in Medicaid from 1997 to Dec 1998.	- 192,441; - 49%; - 60% W; 7% B; 15% H; 33% Others - 5-10: 56%; 11-14: 29%; - 15-18: 15%.	- Medicaid claims data - Cross-sectional (7/1997-12/1998)	Descriptive statistics; χ^2 ; regression models	- 2% Medicaid youth had a depression claim at some time during the study period. - Depression prevalence increased with age group, 15-18 years group had the highest depression rates, followed by 10-14 years group, and 5-10 years group.

Source	Study Purpose	- Settings - Welfare Program	Sample	- Sample Size; - Gender (% F) - Race (Total) - Age	- Data - Waves	Analytic strategies	Findings ^b
	depression.						- Among the youngest group (5-10 years), males had 2 times higher depression diagnoses rates than females. This rate was reversed in the oldest group (15-18 year), with females having 2 times higher rate of depression diagnoses than males. - Compared with White youth, youth from ethnic minority groups (except Native Americans) had lower risk of depression.
(b) Comparison Studies (n = 11)							
5. Bachman et al., 2015	To provide information about the characteristics of program enrollees, and the impact of the Family Opportunity Act (FOA), a Medicaid Buy-In program on families of the National Survey of Children with Special Health Care Needs (CSHCN).	- Louisiana - Multiple (The FOA Medicaid Buy-In Program; SSI)	Parents/legal guardians raising a child with a disability enrolled in the Louisiana FOA Medicaid Buy-In Program; and in SSI group; and CSHCN families with income between 200% and 300% FPL group.	- 52; - 43% - DNR - 0-19 years - 0-5: 28%; - 6-11: 38%; - 12-19: 34%	- A 9 sections 30-45 min survey of Louisiana Medicaid Buy-In Program based on NS-CSHCN survey questions - One wave (around 2012)	Bivariate analyses; Pearson χ^2	- The FOA group is less likely than the SSI group to have difficulty with anxiety or depression; - No statistically significant differences of depression between FOA group and the 200-300% FPL group.

Source	Study Purpose	- Settings - Welfare Program	Sample	- Sample Size; - Gender (% F) - Race (Total) - Age	- Data - Waves	Analytic strategies	Findings ^b
6. Buckner et al., 1999	To examine the association between housing status (homeless vs. shelter housed) and measures of child behavior and self-reported symptoms of depression and anxiety.	- Massachusetts - Multiple (AFDC; emergency shelters and transitional housing facilities)	Children age 6 and older who were members of low-income, single-parent, female headed families.	- 228 (80 homeless; 148 newer homeless) - Homeless: 49%; housed poor: 52% - Homeless: 26% W; 21% B; 45% H; 8% Others. Housed poor: 36% W; 16% B; 41% H; 7% others. - <i>Mean(M)</i> : 10 for homeless child; 11 for housed poor child (6-18 years).	- Data collected from the initial interview - Cross-sectional	T-test; χ^2 ; hierarchical regression analyses	- Homeless children reported higher levels of depressive symptoms than housed children, but these differences were not statistically significant. For example, 14% homeless whereas 9% housed poor children reported raw CDI scores \geq 19; The mean raw CDI score was 11 for homeless whereas was 9 of housed children. - Housing status was not associated with self-reported depression.
7. Dooley & Prause, 2002	1. To replicate the previously reported cross-sectional association between welfare status and well-being (depression); 2. To examine 2 selections and 2 social causation hypotheses of causal direction of welfare association with depression.	- U.S. Nationally representative - AFDC	Female respondents to the 1992–94 surveys with data describing depression, alcohol use, and receipt of AFDC	- 3,678; - 100%; - 19.1% H; 28.3% B; 52.6% Others; - 14-22	- National Longitudinal Survey of Youth (NLSY79) - Wave1: 1992; Wave 2:1994	Bivariate and multivariate analysis; Regression	- AFDC recipients reported significantly higher mean levels of depression when compared to the employed and out of the labor force groups; - Entering welfare was associated with increased depression.

Source	Study Purpose	- Settings - Welfare Program	Sample	- Sample Size; - Gender (% F) - Race (Total) - Age	- Data - Waves	Analytic strategies	Findings ^b
8. Gavin et al., 2011	To examine the prevalence and correlates of elevated depressive symptoms in a 17-year cohort study of 173 women who were unmarried, pregnant adolescents between June 1988 and January 1990.	- Public and private hospital-based prenatal care clinics, public school alternative programs, and social service agencies in three urban counties in Washington State - AFDC/TANF	Participants 17 years and younger, married, and planned to carry their pregnancies to term.	- 173; - 100%; - 53% W;28% B; 10% Native; 8% H; 3% Asian; 10% Others; - Period 1: 14.2-19; Period 2: 17.7-23; Period 3: 19-24; Period 4: 24.3-29; Period 5: 29.6-34.5.	- 17-year longitudinal study of adolescent mothers - 17 waves (analyses based on each period rather than across the 5 periods)	Descriptive statistics; χ^2 ; (un)adjusted logistic regression analyses	- Receiving public assistance was positively and significantly associated with elevated depressive symptoms.
9. Go, 1998	To document depressive symptoms in Southeast Asian adolescents and examine possible relation of factors of immigration, acculturation level, family conflict, and peer relations	- 2 middle schools in Sacramento, California - General welfare programs	Southeast Asian immigrant adolescents living in CA.	- 206; - 62%; - Hmong: 39.8%; Chinese: 34%; Mien:16.5%; Vietnamese: 5.3%; Lao/Cambodian: 4.4% - 12-16	- Structured group interviews survey data - One wave	T-test; correlation; regression and path modeling	- Receiving welfare was significantly correlated with adolescents' higher depression symptom scores
10. Kalil et al., 2001	To (a) determine the prevalence of depressive symptoms among a sample of first-time AFDC	- Maryland - AFDC	A stratified random sample of 580 mothers who entered the Maryland AFDC	- 580; - 100%; - 41% W;54% B; 5% Others; - M: 23.8 (25% <	- Face-to-face interview survey - Cross-	Descriptive and multivariate analyses	- Overall, mean CES-D score of 17.88. About 52% of the AFDC young mothers are at risk for clinical depression,

Source	Study Purpose	- Settings - Welfare Program	Sample	- Sample Size; - Gender (% F) - Race (Total) - Age	- Data - Waves	Analytic strategies	Findings ^b
	recipients at the time of their initial entrance onto the welfare rolls and (b) identify risk and protective factors related to depressive symptoms among the women.		rolls for the first time as payees during a 5-month period in 1987.	18 years)	sectional (1987)		indicating high prevalence of depressive symptoms in this random sample of first-time welfare recipients relative to the general population.
11. Knab et al., 2006	To examine the effect of welfare and child support policies on maternal health outcomes	- 20 large U.S. cities - Post-reform welfare and child support policies (general welfare programs)	Married and unmarried mothers were interviewed around the time of a child's birth, with follow-up interviews occurring around the child's first and third birthdays.	- 2,536; - 100%; - DNR; - 18-34	-Fragile Families and Child Wellbeing Study - Baseline:1998 Endline:2000	ANOVA; Regression s; Instrumental variable	- Mothers who received welfare in the last year report worse overall health, higher rates of depression and anxiety, and greater levels of food insecurity.
12. Olfson et al., 2011	To examine the prevalence and demographic and clinical characteristics of children diagnosed with tic disorders in large privately and publicly insured populations.	- California, Florida, New York, Texas, Illinois, Georgia, and Ohio - Medicaid	Children diagnosed with Tourette disorder, chronic motor or vocal tic disorder, and other tic disorders in public and private insurance plans over the course of a 1-year period.	- Total: 26,369,655 (Publicly insured: 10247827 Privately insured: 16121828); - Publicly insured: 49%; privately insured: 49%) - Publicly insured: 35% W; 29% B; 29% H; 8% Others. Privately insured: N/A	- Service and pharmacy claims were examined from the Market Scan Research Databases (2000-2007) and a seven-state Medicaid	CROSSTAB procedure in SUDAAN 9.0; regression models; Separate χ^2 ; Tukey multiple comparisons	- Compared with privately insured youth, children under Medicaid diagnosed with Tourette disorder had higher rates of depression (14.6% versus 9.8%)

Source	Study Purpose	- Settings - Welfare Program	Sample	- Sample Size; - Gender (% F) - Race (Total) - Age	- Data - Waves	Analytic strategies	Findings ^b
13. Pande, 2014	To examine the spillover effect of welfare program on the family, particularly children of the participating mothers.	- 16 locations in 10 states across U.S. - AFDC	16 to 22 years old mothers' who had first given birth at 19 or younger, were not pregnant when they entered the program, had dropped out of high school and were receiving cash welfare assistance.	- 4-18: Publicly insured (57% between 12-18); Privately insured (66% between 12-18) - 5,309 (1735 for BBCS; 1785 for BPI; 1789 for PBI); - 100%; - 25% H and others; 55% B - M: 19 (16-22)	- Analytic Extract File (2001-2004) - 2000-2007 combined data - New Chance project - Baseline:19 89; 18-month follow-up;42-month follow-up;	T-test; χ^2 ; Intent to treat; Treatment on the treated; Regression ; pathway analysis	- BPI anxious-ness/ depression significant negatively affected by mothers' welfare participation; - Mothers in welfare program were more likely to be depressed. - Treatment group mothers had higher (but not statistically significant) depression scores than control group mothers' at both 18- and 42-month follow-up.
14. Rhee et al., 2005	Reveal patterns of physical symptoms using a clustering approach and to examine relationships between the identified patterns and psychosocial factors.	- U.S. sample, nationally representative - General welfare programs	Adolescents from the core sample who participated in both Waves I and II.	- 9,140; - 52%; - 64% W; 19% B; 12% H; 5% Others; - M: 15.6	- Add Health - Wave 1 (94-95); - Wave 2 (1996)	Cluster analyses; χ^2 , ANOVA, regression models	- Youth whose parents received welfare had 3 times greater rate of being in extreme symptom group; Over 30% of welfare adolescents were either HS or ES. - Adolescents from families receiving welfare were unstable subgroup.

Source	Study Purpose	- Settings - Welfare Program	Sample	- Sample Size; - Gender (% F) - Race (Total) - Age	- Data - Waves	Analytic strategies	Findings ^b
15. Sullivan & DeCoste, 2001	To analyze the effects of employment and TANF aid on well-being over time.	- Georgia - TANF	A stratified random sampling Georgia TANF recipients, single, Black female reporting as head-of-household, with a high-school education (GED/diploma), and two children.	- 127; - 100%; - 100% Black - M: 27	- 185-item survey - Wave1: 1999; Wave 2:2000-2001	Bivariate and multivariate analysis	The odds of being in the unstable subgroup increased substantially with an increase in depressive symptoms. - People off TANF at Time 2 experienced a decline in depression; - Those with well-paying jobs had significantly lower depression scores over time.

Note. a - Sources: Study purpose, sample descriptions, and findings are extracted directly and with minor editorial modifications from original reports.

b - Findings column summarizes study findings on the relationship of welfare participation to either youth depression or prevalence of depression among welfare recipients

Abbreviations: AFDC = Aid to Families with Dependent Children. TANF = Temporary Assistance for Needy Families. FPL = federal poverty level. PTSD= posttraumatic stress disorder.

Depression Measures

Shown in Table 1.2, with the exception of one study, the studies included in this review assessed depression using a standardized scale with demonstrated reliability and validity to detect elevated depressive symptoms. The one exception was the Bachman et al. (2015) study, which assessed depression using a single question directed to parents regarding their child's depression: "Does your child have difficulty with feeling anxious or depressed?"

Three instruments were used in more than one study, of which the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) was the most frequently used measure, appearing in six studies. The original CES-D has 20 items, and the full scale was used in four studies (Dooley & Prause, 2002; Kalil et al., 2001; Nebbitt et al., 2014; Pande, 2014). Other studies used one of the several revised shorter versions, and this review yielded three: the CES-D 19-item scale (Rhee et al., 2005), the CES-D 11-item scale (Go, 1998), and the CES-D 7-item scale (Dooley & Prause, 2002). The International Classification of Diseases, Ninth Revision (ICD-9; World Health Organization [WHO], 1970) was used in three studies, but only one study used the original ICD-9 diagnostic codes for depressive symptoms (Richardson et al., 2003), and two studies adopted the Clinical Modification (ICD-9-CM; WHO, 1979) codes (dosReis et al., 2001; Olfson et al., 2011). Four instruments were used in one study each. The 27-item Children's Depression Inventory (CDI) was used by Buckner et al. (2009); the Brief Symptom Inventory (BSI) depression subscale, which is a brief version of the Symptom Checklist 90-R (SCL-90-R) was used by Gavin et al. (2011); the Hopkins Symptom Checklist Depression Subscale (HSCD) was used by Sullivan and DeCoster (2001); and the Diagnostic Interview Schedule (DIS-IV) from the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)* was used in Cook et al.

(2004).

As shown in Table 1.2, four studies did not report specific measures of depression; the type of missing information included the number of scale items, response scales, score range, reliability (alpha), and cut-off values for the severe depression scale (Cook et al., 2004; dosReis et al., 2001; Olfson et al., 2011; Sullivan & DeCoster, 2001). Rather than including the measure details, the authors of each of these studies referred readers to publication citation of the original work that introduced the measure.

Characteristics of Research Data and Analytical Strategies

Shown in Table 1.1, a majority of the 15 studies ($n = 8$) conducted cross-sectional research, and collected or analyzed one wave of data (e.g., Bachman et al., 2015; Cook et al., 2004; Nebbitt et al., 2014). One longitudinal study collected 17 waves of annual data over the 17-year study period (Gavin et al., 2011), and six studies collected two waves of data to examine the relationship between welfare participation and depression among youth over time (e.g., Knab et al., 2006; Pande, 2014; Sullivan & DeCoster, 2001). Two studies used nationally representative datasets: Dooley and Prause (2002) used data from the National Longitudinal Survey of Youth (NLSY79), and Rhee and colleagues (2005) used data from the National Longitudinal Study of Adolescent to Adult Health (Add Health). Four studies used administrative data or Medicaid claims data (dosReis et al., 2001; Nebbitt et al., 2014; Olfson et al., 2011; Richardson et al., 2003).

Depression Prevalence of Youth on Welfare Programs: Mixed Findings from Descriptive Studies

Of the 15 reviewed studies, four studies described the prevalence of depression among youth on welfare programs. One study (Nebbitt et al., 2014) reported the mean CES-

D 20-item scale score ($M = 17.4$; $SD = 9.8$; range: 0-51) of African American adolescents (11 to 20 years; $n = 778$) residing in public housing. The average depression scores of this group was higher than the conventional 16-point cut-point value of the CES-D, indicating a diagnosis of major depressive disorder (Dooley & Prause, 2002).

The remaining three descriptive studies reported rates of depression among the sampled youth (Cook et al., 2004; dosReis et al., 2001; Richardson et al., 2003). For example, Cook et al. (2004) collected data from 744 young women (age: $M = 21$ years; median = 21 years) who were pregnant and eligible for one or more welfare programs offered in Missouri (Medicaid; Women, Infants, and Children [WIC]; and SNAP). These researchers found that 11% of the young women met the diagnostic criteria for major depression. However, Richardson et al. (2003) reported a much lower rate of depression among a sample of youth enrolled in Medicaid. Richardson and colleagues used Washington State Medicaid claims data for a large sample of youth ($N = 192,441$) between 5 and 18 years old, living in families with incomes less than 200% of the federal poverty level. These youth had been continuously enrolled in Medicaid since birth. Richardson et al. found that 2% ($n = 4,084$) of Medicaid youth had received a clinical diagnosis of depression. This rate was similar to the rate reported by dosReis et al. (2001) based on their examination of Medicaid youth from a suburban county of a Mid-Atlantic state. This research team found an overall depression rate of 1.3%, which was based on cross-sectional descriptive research, using administrative mental health services claims data ($N = 15,507$) among youth (< 20 years) of continuous and non-continuous Medicaid enrollees. Nevertheless, when Medicaid youth were divided into three subgroups based on the type of public aid program—foster care ($n = 301$), SSI ($n = 775$), and other aid (e.g., AFDC, WIC; $n = 14,422$)—dosReis et al. found a 15% prevalence

Table 1.2

Summary of Depression Measures and Prevalence from 15 Studies

- Source & Publ. Date - Publication	Depression Measure (Original Citation)	No. of Items	Res- ponse Scales		Score Range	Reliability (α)	Severe Depressive Cut-off Values	Depression Prevalence %/ M (SD)
(a) Descriptive Studies (n = 4)								
- Cook, et al., 2004 - <i>Obstetrics & Gynecology</i>	Diagnostic Interview Schedule for the <i>DSM-IV</i> (Robins et al., 2003)	DNR	DNR	DNR	DNR	DNR	DNR	11%
- dosReis et al., 2001 - <i>American Journal of Public Health</i>	International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM; WHO, 1979)	DNR	DNR	DNR	DNR	DNR	DNR	1.3% - Foster care: 15% - SSI: 7% - Other Aid: 0.7%
- Nebbitt et al., 2014 - <i>Social Work</i>	CES-D-20 (Radloff, 1977)	20	4-point	0: rarely or none of the time to 3: most of the time.	0-60	0.88	Higher scores indicating greater depression.	17.4 (9.8)
- Richardson et al., 2003 - <i>Archives of Pediatrics & Adolescent Medicine</i>	ICD-9 (WHO;1977)	9- code fields	Yes/No	DNR	0-9	DNR	>=1	2%
(b) Comparison Studies (n = 11)								
- Bachman et al., 2015 - <i>Maternal and Child Health Journal</i>	Single question: Does your child have difficulty with feeling anxious or depressed?	1	3-point	A lot of difficulty; A little difficulty; No difficulty.	DNR	DNR	DNR	A lot of difficult: - FOA:20% - SSI:34.2% - 200-300% FPL: 15.2%; A little of difficult: - FOA:24% - SSI:38.2% - 200-300% FPL: 28.3%

- Source & Publ. Date - Publication	Depression Measure (Original Citation)	No. of Items	Response Scales		Score Range	Reliability (α)	Severe Depressive Cut-off Values	Depression Prevalence %/ M (SD)
- Buckner et al., 1999 - <i>Developmental Psychology</i>	Children's Depression Inventory (CDI; Beck & Beamesderfer, 1974; Kovacs, 1985)	27	3-point	0: an absence of symptoms; 1: mild symptoms; 2: definite symptoms.	0-54	0.81	>=19	10.6% (CDI score>=19); - Homeless: 13.8% - Housed poor: 8.8%)
- Dooley & Prause, 2002 - <i>American Journal of Community Psychology</i>	CES-D-20 (Radloff, 1977); CES-D-7	20; 7	0-3	0: rarely or none of the time to 3 = most of the time.	0-60; 0-21	.88; .81	>=16; DNR	25% (CES-D>=16) - On AFDC: 43.8% - Off AFDC: 23.8%
- Gavin et al., 2011 - <i>Women & Health</i>	Brief Symptom Inventory (BSI) depression subscale (Derogatis, 1993); a brief version of the Symptom Checklist 90-R (SCL-90-R) (Derogatis, 1975)	6	5-point	0: not at all to 4: extremely.	0-24	DNR	>=12; or PROMIS T-score>=63	P1: 19.8% P2: 35.2% P3: 33.5% P4: 34.6% P5: 35.2%
- Go, 1998 - <i>Doctoral dissertation- UC Davis</i>	CES-D-11 (Radloff, 1977; Kohout et al., 1993)	11	3-point	1=never; 2=sometimes; 3=often.	11-33	0.72	DNR	M=20.02 (3.31) - Male: 19.17(3.43) - Female: 20.55(3.13)
- Kalil et al., 2001 - <i>American Journal of Community Psychology</i>	CES-D-20 (Radloff, 1977)	20	4-point	1: rarely or none of the time to 4: most of the time.	0-60(re code d)	0.88	Higher scores indicating greater depression.	17.88 (11.41)
- Knab et al., 2006 - <i>Working Paper- Princeton University</i>	Composite International Diagnostic Interview Short Form or CIDI-SF (Walters et al. 2002)	7	Yes/No	Whether or not having feelings of dysphoria or anhedonia in the past year lasting for two weeks or more and if the symptoms lasted most of the day and if they occurred every day	DNR	DNR	DNR	24.5% (depression/anxious)

- Source & Publ. Date - Publication	Depression Measure (Original Citation)	No. of Items	Response Scales		Score Range	Reliability (α)	Severe Depressive Cut-off Values	Depression Prevalence %/ M (SD)
				during the two-week period.				
- Olfson et al., 2011 - <i>Journal of the American Academy of Child & Adolescent Psychiatry</i>	ICD-9-CM (WHO,1979)	8-code fields	DNR	DNR	DNR	DNR	DNR	All youth without Tic Disorders: 3.1%; With Tourette disorder: 14.6%; With chronic motor or vocal tics: 8.5%; With other tics: 8.3%
- Pande, 2014 - <i>Working paper- Social Science Research Network</i>	CES-D-20	20	4-point	0: rarely or none of the time to 3: most of the time.	0-60	DNR	DNR	M=17.99 (10.21) - Treatment: 17.78 - Control: 18.4 Month 18: - Treatment: 15.79 - Control: 15.56 Month 42: - Treatment: 15.62 - Control: 14.92
- Rhee et al., 2005 - <i>Psychosomatic Medicine</i>	CES-D-19 (Radloff, 1977)	19	4-point	0: complete absence of the symptom to 3: most or all of the time during the past week.	0-57	0.87	Higher scores indicating greater depression.	DNR
- Sullivan & DeCoster, 2001 - <i>Journal of Family Social Work</i>	The Hopkins Symptom Checklist Depression Subscale (HSCD; Derogatis, Lipman, & Covi, 1973).	DNR	DNR	DNR	DNR	DNR	DNR	Time 1: - On Welfare: 37.81(10.8) - Off Welfare: 39.13(9.53) Time 2: - On Welfare: 36.08(13.76) - Off Welfare: 43.43(14.03)

Note: DNR= Did not report.

of depression among foster care group, 7% for the SSI group, and 0.7% for the other type of aid group. Thus, descriptive research on recipients participating in different types of welfare programs and in different locations yielded a wide range of depression rates.

Some of the research also examined other factors among welfare recipient youth such as race/ethnicity. Overall, White youth receiving welfare benefits had higher rates of depression than their other racial/ethnic counterparts. For example, dosReis et al. (2001) found that in a sample of youth enrolled in Medicaid, White youth were 1.9 times more likely to be diagnosed with depression than African American youth; however, among youth receiving SSI benefits, African American youth were 1.7 times more likely to be diagnosed with depression than White youth. Similarly, Richardson et al. (2003) found that as compared with White youth, the youth from racial/ethnic minority groups (except for Native Americans) had lower rates of depression. Further, they found that female Native American youth (ages 15 to 18 years) had the highest prevalence of depression (9.4%), whereas male Asian/Pacific Islander youth (ages 5 to 10 years) had the lowest prevalence of depression (0.03%). However, Nebbitt et al. (2014) found an opposite direction of gender differences on depression. They found male African American adolescents reported significantly higher ($p < .05$) depression score ($M = 18.5$) than females ($M = 16.6$).

When Richardson et al. (2003) divided their large sample of youth ($N = 192,441$) into subgroups by age, they found the prevalence of depression increased with age, with the 15 to 18 years old group having the highest rates of depression, followed by the 10 to 14 years old group, and then the 5 to 10 years old group. However, Richardson and colleagues also found that males in the youngest group (5 to 10 years) had diagnosed depression at 2 times the rate of the females in the same age group. Notably, this rate was reversed in the oldest age group,

with females between 15 and 18 years having twice the rate of depression of same age males.

Generally, these four descriptive studies provided mixed findings. Prevalence of depression among youth on social welfare programs varied across studies based a range of individual and program characteristics, including sample size, specific welfare programs in which youth participated, geographic location, gender, and racial/ethnic minority status.

Relationship Between Welfare Participation and Depression

Eleven studies conducted comparison research (e.g., welfare participation vs. non-welfare participation, or among different welfare programs) to examine the relationship between welfare participation and depression among youth. Overall, the reviewed comparison studies reported consistent findings that participating welfare programs was associated with higher risk for depression.

Six of the 11 studies focused on young mothers. For example, Dooley and Prause (2002) focused on the female respondents (14 to 22 years; $n = 3,678$) of the National Longitudinal Survey of Youth (NLSY79) survey, and found that women receiving AFDC benefits had significantly higher levels of depression as compared with women who were employed or out of the labor force. Gavin et al. (2011) used data from a 17-year longitudinal study of young mothers (starting age 14 years; $n = 173$), and found that receiving welfare benefits was positively and significantly associated with higher levels of depressive symptoms. Similarly, Kalil et al.'s (2001) research used a random sample of young mothers (M age = 23.8, $n = 580$) who were first-time users of the Maryland AFDC program, and found that more than half (52%) of the AFDC young mothers had elevated risk of depression. This finding indicated these young first-time welfare recipients had a higher prevalence of depression than the general population. In addition, Knab et al.'s (2006) findings were

consistent with those showing an association between young mothers' (18 to 34 years; $n = 2,536$) welfare participation and higher levels of depression. Pande (2014) also found similar results that young mothers (16 to 22 years; $n = 5,309$) who participated in AFDC program were more likely to be depressed. Moreover, Sullivan and DeCoster (2001) tracked 127 young African American single-mothers who were currently or past welfare recipients (M age = 27 years) from 1990 to 2000/2001, and found that the mothers not currently enrolled in a welfare program had 2 times lower levels of depression than the mothers receiving welfare benefits. Overall, these six studies reported consistent findings of evidence that young mothers participating in welfare programs had higher levels of depression.

For other studies focused on the general youth population, results showed that youth enrolled in Medicaid and diagnosed with Tourette's disorder had higher rates of depression as compared with youth with the same medical condition and enrolled in private insurance (Olfson et al., 2011). In addition, Rhee et al. (2005) found that youth ($M = 15.6$ years; $n = 9,140$) whose parents received welfare benefits had higher risks of having depressive symptoms as compare with their counterparts from non-welfare households. Similar findings were reported in studies that examined a group of U.S. immigrants. For example, Go (1998) conducted a research on a group of Southeast Asian immigrant adolescents (12 to 16 years; $N = 206$) living in California, and found participation in welfare programs was significantly associated with higher depression scores.

However, these consistent findings were not found in one study which comparing welfare recipients with non-welfare recipients among highly vulnerable populations such as homeless youth, welfare participation was associated with lower risk for depression. For example, findings from Buckner et al.'s (1999; youth age 6 to 18 years; $N = 228$) study

showed that youth from low-income, single-parent, female headed families participating in housing related welfare programs had lower rates of depression. Specifically, Buckner et al. found youth who participated in housing programs, such as government-run emergency shelters and transitional housing facilities, and had high rates of participating in cash transfer programs (e.g., AFDC), had lower rates of depression as compared with homeless youth. However, the differences were not statistically significant, indicating housing status was not associated with self-reported depression.

Discussion

One of the primary roles of government is to promote the well-being of citizens by providing social welfare programs to address social problems such as poverty, inequity, and disparity. However, participation in social welfare programs could be a double-edged-sword. While welfare programs may increase income, secure basic human needs for survival (e.g., health care and housing), it appears that receiving welfare benefits from the government is associated with elevated mental health risk for depression or other disorders.

Results from the four descriptive studies are mixed. The reported depression rates varied by sample size, so that the studies with larger sample sizes reported lower depression rates (< 2%; e.g., dosReis et al., 2001; Richardson et al. 2003), whereas the studies with smaller sample sizes reported either higher rates (> 11%; e.g., Cook et al., 2004) or greater proportions of youth above normative levels of depression scores (Dooley & Prause, 2002). Such mixed findings indicate that depression prevalence varies according to welfare program recipient group. In future depression research on welfare recipients, conducting subgroup analyses might yield results that are more precise.

In addition, this review observed that White youth welfare recipients had higher

levels of depression than youth in other racial/ethnic subgroups (dosReis et al., 2001). However, studies found Native American (Richardson et al., 2003) and African American (Nebbitt et al., 2014) youth had higher rates of depression rates than other racial/ethnic subgroups. These findings are consistent with epidemiological depression prevalence among U.S. adolescents, where other racial groups (including Native Americans adolescents) had the highest depression rates (15.6%), followed by White (13.4%), Hispanic (12.6%), Asian (9.7%) and Black (9.0%) adolescent groups (Center for Behavioral Health Statistics and Quality [CBHSQ], 2016). Similarly, these findings are consistent with findings from epidemiological surveys, which suggest that adolescent females have a higher risk of depression compared to males (CBHSQ, 2016). This review also observed similar depression prevalence results according to gender for youth from welfare recipient families (Richardson et al. 2003). Given that female youth groups have a higher risk of depression, developing gender-specific screening and treatment programs for young women who participate in welfare programs is strongly recommended.

Although the descriptive studies yielded mixed findings, such findings are consistent with the characteristics of the youth developmental stage. Studies included in this review typically defined *youth* very broadly and vaguely, with labels ranging from *childhood* to *young adulthood*. At this unique developmental stage, youth experiencing rapid growth and significant development changes at physical, intellectual, psychological, social-emotional, and mental aspects. In addition, during this period, youth are developing life-long attitudes, beliefs, and values (Kellough & Kellough, 2008). These aspects of youth development are influenced by various factors at micro-, mezzo-, and macro-levels such as their peers, parents, families, school, community, and the macro society in which they live. Thus, the

combined influences of these disparate factors could lead to different outcomes. Therefore, given the changing and unstable nature of this developmental period, it is not surprising that studies examining samples of youth from different populations, ethnicities, genders, exposure to welfare benefits, family backgrounds, and geographic locations would produce mixed results.

Overall, this review found that youth participation in welfare programs was associated with higher vulnerability for depression. One possible explanation for this finding might be the shaming effects social stigma has on the mental health of welfare recipients. Several studies mentioned that youth participating in welfare programs are often painfully aware of the social stigma and perception of welfare recipients, which are associated with feelings of shame and experiences of being labeled, discriminated against, and ostracized by their peers (e.g., Buckner et al., 1999; Cook et al., 2004; Dooley & Prause, 2002; Richardson et al., 2003). These effects of stigma can lower the youth's self-esteem, affecting both emotional and psychological well-being. Given that many social welfare programs are means-tested and needs-based programs (versus programs based on developmental needs of the recipients of aid), these program typically provide a minimal level of benefits, which are intended to meet only the basic living needs of recipients, and therefore, rarely help recipients out of poverty. Moreover, the delivery systems of some welfare programs do not provide the same quality of health care or services available to those with private coverage (Barr, 2000). Therefore, despite participating in welfare programs, recipients might still struggle with poverty and financial burdens and/or continue to suffer physical or mental illnesses in addition to the ongoing shaming effects of receiving welfare, leaving welfare recipients at higher risk of depression.

This review also found that more than half of studies (59%) used a cross-sectional research design, which inherently limits the researchers' ability to draw causal inferences about the relationship between welfare participation and depression among youth because cross-sectional data present only a "snapshot" of program effects. Cross-sectional designs cannot control factors such as time order, and thus, findings are at best correlational in nature. In other words, findings from this review showed that youth participation in welfare program was associated with higher risk of depression, but the findings cannot be used to support claims that welfare participation leads to higher levels depression. Moreover, the effects of participating in welfare programs appear to be more distal than proximal, with depression outcomes tending to be among the long-term effects. Thus, for future research, a better approach would be to use a longitudinal design that includes collecting multiple waves of data.

Furthermore, comparison of results across studies would be more meaningful if there was greater use of a standardized instrument to measure depression. Although the CES-D (Radloff, 1977) was the most frequently used measure, this depression scale was used in fewer than half of the 17 reviewed studies. Moreover, making comparisons of depression rates that have been inconsistently measured or obtained using different dimensions and instruments (e.g., the CDI, ICD, and HSCD scales) raises serious concerns about the validity of such comparisons. The lack of consistent measures and consensus on what measures should be used limits the ability to draw conclusions about the relationship between welfare participation and depression across studies. In addition, many studies did not report specific measurement information about the instrument regarding the number of items, response scales, score range, reliability (alpha) and the cut-off values for each scale. Although such

information is available through the original studies that introduced the measure, by including these details in the study reports, authors would ensure their findings are understood in their appropriate context. Even though using the standardized and validated instruments, without reporting whether the measure was performed fitly and properly for a new dataset and population, results of these studies should be questioned. Therefore, it is strongly recommended that authors report detailed information regarding the measure used to assess depression.

Last, this review found that most comparison studies only examine the correlation between welfare participation and depression. Although some of the studies had collected multi-waves of data, the analyses were based on combined data rather than cross the multiple waves of data (e.g., Gavin et al., 2011; Olfson et al., 2011). For future research, utilization of longitudinal data and advanced statistical methods (e.g., growth curve modeling, or regression discontinuity), in order to estimate the approximate causality between welfare participation and depression is warranted.

Limitations

This review has several limitations that must be acknowledged. First, conventional protocols for conducting a systematic review suggest that multiple researchers first work independently and then collaborate on conducting a cross check during the data extraction process to minimizing the potential mistakes of missing any eligible studies. However, given the nature of dissertation, this systematic review had to be undertaken by a single researcher. To address this potential problem, the author conducted multiple self-checks during the data search, extraction, and synthesis processes. Second, this review has potential risk of publication bias. This study focused on empirical studies that were published in English.

Although a gray literature search via Google search was conducted to include eligible unpublished online resources (e.g., working papers), it is likely that other studies on this topic exist that were published in languages other than English, and therefore, were not included in this review. Third, although the author followed best practices in developing a search strategy, which included consulting a research librarian and topic experts, it is possible that the search terms used were not capable of exhausting the available literatures. Last, this review did not use a fixed range of youth ages. Therefore, some of the findings based on varied age definitions of “youth” make direct comparison challenging or impossible.

Implications

This systematic review has implications for policy, practice, and research. To date, youth with depression have low rates of participation in mental health services. For example, less than half U.S. youth with depression (44.6%) received mental health services in 2015 (CBHSQ, 2016). Given that low-income populations are at high risk for depression, with limited sources and financial capability, government should take the responsibilities to help these needy populations. For example, developing and funding welfare programs is one of the most common ways to ensure those in need of physical and mental health services have access to health care, regardless of their ability to self-pay. Further, because poverty among youth is likely a multidimensional effect, policy makers should explore initiatives to develop social welfare programs tailored to the needs of particular subgroups of intended beneficiaries; the design of such programs should account for the target group’s developmental stage as well as short- and long-term needs.

This review recommends that policy makers, practitioners, researchers, and scholars collaborate on finding effective ways of reducing barriers to participate in welfare programs

and increase access to mental health treatment. For example, Barr (2000) listed several ways to reduce barriers to participating in welfare programs and making welfare participation normative, such as renaming Medicaid and CHIP welfare programs as *public health coverage*, training eligibility staff to provide high-quality customer service and to treat all recipients as valued account holders, improving provider reimbursement rates to attract more high-quality providers to the system, simplifying the application and redetermination process, and adopting payment formats in welfare coverage similar to those in the private market. In addition, eliminating the stigma associated with receipt of welfare is critical to ensuring the well-being of vulnerable groups that goes beyond providing assistance with basic needs. This is critical to find out appropriate ways to eliminate the stigma of effects of welfare recipients and policy makers need to consider ways to counter stigma in their design and implementation of welfare programs.

This review has implications for social work practice. For example, social workers in the poverty alleviation field or employed in welfare departments should be aware of any stigma effects that might occur when providing services or assistance to clients. In addition, social workers can make greater efforts to eliminate any potential negative stereotyping related to mental health treatment. More importantly, social workers need to develop gender-specific screening mechanisms and improve treatment of depression, especially for females who participate in welfare programs.

In conclusion, this systematic review summarizes the available evidence and helps clarify the evidence on the relationship between welfare participation and depression among youth. Although mixed findings on the prevalence of youth depression were observed from the descriptive studies, it is important to note that the comparison studies consistently showed

that participation in welfare programs was associated with a higher vulnerability for depression. In addition, because this review used welfare participation as a marker for low SES, the summary of findings presented here has implications for policy makers, practitioners, and researchers when developing and designing programs (or interventions) to improve youth mental health outcomes, especially for the most vulnerable populations.

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(*denotes report in systematic review)

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PAPER II

EXPLORING THE RELATIONSHIP BETWEEN WELFARE PARTICIPATION IN CHILDHOOD AND DEPRESSION IN ADULTHOOD IN THE UNITED STATES

Abstract

Objective: Depression is a serious mental health disorder, and untangling its causal agents is a major public health priority in the United States. A growing body of research suggests that depression disproportionately affects women and those in lower socioeconomic strata. To address this health disparity, this study examines the relationship between participating in welfare programs during childhood (before age 18 years) and experiencing depression during young adulthood. **Method:** This study uses data from the National Longitudinal Study of Adolescent to Adult Health ($N = 15,701$) collected in Wave I (1993-94) and Wave IV (2008). Multiple imputation ($m = 20$) is used to deal with missing data. Propensity score matching is used to reduce the selection bias of the two groups (welfare recipients vs. non-recipients). The imputed and matched data are then analyzed using logistic regression (for the clinical diagnosis of depression [$1 = \text{yes}$; $0 = \text{no}$]) and ordinary least squares regression (for the self-reported depression score). In addition, subgroup analyses include examinations by household income levels (poor, near poor, and non-poor) and two gender groups. **Results:** Overall, young adults from welfare-recipient families reported significantly higher depression scores, but results did not show a significant relationship between welfare participation and a clinical diagnosis of depression. Results of subgroup analyses showed only the lowest income group of welfare recipients (i.e., poor group) had significantly higher

depression scores, whereas only the near-poor group had a significantly higher probability of having received a clinical diagnosis of depression. Additionally, the subgroup analyses showed group differences based on gender, with significantly higher depression scores found for the subgroup of female youth from welfare-recipient families. However, no significant differences were found between the gender groups regarding clinical diagnoses of depression. **Discussion:** Using welfare participation as an economic marker, the subgroup analyses help to identify target populations for future intervention. Implications of this study will be of interest to policy makers and have value for informing policy decisions regarding expanding Medicaid coverage for mental health treatment.

Exploring the Relationship Between Welfare Participation in Childhood and Depression in Adulthood in the United States

Introduction

The series of New Deal programs proposed by President Franklin Roosevelt and enacted by the U.S. Congress during the 1930s ushered the nation into the era of the modern welfare state (Moffitt, 2015), with its unique melding of democracy, welfare, and capitalism (Marshall, 1950). The New Deal aimed to create a safety net of programs to improve the lives of those suffering the effects of the Great Depression such as high rates of unemployment (about 25%), food insecurity and hunger, inability to afford medical care, and poor housing and homelessness. Specifically, the Social Security Act of 1935 (Public Law 74-271) was enacted to provide general welfare to needy populations (e.g., the elderly, the blind, and dependent children). In the decades that followed, this Act and its subsequent amendments served as a catalyst for the expansion of welfare coverage and eligibility (e.g., the Medicare program of 1965 that provides medical insurance to adults 65 years and older). The various federal welfare programs serve as meaningful milestones for charting the process of establishing the U.S. welfare system.

Title IV of the 1935 Social Security Act created the federal assistance or “welfare” program known as Aid to Families with Dependent Children (AFDC). AFDC was administered through the U.S. Department of Health and Human Services (U.S. DHHS), and was designed as an unconditional means-tested welfare program to provide cash welfare payments to children who did not have parental support due to the parents’ absence from the home, death, disability, or unemployment (U.S. DHHS, 2009). Over time, eligibility restrictions were relaxed, which led to dramatic increases in the number of welfare recipients. AFDC had no time caps, and reliance on welfare became a way of life for some families

(Maynard, Boehnen, Corbett, Sandefur, & Mosley, 1998). AFDC operated until 1996, when President Bill Clinton signed the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA; Public Law 104-193), shifting the U.S. social welfare policy from “welfare” to “workfare”; that is, a shift from a program of unconditional means-tested cash assistance to a program requiring work participation or participation in job training programs. AFDC was replaced by the Temporary Assistance for Needy Families (TANF) program (Besley & Coate, 1992), and introduced other reforms such as lifetime participation limits. Even though the PRWORA reforms were implemented more than 20 years ago, research on the correlates of participation in welfare programs on depression has been largely neglected. To address this knowledge gap, the purpose of this study is to examine the association between participating in welfare programs during childhood (birth to 18 years) and depression during young adulthood (24-32 years). By creating a better understanding of the relationship between welfare participation and depression, this study has potential to inform the development of new programs and interventions at the intersection of poverty alleviation and health care.

Poverty Rates and Welfare Spending in the United States

Among developed countries, the United States has the world’s highest poverty rate (Organisation for Economic Co-operation and Development, 2017). The U.S. poverty rate in 2015 was 13.5% of the population (U.S. Census Bureau, 2016), which translates to nearly 43.1 million people living beneath the federal poverty level (FPL; Proctor, Semega, & Kollar, 2016). Similarly, the child poverty rate in the United States is among the highest in a developed country (United Nations International Children's Emergency Fund, 2012; 2014). In 2014, low-income households of four persons (i.e., two adults and two children), defined

as having income less than \$48,072 (200% of the FPL), included approximately 43% of the U.S. child population, or 31 million children (Jiang, Ekono, & Skinner, 2016).

Living in low-income households exposes adults and children to elevated risk and greater likelihood of experiencing adverse conditions such as homelessness, unsafe neighborhoods, food insecurity, and inadequate health care (Andrews, Nord, Bickel, & Carlson, 2000; Coleman-Jensen, Gregory, & Singh, 2014; McBride Murry et al., 2011; Nunez, 1996; Smith, Wise, Chavkin, Romero, & Zuckerman, 2000). In turn, these adverse conditions contribute to negative child outcomes such as poor academic achievement and school drop out as well as short- and long-term problems in the areas of behavioral, psychosocial, physical, and mental health (Brooks-Gunn & Duncan, 1997; Casey et al., 2004; Smith et al., 2000). For example, Brooks-Gunn and Duncan (1997) conducted a review of studies to identify the effects of poverty specific to child outcomes. The authors analyzed six large, nationally representative data sets to compare the outcomes of children (birth to 17 years) from poor and non-poor households while controlling for other family characteristics (e.g., gender of household head, mother's age and education). The results showed that as compared with their non-poor counterparts, children from poor families had worse outcomes, especially in the domains of physical health, behavioral health, cognitive development, and academic achievement. Specifically, living in poverty contributed to poor physical health outcomes, which were measured using indicators of chronic asthma, low birth weight, incidence of lead poisoning, and growth stunting. Brooks-Gunn and Duncan's data analysis also revealed poor children had worse cognitive outcomes (e.g., developmental delays and learning disabilities) as well as worse emotional and behavioral outcomes. In turn, these poor outcomes most likely contributed to the finding of lower academic achievement among

children living in poverty, including higher rates of grade repetition, expulsion, and high school drop out. Additionally, Brooks-Gunn and Duncan found children living in poverty had other poor outcomes such as elevated rates of adolescent pregnancy, single parenthood, inability to maintain employment by the age of 24 years, and food insufficiency.

In response to high poverty rates, the United States federal government has a long history of implementing policies and programs aimed at reducing poverty by assisting the low-income population with meeting basic needs. These programs, often referred to as the social safety net, include the Supplemental Nutrition Assistance Program (SNAP; formerly known as the Food Stamp program); Housing Choice Voucher program (i.e., Section 8 housing assistance); Supplemental Security Income; TANF; the Women, Infants, and Children program; and Medicaid. Reports for 2012 indicated that 21.3% of the U.S. population (52.2 million people) participated in one or more of these welfare programs each month (Irving & Loveless, 2015; U.S. Census Bureau, 2016), and a 2013 study found that Medicaid paid for half of all U.S. births (Markus et al., 2013). In 2016, about 67.9 million Americans are receiving some form of governmental welfare benefits, which includes about 41.2 million recipients of SNAP, 10.2 million recipients of unemployment insurance, 7.7 million recipients of housing assistance, 4.3 million recipients of TANF benefits, and 4.5 million recipients of other types of general welfare benefits. In addition, about 70.5 million people were enrolled in Medicaid (Statistic Brain Research Institute, 2016). In 2012, children represented approximately 75% of TANF recipients; about half (50.9%) of these TANF families had one child, 26.9% had two children, and 20.3% had three or more children (U.S. DHHS, 2014).

The total federal and state government spending on all the welfare programs in 2011

was about \$1.03 billion (U.S. Senate Budget Committee, 2012). However, despite spending nearly \$1 trillion each year on more than 126 welfare programs to fight poverty, these anti-poverty programs have been ineffective in reducing poverty rates (Tanner, 2012). In fact, the U.S. poverty rate has remained higher than 10.5% since 1964 when President Lyndon B. Johnson declared an “unconditional war on poverty in America” (Johnson, 1964, §III, para.2). Moreover, as shown in Figure 2.1, in the two decades since the 1996 welfare reforms, the United States has reached new highs for both national and child poverty rates (Proctor et al., 2016). This statistical evidence supports the argument that welfare policy in the United States have failed to have a sustainable effect on poverty.

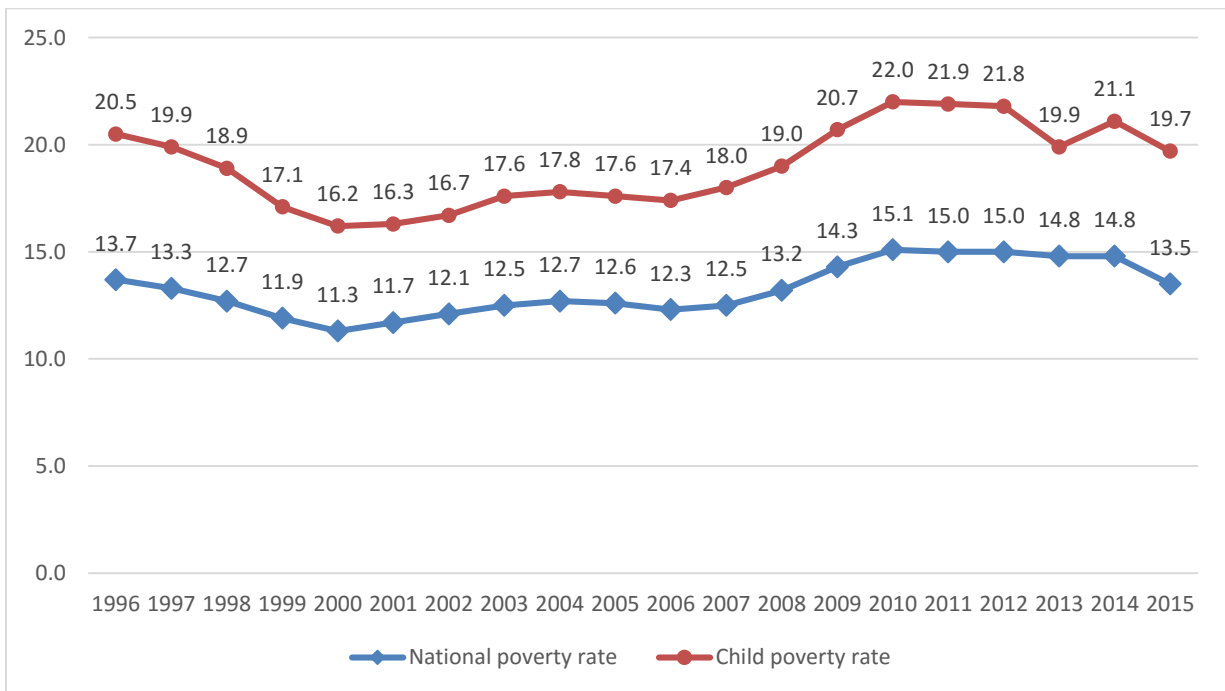


Figure 2.1. U.S. national poverty and child poverty rates. Figure reproduced from Proctor et al. (2016).

Added to the failure of U.S. welfare programs to significantly reduce the poverty rates (Tanner, 2012), researchers have found that participation in welfare programs is associated with long-term negative health outcomes. For example, one study found women who received welfare benefits (e.g., TANF) had a higher risk of developing mental health

illnesses such as depression (Coiro, 2001). In addition, recent research has shown the relationship between childhood poverty and behavior can persist during adulthood. Specifically, research has shown children from welfare recipient families faced elevated risk in adulthood for substance use (Wu, Zerden, & Wu, 2016) and smoking (Zerden, Wu, Wu, & Fraser, 2017). Moreover, other research has shown that children participating in TANF had lower cognitive development scores (measured using the Peabody Picture Vocabulary Test) than their counterparts living in households that did not receive welfare (Heflin & Acevedo, 2011). Despite these critical problems associated with poverty and welfare programs, few studies have examined the younger population of welfare recipients to determine whether a relationship exists between childhood welfare participation and mental health during young adulthood. Therefore, to address this knowledge gap, this study examined U.S. data to investigate the association between welfare participation in childhood and depression in young adulthood.

Prevalence of Depression Among U.S. Youth

Internationally, depression affects between 1% and 3% of prepubertal children and 6% of postpubertal children and adolescents (Dolle & Schulte-Körne, 2014). In the United States, depression is a common mental disorder among adolescents (ages 12 to 17 years; Center for Behavioral Health Statistics and Quality [CBHSQ], 2016). Results from the National Survey on Drug Use and Health (NSDUH) indicate an increasing trend in the number of U.S. adolescents affected by depression (CBHSQ, 2016). As shown in Figure 2.2, data from 2005 show about 8.8% of adolescents were diagnosed as having a major depressive episode (MDE) that met the criteria of the *Diagnostic and Statistical Manual of Mental Disorders* (4th edition; *DSM-IV*; American Psychiatric Association, 1994). This

percentage increased to 9.1% in 2012, 10.7% in 2013, and 11.4% in 2014. In 2015, the percentage of youth with a diagnosed MDE reached a high point of 12.5%, which translates to approximately 3 million adolescents (CBHSQ, 2016).

Similarly, in 2015, nearly 10.3% of U.S. young adults (ages 18 to 25 years), or about 3.6 million, had a past-year MDE meeting *DSM-IV* criteria (CBHSQ, 2016). Although this percentage is lower than the prevalence among adolescents, the young adult group also had a high prevalence of other types of mental disorders (See Figure 2.2). Since 2008, more than 18% of young adults have received a clinical diagnosis for at least one type of mental illness or disorder meeting *DSM-IV* criteria. In 2015, 21.7% of young adults (about 7.8 million individuals) were reported to have had some type of mental disorder, which means that more than 1 in 5 young American adults suffered from a mental illness (CBHSQ, 2016).

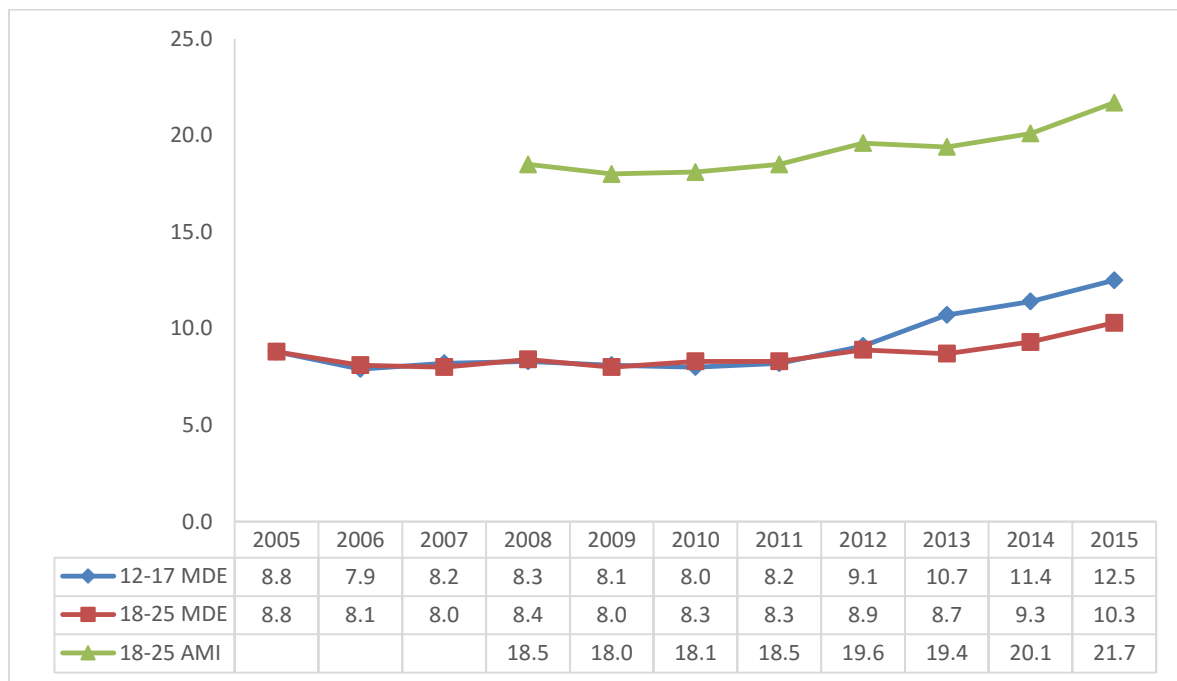


Figure 2.2. Prevalence of major depressive episodes (MDE) and all other forms of mental illness (AMI) by age group. Figure reproduced from CBHSQ, 2016.

The high prevalence of mental illness among U.S. adolescents and young adults is

evidence of a serious public health issue. Urgent attention to this public health crisis is warranted because mental illness at an early age affects not only a person's physical and psychosocial developmental trajectory but also the person's ability to live independently and lead a self-sufficient, productive life (Brown et al., 2009; Elovainio et al., 2015; Stewart, Ricci, Chee, Hahn, & Morganstein, 2003). In addition, the availability of treatment for mental illness among children reflect a country's social safety net. In other words, it is closely related to the support for those with mental illnesses available at the household (e.g., parenting and family supports), community (e.g., neighborhood supports and access to health care services), and societal (e.g., social welfare and social services) levels.

Despite the increasing number of youth and young adults suffering from mental illness, the use of mental health services among these groups has remained extremely low. For example, in 2015, among the 3 million youth with a past-year MDE, about 60.7% (1.8 million) did not receive treatment for depression (CBHSQ, 2016). Similarly, more than half (53.2%) of young adults (18 to 25 years) with a past-year MDE did not receive treatment for depression (CBHSQ, 2016). Moreover, the NSDUH reported even lower receipt of "any type" of mental health treatment among U.S. young adults, with more than two thirds (68%) of young adults with mental illness reporting no use of mental health services (CBHSQ, 2016). Untreated mental health can bring other serious sequelae, for example, recent evidence has shown untreated postpartum depression can negatively affect both maternal and child health. Mothers with untreated postpartum depression have been found to have higher rates of major depressive relapses, increased likelihood of hospitalization (Chan, Natekar, Einarson, & Koren, 2014; Cohen et al., 2006), and elevated risk of conversion to bipolar disorder (Sharma & Sharma, 2012). Moreover, children born to women with perinatal

depression have a high risk of premature birth, low birth weight, and poor childhood development (Chan et al., 2014; Gentile, 2017). Therefore, understanding the potential barriers to using mental health services among young adults is also an important aspect of improving maternal and child health.

A growing body of research evidence has suggested that depression is disproportionately high among women, especially women who are of childbearing age or pregnant (Orr, Blazer, James, & Reiter, 2007). An example of this gender gap is found in the NSDUH data that show 19.5% of female adolescents had a past-year MDE whereas only 5.8% of male adolescents reported a past-year MDE (CBHSQ, 2016). Overall, the lifetime incidence of depression among women is 1.7 to 2.7 times greater than the incidence of depression among men (Burt & Stein, 2001). Therefore, it is also important to look at gender differences when examining the relationship between welfare participation and depression.

Research has also shown that depression is associated with socioeconomic status (SES), with the prevalence of depression unevenly distributed across the different SES strata (Gilman, Kawachi, Fitzmaurice, & Buka, 2002). SES is commonly assessed using the federal poverty level (FPL). The FPL is updated annually to calculate the minimum income needed to sustain households of different family size, composition, and location (e.g., the FPL is higher in Alaska and Hawaii than on the U.S. mainland). SES is often described as having income of a certain percentage above or below the FPL. Mental health researchers have shown a statistically significant negative relationship exists between SES and the presence of mental illness, such that people from lower SES levels have higher risk of mental illness (Gilman et al., 2002; Hudson, 2005). For example, research conducted in 2013 showed the incidence of past-year MDE fell as income rose: at least one past-year MDE was reported by

8.9% of people living below the FPL, 7.9% of those with incomes up to 199% of FPL, and 5.8% of those with incomes higher than 200% of the FPL (CBHSQ, 2014). Given the evidence supporting the links between gender, SES, and mental health (e.g., Aneshensel & Sucoff, 1996; Belle, 1990; Jackson & Williams, 2006), this paper expands the examination of the relationship between childhood welfare participation and depression in young adulthood to include the investigation of whether these relationships differ by household income levels and by respondents' gender.

Theoretical Framework: Wider Determinants of Health Model

The Wider Determinants of Health model (Dahlgren & Whitehead, 1991) suggests that good health is produced by the complex interrelationships of genetic make-up, age, gender, behavioral factors (e.g., lifestyle choices of physical activity and dietary habits), social determinants (e.g., work environment, transportation, education, health and social care services, unemployment, and welfare), and other physical and social environmental factors. Indicating that biological risk may be environmentally triggered (i.e., epigenetic risk), an increasing number of studies have demonstrated a significant impact of the social determinants of health on individual health status. Among other factors, the social determinants of health include quality of housing, suitability of work, and access to health care and social welfare services (Bambra et al., 2010; Marmot et al., 2008; Viner et al., 2012).

The Commission on Social Determinants of Health of the World Health Organization (2017, para. 1) defines the social determinants of health (SDH) as follows:

The conditions in which people are born, grow, live, work and age. These circumstances are shaped by the distribution of money, power and resources at global,

national and local levels. The social determinants of health are mostly responsible for health inequities - the unfair and avoidable differences in health status seen within and between countries.

Poverty, as one SDH factor, makes it extremely difficult for people to consume healthful food, maintain healthy lifestyles (including access to health services), access safe housing and living environments, and receive quality education. These resource gaps contribute to poor health, especially for low-income and disadvantaged people. To counter-balance this statement, welfare programs have been designed to increase well-being by providing assistance in meeting basic needs, and providing access to services and supports for individuals, families, and communities in need. Researchers commonly find that exposure to environmental risks during childhood in domains such as socioeconomic, psycho-emotional, and parental lifestyle are significant predictors of depressive symptoms in adulthood (Elovainio et al., 2015). However, more research is needed to better understand the relationship between welfare policies and mental health outcomes, especially research focusing on young people (Bambra et al., 2010). The current study aims to fill this research gap by using data from a national longitudinal survey to examine the following three research questions:

1. Compared with young adults from non-welfare recipient families, do young adults from welfare-recipient families during childhood have different depression outcomes? (controlling for participants' individual, parental, and household demographic characteristics)?
2. Does the relationship of depression and welfare participation differ by household income level?

3. Does the relationship of depression and welfare participation differ by young adults' gender?

Method

Data and Sample

This study used survey data from the National Longitudinal Study of Adolescent to Adult Health (Add Health). Add Health is a longitudinal survey of a nationally representative cohort of students in Grades 7 to 12 that began collecting data during the 1994-95 academic year. Participants have been followed into young adulthood (ages 24 to 34 years at Wave IV) with four waves of in-home interviews (Wave I, 1995, $N = 20,745$; Wave IV, 2008-09, $N = 15,701$). The Add Health study has yielded rich data tracking dimensions of participants' social, economic, psychological and physical from childhood to adulthood well-being as well as other relevant health-related measures (See Harris, 2013, for detailed information on the Add Health survey design). In addition, the Add Health survey collected parent information at Wave I ($N = 17,670$).

The study sample for this paper consisted of 15,701 respondents with complete data for the Wave I and IV Add Health surveys. In addition, study data included the respondents' family background and parental information to allow for the examination of the relationship between welfare participation as a child and depression as a young adult. Considering the large amount of missing data for certain variables included in the analytic model (see Table 2.1), this study used multiple imputation to handle the missing data.

Table 2.1
Missingness of Variables

Variable	Before Multiple Imputation					After Multiple Imputation (n = 15,701) ¹	
	n	# Missing	% Missing	M	SE	M	SE
Dependent Variables (Wave 4)							
Diagnosed depression	15698	3	0.02	0.10	0.30	0.10	0.00
Depression scores	15701	0	0	5.29	4.13	5.29	0.03
Independent variable							
Childhood welfare receipt	15533	168	1.07	0.19	0.40	0.20	0.00
Covariates (Wave 1)							
<i>Young adult level</i>							
Gender (male=1)	15701	0	0	0.47	0.50	0.47	0.00
Age	15701	0	0	15.10	1.75	15.10	0.01
Race	15688	13	0.08	3.54	1.65	3.54	0.01
General health	15689	12	0.08	2.12	0.91	2.12	0.01
<i>Parental level</i>							
Health status	13560	2,141	13.64	1.17	0.45	1.18	0.00
Education level	13497	2,204	14.04	5.48	2.37	5.46	0.02
Employment status	13332	2,369	15.09	3.11	1.21	3.11	0.01
Health insurance type	13480	2,221	14.15	2.60	1.12	2.61	0.01
<i>Household level</i>							
Family structure	15701	0	0	2.05	1.07	2.05	0.01
Household income	11917	3,784	24.1	46.39	50.47	45.63	0.51
Household size	15673	28	0.18	3.63	1.65	3.63	0.01
Neighborhood safety	15626	75	0.48	0.89	0.31	0.89	0.00
Survey weight	14800	901	5.74	1484	1435	1483	12

Note. ¹ The M(mean) and SE(standard error) for each variable were aggregated based on the 20 imputed files.

Measures

Dependent variables. The dependent variables were defined as two dimensions of depression among young adults in Wave IV: *Self-report depression scores* and *diagnosed depression*.

Self-report depression scores. Self-reports of depression were measured at Wave IV using the Center for Epidemiologic Studies-Depression Scale (CES-D; Radloff, 1977). The CES-D scale is composed of 20 items that ask respondents to rate the extent to which they agree with statements describing behavior in the past week. The Add Health survey contained 18 of 20 CES-D items for Wave I and Wave II, and included nine items for Wave

III and Wave IV. Example CES-D items used in the Add Health survey are given below:

How often was the following true during the past seven days? You were bothered by things that usually don't bother you; You could not shake off the blues, even with help from your family and your friends; You had trouble keeping your mind on what you were doing; You felt depressed; You felt that you were too tired to do things; You felt sad; You felt that people disliked you.

Responses to the items were captured using a 4-point (0 to 3), with higher scores indicating greater agreement with the statement. Responses for the nine items included in the Wave III and Wave IV surveys were summed, with higher values indicating a greater severity of depression. The CES-D has concurrent validity with other self-report depression scales (Radloff, 1977). The CES-D also has acceptable internal consistency based on Add Health Wave IV data, with an overall Cronbach's alpha of 0.81.

Diagnosed depression. The variable indicating the respondent had received a clinical diagnosis of depression from a doctor, nurse, or other health care provider after the age of 18 was a dichotomous variable (yes = 1, otherwise = 0).

Variable of interest. Childhood welfare participation was measured by asking participants, "Before you were 18 years old, did anyone in your household ever receive public assistance, welfare payments, or Food Stamps?" Responses to the questions were based on data from Wave III; for participants missing Wave III data (18%), responses were based on the same question from Wave IV data. About 20% of participants reported that their family that received some form of public assistance.

Covariates. This study controlled for demographic and socioeconomic variables at the young adult, parental, and household levels. At the young adult level from Wave I,

control variables included *gender* (1 = female; 0 = male), *age* (continuous variable), and *race/ethnicity*. *Race/ethnicity* was recoded as three dummy variables (reference group = White): Black, Hispanic, Others (e.g., Asian, Native American and mixed). *Childhood general health* status at Wave I was also controlled by asking participants to rate their general health. Responses were recoded as a dummy variable (1 = *excellent/very good/good*; 0 = *fair/poor*).

At the parental level (usually the resident mother), the analysis controlled for *parental health status, education levels, employment status* and *health insurance type* using Wave I data. *Parental health status* was recoded as two dummy variables: *fair* and *poor* (reference group = good). *Parental education* was measured by the highest education level for either of the parents using nine categories that ranged from Grade 8 or less (coded as 1) to professional training beyond a 4-year college or university degree (coded as 9). *Employment status* was coded as three dummy variables (reference group = full-time employed): unemployed and not looking for a job; unemployed and looking for a job, and part-time employed. *Health insurance type* was coded as four dummy variables (reference group = uninsured): Medicare or Medicaid, private insurance (e.g., Blue Cross/Blue Shield or Cigna), prepaid health plan (e.g., a health maintenance organization [HMO]), other insurance types.

At the household level, this study controlled for *family structure*, which was measured as three dummy variables (reference group = two biological parents): two parents but only one biological parent; single parent; and other (e.g., foster parents). *Household income* was measured by asking parents to report the total before-tax income all persons in the family received in 1994, including income from welfare benefits, dividends, and all other sources (range: \$0 to \$999,000). *Household size* (number of persons living in the household),

and self-perceived *safety in their neighborhood* (1/0) from Wave I were also controlled in the analytic models.

Analytic Strategies: A Four-fold Analysis Strategy

Missing data analysis. Because some of the variables had more than 5% missing values (see Table 2.1), multiple imputation was used to estimate those values for each variable using Stata 13.0 (i.e., estimates computed using “mi” syntax to impute missing values by chained equations). Twenty imputed files were generated for further analysis.

Propensity score greedy matching. Because this study used secondary data, the two groups (i.e., those with and those without childhood welfare participation) were not composed of randomly assigned participants. Therefore, the analysis used propensity score matching (PSM) methods to reduce possible selection bias; specifically, the analysis used propensity score greedy matching with the nearest neighbor within caliper. For each “treated” subject (in this case, a welfare recipient), a “control” subject with the closest propensity score within a predetermined common-support region (also called caliper) was selected (Guo, Barth & Gibbons, 2006; Guo & Fraser, 2015). Following Rosenbaum and Rubin’s (1985) suggestion, 0.01 was used as the caliper.

A three-step PSM process was used following the approach recommended by Guo and Fraser (2015). In Step 1, logistic regression based on all the co-variates was used to estimate separate propensity scores for each participant indicating the propensity of having been a welfare-recipient during childhood. Step 2 used the estimated propensity score obtained for each participant to determine whether the scores had a common-support region, which would permit one-to-one nearest-neighbor matching and the use of 0.01, as the matching caliper. Following matching, balance checks using standardized mean differences

based on Rosenbaum and Rubin (1985) were conducted. By running the syntax of “*pstest*” after “*psmatch2*”, the Stata output presents a “percent bias reduction,” indicating the differences of standardized mean between the unmatched and matched samples. In Step 3, ordinary least squares (OLS) regression was used with the matched sample to examine the relationship between welfare participation and depression scores. Logistic regression was used for the diagnosed depression outcome variable.

PSM was performed on each imputed file. Following the PSM procedures, I conducted post-matching analyses (i.e., OLS regression for depression score and logistic regression for diagnosed depression) based on the aggregation of matched samples of the 20 imputed files. In addition, the results of the analyses of three data sets are reported to allow comparison of differences across the three data sets: (a) the original data, with no imputation and no PSM; (b) the imputed data, but no PSM; and (c) the imputed data plus propensity score greedy matching.

Propensity score radius matching. Given that the greedy matching process had already reduced the sample size, I also conducted PS radius matching because this method can help retain as many as cases as possible in the analyses. To run radius matching, all the controls with propensity scores within the 0.01 radius were included in the final model. Stata generated a “weight” for each control case. Because Add Health data have survey weights, and using propensity score radius matching also produces weights, this study followed Ridgeway and colleagues’ recommendation to use sampling weights in the estimation of propensity scores and then to use sampling weights multiplied by propensity weights in the outcome regression models (Ridgeway, Kovalchik, Griffin, & Kabeto, 2015).

Finally, this study used a four-fold analysis strategy to triangulate the results by

presenting the regression results based on four permutations of data: (a) the raw data, (b) the imputed data, (c) the imputed data with greedy matching, and (d) the imputed data with radius matching.

Subgroup analyses. To answer Research Questions 2 and 3 (i.e., whether the relationship between welfare receipt and depression differs by household income levels or by respondents' gender), the whole sample was divided into five subsamples, with three subsamples based on Wave I household income levels and two subsamples based on gender. The income levels were defined using 1994 data and the 1994 federal poverty threshold (FPT):

- poor, total household annual income less than 100% FPT ($n = 1,670$; 14%);
- near poor, household income between 100% and 200% FPT ($n = 2,634$; 22%);
and
- non-poor, household income above 200% FPT; $n = 7,932$; 65%);

In addition, the sample was divided into two gender groups: males ($n = 8,352$, 53%) and females ($n = 7,349$, 47%). Then, the same multiple imputation, PSM, and post-matching analyses were conducted separately on these five subgroups.

Results

Table 2.2 shows the aggregated descriptive statistics for all variables of 20 imputed data files. On average, participants had an average self-reported depression score of 5.29 (out of 27), and about 10% of young adults had received a clinical diagnosis of depression after the age 18 years. About one fifth (20%) of the sample had received some form of welfare benefits during childhood (i.e., before age 18 years). The sample had slightly more females (54%) than males. At Wave I (1994), the average age of participants was 15 years old. About

half of the participants identified as White (53%), 22% identified as Black, 16% identified as Hispanic, 6% identified as American Indians or as other race, and 3% identified as Asian. The majority of the participants (93%) reported their general health as *excellent, very good* or *good*.

In terms of parental and household characteristics at Wave I, the average educational level fell between the post-high school *completed vocational/technical training* and *some college*. More than half (58%) of the parents were employed full time, 15% were employed part time, 21% were unemployed and not looking for work, and 6% were unemployed and looking for a job. The majority of parents identified their health status as *good* (85%). About 10% of parents used Medicare or Medicaid as their health insurance, about half (48%) had private insurance, about one-quarter of parents used a prepaid health plan, and 13% of parents did not have health insurance at Wave I. More than half (52%) of the youth participants lived in a household with two biological parents at Wave I. The average household size at Wave I was 3.63 persons. Only 11% of young adults felt unsafe in their neighborhoods.

Testing the Relationship Between Childhood Welfare Receipt and Young Adult Depression

This study used four different approaches to test the relationship between childhood welfare participation and young adult depression: (a) using the original data with missing values; (b) using imputed data; (c) using data based on multiple imputation and PS greedy matching; and (d) using data based on multiple imputation and PS radius matching. The first column in Table 2.3 shows results from list-wise deletion of missing data in the original dataset ($n = 12,004$), and controlling for all other variables. Shown in Table 2.3, column a, as

compared with non-welfare recipient counterparts, young adults whose families received welfare during their childhood (before age 18 years) had significantly higher depression scores. These scores were 0.594 higher ($p < 0.01$), and these young adults had a marginally significant ($p < 0.1$) 21.9% higher probability of being diagnosed with depression after the age of 18 as compared with their non-welfare recipient counterparts.

However, slightly different estimates were obtained with the imputed data files ($m = 20$; and each file has 15,701 observations; See Table 2.3 column b). When using the imputed data files for the depression score, the magnitude of regression coefficient was reduced to 0.474, whereas the significance level remained at the 99% level, which was the same as the original data. For diagnosed depression, the magnitude of the odds ratio increased to 25.7% and was statistically significant at the 95% level.

Using imputed data with propensity score greedy matching reduced the sample size to 5,200 (See Table 2.3 column c). When controlling for all the covariates, results showed young adults from welfare recipient families reported significantly higher depression scores than non-welfare recipients (higher by 0.450; $p < .05$). In addition, young adults from welfare recipient families had a 23.2% higher probability than their non-welfare counterparts of being diagnosed with depression after age 18 years; however, this value was not statistically significant at the 95% level.

When using imputed data with propensity score radius matching, the larger sample size ($n = 14,541$; See Table 2.3 column d) yielded an increased probability of a significant association between childhood welfare participation and both young adulthood depression scores (by .486, $p < .01$) and rates of diagnosed depression (by 32.6%, $p < .01$).

Table 2.2*Weighted Descriptive Statistics for Independent Variables, Add Health, Wave 1 (1994-1995)¹*

	Measures	M	95% CI
Dependent Variables			
Depression score	Sum of CES-D 9-item	5.29	[5.23, 5.36]
Diagnosed Depression	1=yes; 0=no	0.10	[0.10, 0.11]
Variable of interest			
Childhood Welfare participation	1=yes; 0=no	0.20	[0.19, 0.20]
Covariates			
Individual Level			
Male	1=yes; 0=no	0.47	[0.46, 0.48]
Age	year	15.10	[15.08, 16.13]
Race			
White	1=yes; 0=no	0.53	[0.52, 0.54]
Black	1=yes; 0=no	0.22	[0.22, 0.23]
Hispanic	1=yes; 0=no	0.16	[0.15, 0.17]
Other	1=yes; 0=no	0.09	[0.08, 0.09]
Good general health	(1 = Excellent/very good/good; 0=Fair/poor)	0.93	[0.92, 0.93]
Parental Level			
Health status			
Good	1=yes; 0=no	0.85	[0.85, 0.86]
Fair	1=yes; 0=no	0.11	[0.11, 0.12]
Poor	1=yes; 0=no	0.03	[0.03, 0.03]
Parental education level	Range: Grade 8 grade or less (=1) to Professional training beyond 4-year college/ university (= 9)	5.46	[5.42, 5.51]
Employment status			
Not working not looking for a job	1=yes; 0=no	0.21	[0.20, 0.22]
Not working, looking for a job	1=yes; 0=no	0.06	[0.05, 0.06]
Employed part time	1=yes; 0=no	0.15	[0.14, 0.15]
Employed full-time	1=yes; 0=no	0.58	[0.58, 0.59]
Health insurance type			
Medicare or Medicaid	1=yes; 0=no	0.10	[0.10, 0.11]
Individual or group private coverage	1=yes; 0=no	0.48	[0.48, 0.49]
Prepaid health plan	1=yes; 0=no	0.25	[0.24, 0.25]
Others	1=yes; 0=no	0.05	[0.04, 0.05]
None insurance	1=yes; 0=no	0.13	[0.12, 0.13]
Household Level			
Family Structure			
Single parent	1=yes; 0=no	0.29	[0.29, 0.30]
Two parents one biological	1=yes; 0=no	0.11	[0.10, 0.11]
Two biological parents	1=yes; 0=no	0.52	[0.51, 0.52]
Other	1=yes; 0=no	0.08	[0.08, 0.09]
Household Size	Number of people	3.63	[3.60, 3.65]
Household Income	Total 1994 household income before taxes (by thousands)	45.63	[44.61, 46.65]
Neighborhood safety	1=yes; 0=no	0.89	[0.88, 0.89]

Note. ¹Based on the aggregation of 20 imputed files; M = mean; CI= Confident Interval.

Table 2.3
Regression Results Using Different Datasets

	(a) Not Imputed	(b) Imputed	(c) Imputed with greedy matching	(d) Imputed with radius matching
Depression Score (β)	0.594** [.25 - .94]	0.474** [.19 - .77]	0.450* [.05, .85]	0.486** [.14, .84]
Observations	12,004	15,701	5,200	14,541
Diagnosed Depression (<i>OR</i>)	1.219 [†] [1.00 -1.66]	1.257* [1.04 - 1.51]	1.232 [.95, 1.60]	1.326** [1.08, 1.63]
Observations	12,004	15,701	5,200	14,541

Note. Regressions controlled for all covariates listed in Table 2.2; 95% confidence intervals are shown in brackets; Number of imputed files = 20. *** $p < .001$, ** $p < .01$, * $p < .05$, [†] $p < .1$, two-tailed.

Testing the Welfare–Depression Relationship by Household Income Levels

To obtain a better understanding of the relationship between childhood welfare participation and young adult depression, this study also tested whether the relationships differed by household income levels and by respondents' gender. Table 2.4 presents the results of subgroup analyses using imputed data with PS greedy matching, and shows the subgroup results by household income level (i.e., non-poor, near poor, and poor groups) and by gender (i.e., male and female subsample). Overall, young adults from welfare-recipient families had significantly higher depression scores. However, the subgroup analyses showed a statistically significant higher depression score (0.934; $p < .05$) only among the subsample of young adults from poor households (household annual income < 100% FPT in 1994) that received welfare during their childhood.

Overall, the results showed no statistically significant group differences on the diagnosed depression outcome. However, a statistically significant higher probability (89%; $p < .01$) of being diagnosed with depression was found among the near-poor group from welfare-recipient families. Interestingly, young adults from welfare-recipient families had higher depression scores, but this difference was significant only among the poor household

subsample, and was not significant for the near-poor subsample. Young adults from welfare-recipient families had higher probability of being diagnosed with depression, but this difference was statistically significant only among the near-poor families group and not the poor families group (See Table 2.4, Column B). Results based on imputed data with propensity score radius matching yielded similar trends as found using greedy matching (See Table 2.5, Column B).

Table 2.4

Regression Results Based on Imputed Data with Propensity Score Greedy Matching

	(A)	(B)			(C)	
	Full sample	By income level (Wave I)			By gender (full sample)	
		> 200% FPT (Non-poor)	100-200% FPT (Near Poor)	< 100% FPT (Poor)	Female	Male
Depression Score (β)	0.450* [.05, .85]	0.381 [-.29, 1.05]	.287 [-.41, .98]	0.934* [.06, 1.81]	.494 [†] [-.09, 1.06]	0.442 [†] [-.08, .96]
Diagnosed Depression (OR)	1.232 [.95, 1.60]	1.094 [.70, 1.72]	1.889* [1.07, 3.35]	1.269 [.77, 2.10]	1.342 [†] [.96, 1.87]	1.181 [.68, 2.04]
Observations	5,200	1,968	1,446	1,418	2,792	2,238

Note. FPT = federal poverty threshold; Regression analyses controlled for all covariates listed in Table 2.2; 95% confidence intervals are shown in brackets; *** $p < .001$, ** $p < .01$, * $p < .05$, [†] $p < .1$, two-tailed.

Testing the Welfare–Depression Relationship by Gender Groups

In terms of gender differences on the relationship between welfare participation in childhood and depression in young adulthood, Table 2.4, Column C shows that, as compared with females from non-welfare recipient families, females who came from welfare-recipient families had marginally significant ($p < .1$) higher depression scores and an associated higher probability of being diagnosed with depression. For males, as compared with their non-welfare recipient counterparts, males who came from a welfare-recipient family had only a marginally significant higher depression score, and the results showed no statistically significant group differences for the probability of males being diagnosed with depression. Results from propensity score radius matching showed similar trends for the gender

differences, with the exception of female welfare recipients had statistically significant higher depression scores (.489; $p < .05$) and a 38.1% higher probability of being diagnosed with depression ($p < .05$; see Table 2.5, Column C).

Table 2.5
Regression Results Based on Imputed Data with Propensity Score Radius Matching

	(A)	(B)			(C)	
	Full sample	By income level (Wave I)			By gender (full sample)	
		> 200% FPT (Non-poor)	100-200% FPT (Near Poor)	< 100% FPT (Poor)	Female	Male
Depression	0.486**	0.351	.291	0.865*	.489*	0.454 [†]
Score (β)	[.14, .84]	[-.15, .85]	[-.36, .94]	[.16, 1.57]	[.00, .98]	[-.02, .93]
Diagnosed	1.326**	1.006	1.935**	1.339	1.381*	1.150
Depression (OR)	[1.08, 1.63]	[.68, 1.48]	[1.24, 3.03]	[.84, 2.15]	[1.05, 1.81]	[.68, 1.94]
Observations	14,541	9,661	2,921	2,175	7,512	6,588

Note. FPT = federal poverty threshold; Regression analyses controlled for all covariates listed in Table 2.2; 95% confidence intervals are shown in brackets; *** $p < .001$, ** $p < .01$, * $p < .05$, [†] $p < .1$, two-tailed.

Discussion

The four-fold results suggest that young adults whose childhoods included living in families that participated in welfare programs had significantly higher depression scores as compared with young adults whose families did not receive any form of public assistance. In addition, the findings suggest that young adults from welfare-recipient families had a higher chance of being diagnosed with depression. However, the level of significance varied. A non-significant ($p > 0.1$) relationship was found based on OLS regression with greedy matching ($n = 5,200$) and imputation of missing information, a marginally significant ($p < 0.1$) relationship was found based OLS regression with no adjustments for selection and without imputation ($n = 12,004$), whereas a statistically significant ($p < 0.05$) relationship was observed based on radius matching ($n = 14,541$) with imputation and OLS with imputation ($n = 15,701$). Therefore, using different sample sizes (based on the analytic method used) produced slight differences in statistical significance values based on the level of estimations.

As noted, when greedy matching was used, the sample size was substantially smaller, and the results of the greedy matching analysis did not reach statistical significance. In contrast, when radius matching was used, which preserved the larger sample size, the analysis produced significant outcomes. This difference in significance serves as a cautionary note, especially for those working with large datasets. Researchers must be cautious when making conclusions based on large datasets because the large sample size has an inherent risk of producing false significant results.

Subgroup analyses suggest that higher depression scores occur principally among the group of young adults raised in poor welfare-recipient families. No statistically significant group differences were found when the whole sample was considered, whereas the subgroup analyses indicated only the near-poor group had a statistically significant higher probability of being diagnosed with depression. In addition, a significant gender difference was observed, indicating that females who came from welfare-recipient families had both marginally significant higher depression scores and a higher probability of being diagnosed with depression. When using propensity score radius matching, childhood welfare participation among females was significantly associated with both depression outcomes. Consistent with previous studies on the subject (e.g., Dooley & Prause, 2002; Kalil, Born, Kunz, & Caudill, 2001; Knab, Garfinkel, & McLanahan, 2006; Pande, 2014), this study found that females from welfare families reported higher incidences of depression compared to non-recipient females. Therefore, to improve the mental health of socioeconomically disadvantaged female groups, developing gender-specific screening and treatment programs for this vulnerable population is strongly recommended.

The subgroup analyses of this study offer rich opportunities for further investigation

of the between-group differences among the three income level groups and the two gender groups. The subgroup analyses yielded very interesting findings regarding the association of welfare receipt during childhood and young adult depression relative to household income and participant gender. The nuanced understanding afforded by the subgroup analyses would have been lost if the study design had not included splitting the sample into subgroups. Such findings have important implications for policy makers. To make best use of limited resources, policy makers must ensure that anti-poverty policies target the correct segment of the population for the desired outcome.

This study also has implications for future research that might use welfare participation as a “marker” in subgroup analyses. The results of this study demonstrate the utility of using welfare participation as a marker in subgroup analyses to identify the target population for future interventions. Among the poor, near-poor, and females, young adults from welfare-recipient families are the most vulnerable population for succumbing to depression. Therefore, when developing anti-poverty policies or interventions, these subgroups warrant greater attention. These findings can be valuable to social workers and mental health providers in designing intervention or prevention programs targeted to specific vulnerable populations such as young females from low-income families. Grote and colleagues (2015) have developed a promising intervention called MOMcare intervention, which is a collaborative care program (comprised of a behavioral health specialist, the patient’s OB/GYN provider, a psychiatrist, and a social worker). The program aims to address perinatal depression of socioeconomically disadvantaged pregnant women (mean age = 27 years) in the United States, and randomly assigned 168 women into two groups (treatment = 83; control = 85). Brief interpersonal therapy (IPT; 8 sessions) plus

antidepressant medication (or both) were provided to the women in the treatment group, whereas the control group women received the usual standard of care (i.e., Intensive Maternity Support Services). Grote et al. (2015) found that the MOMcare significantly improved the treated women's depression severity and remission rate compared with the control group. Therefore, adapting such an integrated care program for vulnerable populations in the future is recommended.

The subgroup analyses also revealed the reversed significance of the two outcomes among the poor group (significant on depression scores rather than diagnosed depression) and the near-poor group (significant on diagnosed depression rather than depression scores). Possible explanations draw on the social determinants of health perspective. The seeming conundrum of higher depression scores and lower rates of depression diagnoses of the poor group might reflect that although these young adults were suffering with depression, they did not have access to clinics for depression screening and formal diagnosis.

The study has several limitations that must be acknowledged. First, the Add Health dataset lacks information on participation in specific welfare programs. Without this information, it is impossible to know if one form of public assistance has a stronger relationship with mental health outcomes of welfare recipients; thus, the study findings have limited policy implications for specific welfare programs. Given this limitation, the findings of this study should be considered as suggested relationships that have implications at only the general welfare policy level. Second, this study has potential threat to internal validity because the comparison groups of welfare participation were not randomly assigned, and this study uses a PSM approach to reduce the selection bias. However, PSM mimics the randomization process only based on the selected control variables, and has potential bias

missing some indicators that may affect the welfare-depression relationship. Last, although propensity score analysis controls selection bias for the effects of household welfare participation based on the observed variables, this analytic approach is vulnerable to unobserved heterogeneity.

Despite the limitations, this study has several unique strengths that contribute to the literature on the long-term impact of welfare policies on individual mental health, using the indicator of depression experienced in young adulthood, and focusing on vulnerable populations, using the indicator of welfare participation during childhood. First, using the Add Health nationally representative longitudinal dataset allows broad generalization of the findings as well as the exploration of the long-term effects of welfare participation. Second, this study used Multiple Imputation to mitigate against the potential risk of increasing Type I errors posed by the reduction in sample size due to missing data. Using multiple imputation also decreases the chance of uncovering significant differences in adult health outcomes among different welfare recipients when such differences actually exist. Third, this study used two propensity score matching methods (greedy and radius matching) to reduce sample selection bias, yielding more robust results. The paper presents a comparison of four estimation approaches using (a) raw data; (b) imputed data; (c) imputed data with greedy matching; and (d) imputed data with radius matching, which showed more nuanced results based on the different sample size. Last, this study included a subgroup analysis, which allows further exploration of whether the relationship between childhood welfare participation and young adult depression differs by income levels and gender.

In conclusion, the findings of this study suggest that former welfare participants—especially young women—may not have sufficient information and awareness about

depression and its symptoms either to seek help or may not have access to mental health clinics, especially those living in rural and inner city areas (Cook et al., 2004). When young adults are seen by their primary care providers, physicians and others should focus on all aspects of health. Given these SDH-informed explanations, it is recommended that welfare policy makers expand Medicaid coverage for mental health screening and treatment. In fact, current Medicaid policy has many obstacles to patients using mental health services and provides limited coverage for treatment of depression.

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PAPER III

EXPLORING THE RELATIONSHIP BETWEEN WELFARE PARTICIPATION AND DEPRESSION AMONG YOUTH IN CHINA

Abstract

Objective: Although welfare programs provide a safety net for low-income people by providing direct cash transfers, research suggests that receiving welfare benefits is associated with a variety of negative life course outcomes in China and other countries. However, little research has examined the relationship between Dibao, China's principal cash transfer program, and mental health outcomes, such as depression, among Chinese youth. The objective of this study is to explore the correlations between Dibao participation and rates of depression among youth (16-24 years) in China. **Method:** This study uses the 2012 China Family Panel Studies (CFPS) survey data to examine the relationship between Dibao participation and depression among Chinese youth. Propensity score matching based on multiply imputed datasets is used to reduce selection bias and to test the robustness of the main analytic results. In addition, analyses are conducted with 9 subgroups to provide a nuanced understanding of the relationship between welfare receipt and depression. **Results:** Youth from Dibao families had significantly higher depression scores than their non-Dibao counterparts. Results from 9 subgroup analyses showed 3 groups of Dibao recipients (i.e., rural Dibao youth, Dibao youth with a child, and female Dibao youth with a child) were at significantly higher risk for depression. Across the sample, higher depression scores were observed for female youth, youth with lower education levels, youth employed full-time,

youth with perceived low social status, youth from rural areas, and youth whose mothers had low education levels. **Discussion:** Several potential explanations of the findings of this study are offered. In addition, the discussion explores the study's implications for policy makers and value toward informing the development of appropriate eligibility evaluation methods, refining the Dibao application process, and designing specific health care programs for the high vulnerable populations.

Exploring the Relationship Between Welfare Participation and Depression Among Youth in China

Introduction

Although almost all countries have means-tested welfare programs that provide a safety net for low-income people, these programs have an inherent double-edged sword quality. On the one hand, welfare programs provide direct cash transfers to low-income households to ensure that basic needs are met. On the other hand, receiving welfare benefits appears to have negatively associated with recipients' psychological and mental health outcomes because, according to the literature, of the demanding and demeaning application process for means-tested programs (Gao, 2017). This conundrum has been the focus of an increasing number of studies that have examined the effects of welfare participation, and especially a large body of literature that has examined cash transfer programs in developing countries.

Welfare programs are government regulated/sponsored programs intended to aid those who live under the minimum income level or threshold as determined by each government. Welfare benefits take many shapes such as cash assistance programs, which can be conditional or unconditional programs; food assistance; utility assistance; medical assistance; or vocational training/rehabilitation services. Unconditional welfare programs are those that benefit a large percentage of the population, such as the U.S. Social Security program and the Chinese Dibao program. Conditional welfare programs benefit a smaller percentage of the population but participants must meet certain eligibility requirements to obtain benefits. For example, the Brazil *Bolsa Familia* program and the Mexico *Oportunidades* program.

Internationally, welfare programs (e.g., cash transfer programs) have been shown to

positively correlate with a better range of health outcomes among program recipients (Lagarde, Haines, & Palmer, 2009). For instance, in Brazil, children participating in the *Bolsa Familia Programme* households had better nutritional outcomes (Page-Adams, Scanlon, Beverly, & McDonald, 2011). In Mexico, health researchers examining the effects of the conditional cash transfer project Progresa (now called Oportunidades) on child health, especially anemia, found significant markers of better health among children participating in the Progresa program, which included cash transfers, nutritional education, and nutritional supplements. Specifically, as compared with children who did not participate in Progresa, the participating children had significantly higher mean hemoglobin values after 1 year (Rivera, Sotres-Alvarez, Habicht, Shamah, & Villalpando, 2004). In Malawi, low-income adolescent schoolgirls who participated in the Zomba conditional cash transfer program showed reduced rates of HIV infection and herpes simplex type 2 infections as compared with their counterparts who did not participate in Zomba (Baird, Chirwa, McIntosh, & Ozler, 2010; Baird, Garfein, McIntosh, & Ozler, 2012).

Moreover, participating in some cash transfer programs has been shown to associate with better mental health outcomes of youth recipients. For example, the South African Child Support Grant program, which is an unconditional cash transfer program, was shown correlated with positive mental health status of participating youth (Plagerson, Patel, Harpham, Kielmann, & Mathee, 2011). However, program participants reported experiencing high levels of social stigma stemming from the widely held view that people who receive welfare benefits such as cash transfers are lazy and irresponsible (Hochfeld & Plagerson, 2011). The social stigma experienced by those who participate in welfare programs is likely to lead to increased stress and anxiety among program participants, which in turn, might lead

these vulnerable individuals to drop out of the program and fall deeper into poverty (Frazer, 2011).

Similar welfare-associated stigma has been reported in China. Beginning in 1993, China implemented one of the world's largest unconditional cash transfer programs: The Minimum Livelihood Guarantee program, also known as *Dibao*. Studies have revealed stigma associated with participating in *Dibao* has reduced the take-up rates of the program, and led to recipients reporting feelings of shame and despair because they were receiving *Dibao* benefits (Gao, 2017; Li & Walker, 2016; Solinger & Hu, 2012).

To date, the literature has primarily focused on the general population, and little research has examined the relationship between *Dibao* participation and youth depression in China. This paper sought to fill this knowledge gap given that youth depression in China has become one of the most common mental disorders, and a pressing social problem because of serious consequences such as high rates of youth suicide (Phillips, Li, & Zhang, 2002; Zhang, Shai, & Wang, 2016). This paper presents findings from an examination of the relationship between welfare participation and rates of depression among youth, using a newly available dataset from a national household survey conducted in China.

Dibao: One of the Largest Welfare Programs in the World

Dibao was created by the Chinese Central Government to ensure that lower income households would not fall below a minimum living standard. *Dibao* was first initiated in Shanghai, where the program has operated successfully since 1993. Based on the success of the Shanghai program, in 1999, *Dibao* was scaled up as a nationwide program (Gao, 2017; Gao, Garfinkel, & Zhai, 2009; Gao, Wu, & Zhai, 2015). Similar to many public services in China, *Dibao* is a *hukou*-based policy. The Chinese *hukou* system is a government system of

household registration that limits where people live, attend school, and enroll for public programs such as Dibao. Hukou imposes barriers between rural and urban areas by restricting in-country mobility. Hukou is always tied to the family's location of origin. For example, a child born in an urban area to in-country migrants from a rural area will have a rural hukou because the parents' have a rural hukou. In addition, many Chinese governmental policies are tied to hukou, and thus, restrict individuals' access to education, employment, health care, and welfare benefits (Chapman, Zhu, & Wu, 2013; Wu & Wu, 2013).

The Chinese government developed the Dibao program to provide a social safety net for the large subpopulation of low-income people in China. Based on data from the Ministry of Civil Affairs (2015) annual reports, totaled Dibao expenditures for the 2015 fiscal year was nearly 165 billion yuan. Specifically, urban Dibao expenditure was almost 71.9 billion yuan, whereas rural Dibao expenditure was about 93.2 billion yuan. By November 2016, Dibao was serving about 4.4% of China's population, which translates to more than 60.5 million recipients, of whom 45.6 million lived in rural areas and 14.9 million lived in urban areas. Dibao covered about 8.6 million urban households, and about 26.3 million rural households (Ministry of Civil Affairs, 2016).

Development Stages. More than 20 years have passed since the initiation of the Dibao program in Shanghai. Gao (2017) concluded the development of the Dibao program has experienced four stages. Stage 1, (1993-1999) was the initial scale-up of local pilot programs to a national program of Dibao in urban areas. In Stage 1, Dibao covered nearly one million low-income urban citizens. Stage 2 (2000-2007), was marked by the expansion of the Dibao program to rural areas of China (see Figure 3.1). In the early years of Stage 2, the number of urban dwellers covered by Dibao increased dramatically and then stabilized at

around 22 million recipients. The initial implementation of Dibao in rural areas covered around 4 million rural recipients; from 2005 to 2007, the number of rural Dibao recipients has increased by almost twofold each year, increasing from (8.3 million in 2005, to 15.9 million in 2006, to 35.7 million in 2007; See Figure 3.1). Given this rapid expansion of the rural Dibao program, the number of rural Dibao recipients surpassed the number of urban Dibao recipients in 2007. Stage 3 (2007-2013) development saw the “stabilization and standardization of urban and rural Dibao” Gao (2017, p.20). During Stage 3, the number of rural Dibao recipients continued to increase, reaching a peak in 2013 with nearly 53.9 million recipients. In contrast, the urban program remained stable at about 23 million but then decreased to 20.6 million recipients in 2013. Stage 4 development includes the period from 2014 to the present time. This stage of development is described as the maturation of the Dibao program as the system moves “toward the establishment of a comprehensive social assistance system” (Gao, 2017, p. 24).

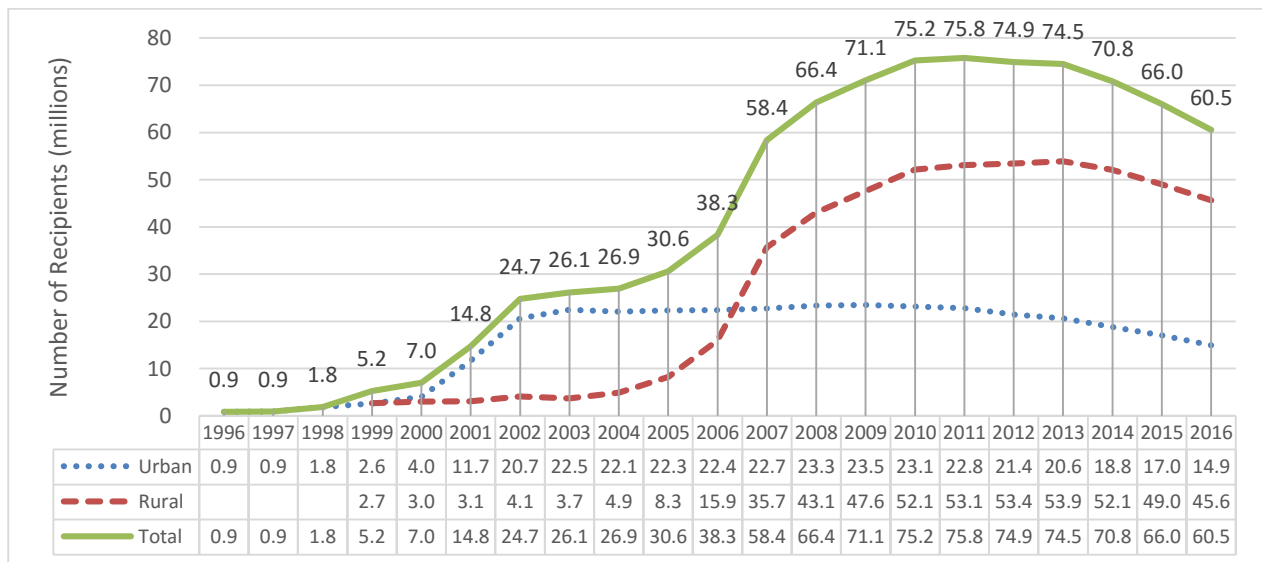


Figure 3.1. Total Dibao recipients (by million). Sources: Author’s calculations using data from the National Bureau of Statistics (1996-2015) and monthly reports of the Ministry of Civil Affairs (November, 2016).

An important milestone of this last stage was the Central Government's creation of the "Provisional Regulations on Social Assistance" (2014). This regulation codified China's social assistance programs, and the regulation recognized Dibao as the predominant social assistance program. In addition, this regulation clearly outlined the Dibao application process, eligibility criteria, as well as the systems used for programing monitoring and checking recipients' household income. Because this regulation helps to ensure compliance with eligibility criteria, thus reducing target error, the number of Dibao recipients has been reduced each year since 2014 (see Figure 3.1 for details).

Eligibility. Eligibility for Dibao benefits is based on the average income of all members of an applicant's family, and this amount must be below the Dibao threshold, which varies by location. The Dibao threshold is determined by the local government where the applicant's hukou is registered (Wu & Ramesh, 2014). Family membership is defined as including (a) spouse, (b) minor children, (c) adult dependent children, (d) unmarried children with same hukou registration location, (e) grandchildren whose parents are deceased and are dependent on the grandparents for support, and (f) other eligible members as acknowledged by the Civil Affairs Department (Central People's Government of China, 2014). The calculated household total income amount includes all members' basic salary, allowances, subsidies, and bonuses as well as all other earned income from farming, nonagricultural self-employment, and informal or casual jobs. Additionally, the income calculation includes household assets, savings, stocks, bonds, and funds. Eligibility for Dibao benefits also accounts for the condition of the applicant's housing, the ability of other household members to work, and the health status of each household member (e.g., disability or illness).

The Dibao thresholds vary substantially at the county level, different provinces set

different Dibao thresholds, and rural areas have different thresholds from urban areas (see Appendix 3.A). In addition, Dibao threshold is adjusted for the regional differences in cost of living. For example, urban households in Beijing with a monthly income of less than 500 yuan are eligible for Dibao benefits. In contrast, a monthly income of 500 yuan for a household in a rural province—where housing, food, and transportations costs are considerably lower than urban areas—might be too high for the family to qualify for Dibao benefits. In 2011, the average urban-rural gap in Dibao benefits was 141 yuan.

Since 2015, governments in several major cities have sought to narrow the urban-rural Dibao gap by adopting equal benefit amounts or *lines* for rural and urban Dibao, called the *integrated urban-rural Dibao line* (*chengxiang binggui*). Public data on the Ministry of Civil Affairs website indicated that by the end of 2016, 32 cities had adopted the integrated urban-rural Dibao line or similar strategy. The adoption of more equitable Dibao lines in these 32 cities has the monthly urban-rural Dibao gap to less than 50 yuan (see Appendix 3.B), such as Shanghai, Suzhou, Beijing, and Guangzhou. In addition, the highly urbanized area of Beijing established a more lenient Dibao poverty threshold for all Beijing households given the higher cost of living. Moreover, the Beijing government recently modified the eligibility criteria for households with members who have a serious illness (e.g., leukemia, severe mental illness, and HIV/AIDS) or severe disabilities. These changes were introduced in 2014, and raised the poverty threshold to 877.5 yuan per month for households with special needs (Beijing Municipal Civil Affairs Bureau, 2015). Therefore, although many cities still have high urban-rural Dibao gaps, certain economically developed cities have started to narrow the Dibao gap. In addition, the number of cities that have adopted the integrated urban-rural Dibao line is increasing steadily over time.

Dibao benefits. Dibao is a form of subsidy assistance based on means-tested criteria that account for the applicant's location and local Dibao line (i.e., assistance level). The basic premise is that each Dibao beneficiary receives the difference between the local Dibao line and the average household monthly income. In addition, Dibao uses a case-by-case checking system to consider each participant's situation such as caring for family members with serious disabilities or illness, or family members who are very old adults. In these types of special circumstances, applicants might qualify to receive additional subsidies or their household income could be adjusted accordingly. In addition, Dibao benefits are adjusted based on the respective urban and rural consumer price indexes. Therefore, each family and each individual in a household might receive a different amount of Dibao benefits.

Dibao misses the target: Partial delivery and incomplete coverage. To strengthen the social safety net work, the Chinese government also offers several additional benefits to eligible Dibao recipients. For example, Dibao recipients might qualify for a lower deductible on their medical insurance, scholarships for their children's education (e.g., free education, stipends for boarding students), employment assistance, housing assistance, heating cost assistance (for some Northern cities), utilities subsidies, and special assistance for victims of natural disasters. Understandably, these additional benefits are very attractive to many people of all income strata, and thus, many ineligible people try to participate in the Dibao program. Despite the means-tested and other eligibility criteria established for the Dibao program, the program has been threatened by overspending due to fraudulent receipt of Dibao benefits.

Further, the alarming high targeting error (i.e., *mis-targeting* or providing benefits to ineligible recipients) of the program is the result of inefficient program administration and high levels of corruption among Dibao program officials (Gao, 2017; Golan, Sicular, &

Umapathi, 2014; Solinger & Hu, 2012). To quantify the mis-targeting rate of the Dibao program, Golan and colleagues (2014) used rural household survey data from the China Household Income Project for 2007, 2008 and 2009, and found the mis-targeting rate for 2007 was 94%, for 2008 was 92%, and for 2009 was 86%. A similar high rate of program overspending was found by Han and Xu (2014) using other rural household survey data from five Central and Western provinces (i.e., Jiangxi, Anhui, Henan, Shanxi, and Gansu; $N = 9,107$), and found the rural mis-targeting rate was 73% in 2010.

Despite the extent of Dibao expenditure, a large percentage of the target population is not participating in the program. For example, Golan et al.'s (2014) report showed that among the Dibao-eligible population, the program had a take-up rate of only 16.3% in 2007, 6.7% in 2008, and 10.9% in 2009, meaning huge numbers of needy people were not covered by the Dibao program.

Impacts and correlates of Dibao. Although the Dibao program has encountered implementation problems at the national level (e.g., widespread inclusion and exclusion errors; Gao & Zhai, 2012), overall, the program appears to have reduced poverty in China. Notably, the poorer provinces of the country have demonstrated a superior record of poverty reduction compared to the more affluent provinces (Wu & Ramesh, 2014). However, the goal of anti-poverty of Dibao has not been achieved because Dibao's effectiveness has been constrained by its partial delivery and coverage (Gao, 2017).

A growing body of literature has shown that for both urban and rural Dibao households, their major expenditures were for health expenses (Gao, Zhai & Garfinkel, 2010; Gao, Zhai, Yang, & Li, 2014). Specifically, using the 2007 China Household Income Project urban survey data, Gao and colleagues (2014) found that urban Dibao recipients spent 48.9%

more on medicine and 38.2% more on medical care than their non-recipient peers. These findings support that the Dibao program has improved health care access by enabling urban recipients to afford health care and medicine. Similar findings have been reported for rural recipients. Using survey data from 2010 for 9,107 households in five Western and Central China provinces, Han and colleagues (2016) found that Dibao helped rural low-income families afford health care. These authors also showed that rural Dibao recipients spent a significantly larger portion (25%) of household income on health care expenditures. In addition, this study indicated that as compared to rural non-Dibao recipient families, rural Dibao families were more likely to prioritize the cost of health care over other consumption categories (e.g., education). The high expenditures and priority on health care and medicine among Dibao recipients reflect that health issues are a primary issue for low-income families in China.

Although Dibao participants have reported feeling happier because of receiving the Dibao subsidies and additional benefits, there is some evidence that the stigma associated with welfare receipt could also be demoralizing participants' subjective well-being (Gao, 2017). Evidence from qualitative studies (Han, 2012; Li & Walker, 2016) found that almost all interviewed recipients identified negative effects of welfare participation (i.e., stigma) on their lives and felt ashamed about receiving Dibao benefits. Using the 2002 China Household Income Project survey data, Gao (2017) found that Dibao recipients tended to be more pessimistic about future income, with 25% recipients (versus 19% of non-recipients) believed that their income would decrease over the next 5 years. In addition, Gao found Dibao recipients were more likely to be unhappy about their life situation, with 36% of recipients (versus 12% non-recipients) reporting they felt unhappy about their life situation. Similar

findings were reported from analyses that used CFPS 2010 data and showed that among urban Dibao recipients 17% reported feeling unhappy (vs. 8% non-recipients) and 29% felt dissatisfied about their general life situation (vs. 16% non-recipients; Gao, 2017). Among rural Dibao recipients, Gao (2017) found twice as many rural recipients (24%) than non-recipients (12%) reported feeling unhappy, and 26% rural recipients (vs. 15% non-recipient) reported feeling dissatisfied about their general life situation. Overall, these findings underscore the importance of paying attention to the chain of effects when providing material assistance to low-income people, specifically, the chain of effects related to Dibao participation manifested in recipients' psychological and mental health outcomes.

Correlates of Dibao. Several studies have explored a series of factors associated with Chinese Dibao participation. Generally, these studies had shown individual-level characteristics with a significant relationship to the probability of Dibao participation, including employment status (e.g., unemployment; Du & Park, 2007), income (e.g., low-income; Gao et al., 2009; Gao, Wu et al., 2015), education (e.g., lower education levels; Golan et al., 2014), health status (e.g., poor general health, or disability; Golan et al., 2014), and age (e.g., older age; Gao, 2017). At family level, household size (e.g., large family size; Golan et al., 2014), household structure (e.g., have a death of family member, female household head, and number of elders and children; Gao, 2017). Additionally, some research has shown that a family's geographic location (e.g., less developed regions; Gao, 2017; Gao, Wu et al., 2015) is also related to the probability of Dibao participation. Notably, the analytic models used in these research studies controlled for important covariates of gender, ethnicity, marital status, employment status, hukou, and regional location.

Over the past three decades, the Chinese economy has shown consistent yearly

growth (Wan, 2008). Although this economic growth has benefitted all sectors of Chinese society, the country's economic rise has also magnified social inequality and increased many social problems, including mental health problems such as depression. Given the rapidly changing nature of Chinese society, youth depression has become one of the most common mental disorders and most pressing social problem (Phillips, Li, & Zhang, 2002; Zhang, Shai, & Wang, 2016). Li and colleagues (2016) conducted a meta-analysis based on 14 papers (which included 72,402 participants of whom 12,318 had depression), and yielded an estimated prevalence of depression among Chinese children and youth was about 15.4% (95% CI [13.3%, 17.8%]). In addition, this study found higher prevalence of depression among boys (16.8%) than girls (15.6%); higher depression rates among rural children and youth (20.0%) than those from urban areas (16.2%); and a higher prevalence of depression among high-school students (23.3%) than middle-school students (16.2%).

Depression has many serious consequences. In China, depression is a leading cause of youth suicide, with suicide ranking as the top reason of premature mortality by injury (Zhang et al., 2010). Rates of youth suicide in China are greatest among youth and young adults between 15 and 24 years old. The rate of suicide is especially high among rural females, with one study reporting the average suicide rate during 1987–1994 for rural females in the 15 to 24 years age group was 42.53 per 100,000 persons, compared with only 1.05 per 100,000 persons for the youngest group (5 to 14 years), and 35.37 per 100,000 persons in the next highest age group (25 to 34 years; Zhang et al., 2010). In addition to depression, common reasons underlying youth suicide include family disputes and estrangement, chronic illness, poverty, psychological disorders and problems, and academic failure or poor performance (Phillips et al., 2002; Zhang et al., 2010). However, a recent systematic review (Wu, under

review) could not identify any empirical studies on welfare participation and youth depression in China. To address this knowledge gap, this study investigated the relationship between Dibao participation and youth depression in China.

Research Questions

This cross-sectional study aimed to examine the relationship between Dibao participation and depression among youth in China. To yield a holistic understanding of this relationship, this study was guided by the following research questions:

1. Does the prevalence of depression differ between youth from Dibao recipient families as compared with youth from non-Dibao recipient families (controlling for participants' individual, parental, and household demographic characteristics)?
2. Does the relationship between Dibao participation and depression differ by urban versus rural location?
3. Does the relationship between Dibao participation and depression differ by whether youth was also parent to a child?
4. Does the relationship between Dibao participation and depression differ by whether female youth was also parent to a child?
5. Does the relationship between Dibao participation and depression differ by household income levels?

Method

Data and Sample

This study used the China Family Panel Studies (CFPS) 2012 survey data. CFPS is a national longitudinal survey that collects new waves of data in even-numbered years. In odd-numbered years, CFPS focuses on data maintenance, including follow-up on specific

samples. The CFPS is conducted by Peking University's Institute of Social Science Survey, which collected the first wave of data in 2010 (Xie, 2012). CFPS uses a complex sampling method (i.e., a stratified, multistage, multilevel, and probability-proportional-to-size sampling protocol) to draw its sample from 25 provinces that encompass 94.5% of the residences of Mainland China (excluding Hong Kong, Macau, and Taiwan). The sample excludes six provinces (Tibet, Qinghai, Xinjiang, Ningxia, Inner Mongolia, and Hainan; for details of the study design, see Xie, Qiu, & Lü, 2012). CFPS did not survey the provinces with the five highest percentages of ethnic minorities and populations with high risk of poverty. Therefore, the results have limited external validity for ethnic minorities and related issues of poverty among minorities. However, the findings have high relevance for the Han, the predominant ethnicity in China that constitutes 92% of the population of Mainland China.

The CFPS 2012 dataset includes 43,849 individuals from 13,193 households. Of these, 25,474 individuals were from 7,082 households in rural areas, and 18,375 individuals were from 6,111 households in urban areas. The present study used a subsample of youth between the ages of 16 and 24 years old; the initial youth subsample had 5,887 youth from 4,369 households. This sample was reduced because of systematic missing data for the depression measures ($n = 1,347$), province data ($n = 17$), and duplicate records (i.e., personal ID; $n = 203$). In addition, 67 cases were dropped because respondent youth had extremely high scores on the depression measure (highest 1%), another 60 cases were dropped because they received other types of Chinese welfare programs (e.g., "Five Guarantees [*wubao*]"), and one case of a youth with foreign nationality was excluded from the final sample. These exclusions yielded a final analytic sample size of 4,192 youth from 3,345 households.

Measures

Dependent variable. *Depression* was measured using the Center for Epidemiologic Studies Depression scale (CES-D; Radloff, 1977). The CES-D consists of 20 items that ask participants to rate their level of agreement with statements describing their behavior in the past week. Sample items include, “You were bothered by things that usually don’t bother you; You could not shake off the blues, even with help from your family and your friends; You felt depressed.” Responses are captured on a 4-point scale (0 to 3). Responses for the 20 items were summed, with higher values indicating a greater severity of depression. The CES-D has concurrent validity with other self-report depression scales (Radloff, 1977). Additionally, the CES-D has acceptable internal consistency based on CFPS 2012 data, with an overall Cronbach’s alpha of 0.79.

Variable of interest. The key independent variable is whether a respondent’s family received Dibao benefits at any point during the year prior to the survey date (1 = *yes*; 0 = *no*). Overall, about 11% ($n = 457$) of youth reported that their families had received Dibao in the last year.

Control variables. Based on previous studies (Du & Park, 2007; Gao et al., 2009; Gao, Yang, & Li, 2015; Gustafsson & Deng, 2011; Wu & Ramesh, 2014), the present study controlled for the following individual characteristics: *age* (continuous, 16–24 years), *hukou* (1 = urban hukou; 0 = agriculture hukou or non-hukou [or without a hukou]), *gender* (1 = male; 0 = female), *ethnicity* (1 = minority; 0 = Han), highest education level (recoded as four binary variables: *primary school or less* [reference group], *middle school*, *high school*, and *bachelor [4-year] degree or higher*), life status (recoded as two dummy variables: *full-time students*, and *neither employed nor in school* [reference group: *full-time employment*]). In

addition, given that this study focused on youth, instead of controlling for marital status, the analysis controlled for whether the youth was the parent of a child, which could include teenage parents. See Table 3.1 for detailed measures.

The analyses also controlled for the following parental and household characteristics: *household yearly income per person* (total household yearly income divided by household size; continuous variable; log transferred), *self-perceived social class* (measured by self-reported social status in the local context; was recoded as two dummy variables: middle, and high [reference group: low]), *household size* (total number of people in the same household), and *geographic location* (urban = 1; rural = 0). This study also controlled for whether *both parents ate meals at home* (both parents ate at home = 1; at least one parent did not eat at home = 0) because this measure reflects family structure. Specifically, this measure reflects parental marriage status, whether the youth's parents were living, and if the youth was part of the "left behind population" (i.e., rural parents have migrated to cities for work, leaving children in care of others or living on their own). Moreover, previous research has indicated that a mother's education was an important predictor of child health outcomes (Chen & Li, 2009); therefore, this study controlled for maternal age (recoded as two dummy variables: 46 to 55 years; older than 55 years [reference group: less than 46 years]) and education (coded as three dummy variables: *primary; middle; high school or above* [reference group: 1 = *illiterate*]). See Table 3.1 for details of the distributions.

Table 3.1*Variable Descriptions of Whole Sample*

Variables	(a) Whole Sample (n = 4192)					(b) Non-Dibao recipients (n = 3725)					(c) Dibao Recipients (n = 457)					(d) Difference (non-dibao - Dibao)
	N	M	SD	Min	Max	n	M	SD	Min	Max	n	M	SD	Min	Max	
Dependent variable:																
Depression score (sum of CES-D)	4192	11.31	6.17	0	29	3735	11.19	6.11	0	29	457	12.30	6.56	0	29	- 1.10 ***
Independent Variables:																
Dibao (1=yes)	4192	0.11	0.31	0	1	3725	0	0	0	0	457	1	0	1	1	
Individual level																
Urban hukou (1=yes)	4192	0.21	0.41	0	1	3735	0.21	0.40	0	1	457	0.25	0.43	0	1	- 0.04 *
Age	4192	20.29	2.67	16	24	3735	20.31	2.66	16	24	457	20.08	2.72	16	24	0.24 *
Gender (1=male)	4192	0.47	0.50	0	1	3735	0.47	0.50	0	1	457	0.49	0.50	0	1	- 0.02
Minority (1=yes)	4192	0.04	0.19	0	1	3735	0.03	0.17	0	1	457	0.09	0.29	0	1	- 0.07 ***
Highest Education Level																
Primary and less	4192	0.24	0.43	0	1	3735	0.23	0.42	0	1	457	0.33	0.47	0	1	- 0.10 ***
Middle	4192	0.43	0.50	0	1	3735	0.43	0.50	0	1	457	0.42	0.49	0	1	0.02
High	4192	0.23	0.42	0	1	3735	0.24	0.42	0	1	457	0.18	0.39	0	1	0.05 *
Bachelor deg. & higher	4192	0.10	0.30	0	1	3735	0.10	0.30	0	1	457	0.07	0.26	0	1	0.03 †
Life Status																
Employed full-time	4192	0.35	0.48	0	1	3735	0.36	0.48	0	1	457	0.29	0.45	0	1	0.07 **
Full-time student	4192	0.38	0.48	0	1	3735	0.37	0.48	0	1	457	0.39	0.49	0	1	- 0.02
Not employed, not student	4192	0.27	0.44	0	1	3735	0.26	0.44	0	1	457	0.32	0.47	0	1	- 0.05 *

Variables	(a) Whole Sample (n = 4192)					(b) Non-Dibao recipients (n = 3725)					(c) Dibao Recipients (n = 457)					(d) Difference (non-dibao - Dibao)
	N	M	SD	Min	Max	n	M	SD	Min	Max	n	M	SD	Min	Max	
Has child (1=yes)	4192	0.16	0.37	0	1	3735	0.16	0.37	0	1	457	0.16	0.36	0	1	0.01
Household level																
Income (log)	4100	8.78	1.22	-1.61	12.68	3656	8.82	1.23	1.61	12.68	444	8.45	1.07	4.61	10.75	0.37 ***
Perceived social class level																
Low	4174	0.25	0.43	0	1	3720	0.24	0.43	0	1	454	0.31	0.46	0	1	- 0.06 **
Middle	4174	0.58	0.49	0	1	3720	0.58	0.49	0	1	454	0.55	0.50	0	1	0.04
High	4174	0.17	0.38	0	1	3720	0.17	0.38	0	1	454	0.15	0.36	0	1	0.03
Both parents eat at home	3828	0.83	0.37	0	1	3419	0.84	0.37	0	1	409	0.77	0.42	0	1	0.07 **
Mother's education level																
Illiterate	4165	0.24	0.43	0	1	3714	0.23	0.42	0	1	451	0.39	0.49	0	1	- 0.16 ***
Primary	4165	0.34	0.47	0	1	3714	0.35	0.48	0	1	451	0.31	0.46	0	1	0.04
Middle	4165	0.30	0.46	0	1	3714	0.31	0.46	0	1	451	0.22	0.42	0	1	0.09 ***
High school & above	4165	0.12	0.32	0	1	3714	0.12	0.33	0	1	451	0.08	0.27	0	1	0.04 *
Mother's age																
< 46 years	4138	0.53	0.50	0	1	3695	0.53	0.50	0	1	443	0.58	0.49	0	1	- 0.05 *
46-55 years	4138	0.41	0.49	0	1	3695	0.42	0.49	0	1	443	0.36	0.48	0	1	0.05 *
> 55 years	4138	0.06	0.23	0	1	3695	0.06	0.23	0	1	443	0.06	0.23	0	1	0.00
Family size	4192	4.68	1.74	1	14	3735	4.65	1.73	1	14	457	4.89	1.76	2	12	- 0.24 **
Urban (1=yes)	4192	0.41	0.49	0	1	3735	0.41	0.49	0	1	457	0.37	0.48	0	1	0.05 †

Note: T-test (for continuous variable) and chi-square test (for dummy variables) were used to test the group differences between Dibao and non-Dibao groups; *** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .1$, two-tailed.

Analytical Strategies

Main analytic approach. Because some of the variables had missing values (See Table 3.1 for each variable's observations), using the list-wise deletion method for dealing with missing data significantly reduced the analytic sample size (e.g., for the whole sample, after conducting ordinary least square (OLS) regression with list-wise deletion, the sample size was reduced by approximately 10%, from 4,129 to 3,706). Therefore, multiple imputation (i.e., using "mi" syntax in Stata) was used to estimate the missing values. Imputation created 20 imputed files. Based on the 20 imputed datasets, aggregated robust multiple regression was used to explore the relationship between participating the Dibao welfare program and depression among youth in China.

Sensitivity testing. As shown in Table 3.1, column d, more than half of the covariates had significant differences between the Dibao and non-Dibao groups, indicating a potential selection bias existed between the two groups. Therefore, propensity score radius matching was used to balance the group differences and to reduce the selection bias (Guo & Fraser, 2015); then, the results based on the balanced data were used to test the robustness of the results from the main analytic approach.

The following procedure was followed to run propensity score radius matching. For each imputed file, logistic regression based on all the covariates was used to estimate the propensity scores. Scores for each youth indicate the probability of youth family had received Dibao welfare benefits last year. Next, all the non-Dibao recipients with propensity scores within the 0.01 radius and within the common support region were included in the final analytic model (Rosenbaum & Rubin, 1985). Balance checks on all the covariates before and after matching were conducted to ensure the matching process was performed appropriately.

Last, based on the matched sample, aggregated robust OLS regression based on the 20 imputed files was used to test the relationship between Dibao participation and youth depression. All analyses were run in Stata 13.0.

Subgroup analyses. To answer Research Questions 2 through 5 using the 20 imputed datasets, this study divided the whole sample ($N = 4,192$; 11% received Dibao) into nine subgroups. Aggregated robust OLS regression was conducted separately on the following nine subgroups:

- a. Subgroups by geographic location:
 1. Urban sample, youth from urban areas ($n = 1,705$; 10% received Dibao)
 2. Rural sample, youth from rural areas ($n = 2,487$; 12% received Dibao)
- b. Subgroups by whether youth was parent to a child:
 3. Youth without child sample ($n = 3,511$; 11% received Dibao)
 4. Youth with a child sample ($n = 681$; 10% received Dibao)
- c. Subgroups by female with or without child:
 5. Female without child sample ($n = 1,733$; 10% received Dibao)
 6. Female with child sample ($n = 484$; 11% received Dibao)
- d. Subgroups of low-income population using different poverty thresholds:
 7. The lowest income level: youth total household income was the lowest level of the CFPS 2012 total sample (household income level was categorized into four levels: lowest = under 25%; mid-low= 25-50%; mid-high = 50-75%, and highest = higher than 75% population income level; $n = 873$; 15% received Dibao)
 8. Under Dibao line: youth average household income per person under the local provincial average Dibao line in 2011 (see Appendix 3.A for each province urban

and rural Dibao lines in 2011; $n = 509$; 16% received Dibao)

9. Under relative poverty line (youth household net annual income per person under 25% of the total youth sample: for urban sample in 2011: less than 5,530 yuan, and for rural sample: less than 3,400 yuan; $n = 1,011$; 16% received Dibao).

Results

Sample Descriptions

As shown in Table 3.1 column a, the average depression score was 11.31 ($SD = 6.17$) for this sample. The families of about 11% of youth had received Dibao during the last year. About one fifth (21%) of youth had urban hukou. The sample had slightly more females (53%) than males, the average age of the sampled youth was 20 years old, and only 4% of youth identified as an ethnic minority. About 24% of youth's highest education level was primary school or less, 43% had middle-school degree, 23% had finished high school, and about 10% had a bachelor degree or higher. Slightly more than one third (35%) of the youth were employed full time, 38% had full-time student status, and 27% of youth were neither employed full-time nor in-school students. About 16% of youth were parents of a child.

At the household level, 25% of youth reported their family as having low social class status, 58% reported middle social status, and 17% reported they were at high social status. A majority of youth mothers had attained education at either the primary (34%) or middle school (30%) level. More than half (53%) of youth mothers were younger than 46 years, with only 6% of mothers older than 55 years. Majority youth families (83%) had both parents ate meals at home. The average household size was five persons, and 41% of households were located in urban areas. Table 3.1, columns b and c, show the sample descriptions by Dibao (recipients) and non-Dibao (non-recipients) groups. Table 3.1, column d, presents the group

mean differences for each variable; as shown in column d, 16 of 26 covariates had statistically significant differences between Dibao and non-Dibao groups at the 95% level. See Table 3.1 for detailed sample distributions.

Figure 3.2 shows the average depression score between Dibao and non-Dibao groups for the whole sample and the nine subgroups. Overall, Dibao recipients had higher CES-D depression scores than non-Dibao recipients. The three groups with the highest differences in depression scores were (a) youth with a child (3.14), (b) female with child (2.67), and (c) rural residents (1.53). However, depression scores showed differences of less than .6 between the Dibao and non-Dibao groups for the relative poor, urban, and youth from households with income under the Dibao poverty line.

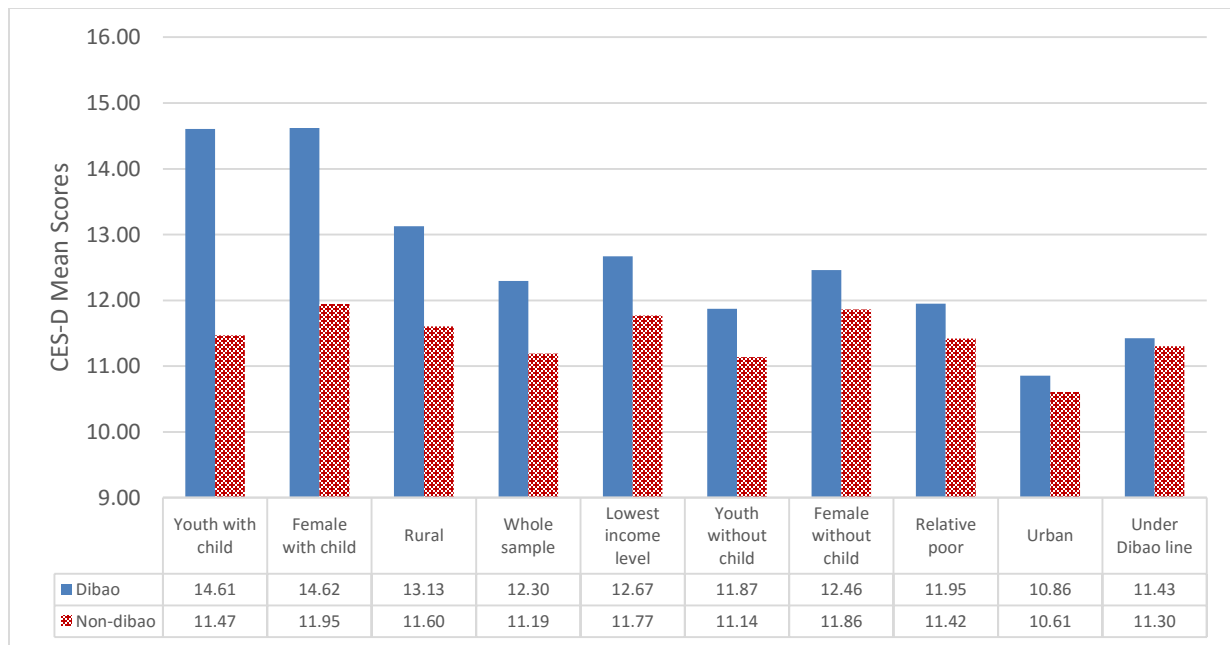
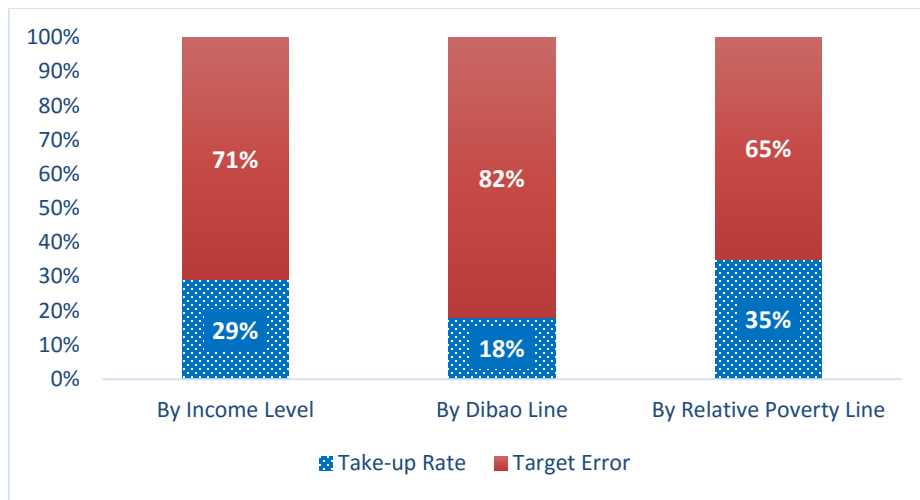


Figure 3.2. Group Comparison of average depression score between Dibao and non-Dibao recipients

Estimation of Dibao take-up rates and mis-targeting rates by poverty threshold.

Figure 3.3 shows the estimated Dibao take-up rates and mis-targeting rates using three

poverty thresholds as previously described: (a) the lowest household income level; (b) local provincial average Dibao line in 2011, and (c) the relative poverty line. Results show that the estimated Dibao take-up rates (i.e., youth whose household income under poverty line received Dibao benefits) based on the three different poverty thresholds were: (a) 29% (household income level), (b) 18% (Dibao line), and (c) 35% (relative poverty line). In addition, based on CFPS 2012 youth data, the estimated Dibao mis-targeting rates (i.e., youth whose household's income was above the poverty line but still received Dibao benefits) using the three different poverty thresholds were: (a) 71% (household income level), (b) 82% (Dibao line), and (c) 65% (relative poverty line).



Note. Income level = the lowest 25% total population household income level threshold; Dibao line = local provincial average Dibao line in 2011; Relative poverty line = youth household net annual income per person under 25% of the total youth sample.

Figure 3.3. Estimation of Dibao take-up rate and mis-targeting rate by poverty thresholds.

Relationship Between Dibao Participation and Youth Depression

Table 3.2, column a, shows the main analytic results of this study to explore the relationship between Dibao participation and youth depression in China. Shown in Table 3.2

column a, as compared with non-Dibao recipient counterparts, youth whose families received Dibao welfare benefits had significantly higher depression scores by .67 ($p < .05$). In addition, at the individual level, other things being equal, males had significantly lower depression scores than females by 1.44 ($p < .001$). Compared with youth whose highest education level was a primary school degree or less, youth with higher education levels had statistically significant lower depression scores. Specifically, youth with middle-school, high-school, and a bachelor's or higher degree had lower depression scores by .64 ($p < .05$), .91 ($p < .01$), and 1.23 ($p < .01$), respectively. In addition, as compared with youth who were employed full-time, students enrolled in school had lower depression scores by .63 ($p < .05$).

For household level covariates, as compared with youth who perceived their families as having low social status, the youth who reported middle or high social status had depression scores that were significantly lower by 1.27 ($p < .001$), and 2.13 ($p < .001$), respectively. Results also showed that mother's education level was negatively associated with youth depression scores. Specifically, lower depression scores were found for youth whose mothers had a primary education (by .88; $p < .01$), middle-school education (by 1.72; $p < .001$), and high-school or higher degree (by .92; $p < .05$). Overall, urban youth had statistically significant lower depression scores (by .63; $p < .01$) than rural youth.

Testing the Welfare–Depression Relationship by Subgroups

Table 3.3 shows the results from subgroup analyses. Column a shows the aggregated OLS regression coefficients between Dibao participation and youth depression based on imputed datasets for each subgroup, controlling for the set of covariates listed in Table 3.2. Column b shows the sensitivity test aggregated OLS regression results using imputed datasets and propensity score radius matching methods for each subgroup.

Table 3.2*Regression Results of Depression (CES-D) on Whole Sample Using Different Datasets*

Variables	(a) Imputed (N = 4,192)			(b) Imputed with radius matching (n = 3,639)		
	Robust			Robust		
	β	SE	P	β	SE	P
Dibao	0.67	0.32	*	0.66	0.35	†
Urban hukou	-0.25	0.27		-0.07	0.53	
Age	-0.06	0.05		-0.07	0.10	
Gender (1=male)	-1.44	0.19	***	-1.35	0.36	***
Minority (1=yes)	0.24	0.54		0.26	0.89	
Highest Education Level (ref: Primary and less)						
Middle	-0.64	0.26	*	-0.82	0.44	†
High	-0.91	0.31	**	-0.92	0.56	†
Bachelor and higher	-1.23	0.41	**	-1.56	0.82	†
Life Status (ref: Employed full-time)						
Full time student	-0.63	0.27	*	-0.80	0.51	
Not employed ,not student	-0.03	0.25		0.03	0.48	
Has child	-0.38	0.33		0.12	0.71	
Income (log)	0.04	0.08		0.03	0.14	
Perceived social class level (ref: Low)						
Middle	-1.27	0.23	***	-1.22	0.40	**
High	-2.13	0.30	***	-2.64	0.62	***
Both parents eat at home	-0.01	0.30		-0.06	0.51	
Mother's education level (ref: illiterate)						
Primary	-0.88	0.26	**	-1.04	0.45	*
Middle	-1.72	0.28	***	-2.36	0.52	***
High	-0.92	0.37	*	-1.04	0.71	
Mother's age (ref: < 46 years)						
46-55	-0.15	0.22		-0.01	0.42	
> 55	0.29	0.44		-0.64	0.76	
Family size	0.06	0.06		0.08	0.10	
Urban	-0.63	0.22	**	-0.81	0.42	†
Constant	15.86	1.33	***	16.45	2.34	***

Note. Number of imputed files = 20. *** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .1$, two-tailed.

Rural Dibao youth had significantly higher depression scores. To answer Research Question 2, subgroup analyses were conducted by geographic location (See Table 3.3, row 1). Results showed that rural Dibao youth had significantly higher depression scores than non-Dibao youth by .98 ($p < .05$). However, the results showed no statistically significant group differences for depression scores among urban youth.

Table 3.3*Robust Regression Results of Depression (CES-D) from Subgroup Analyses*

	Samples	(a) Imputed			(b) Imputed with Radius Matching			
		<i>n</i>	β	Robust SE	<i>n</i>	Sample reduced	β	Robust SE
1	Urban	1705	0.05	0.51	1427	16%	-0.01	0.56
	Rural	2487	0.98*	0.41	2209	11%	1.01*	0.44
2	Youth without child	3511	0.35	0.35	3072	13%	0.38	0.37
	Youth with a child	681	2.47**	0.84	548	20%	2.27*	0.96
3	Female without child	1733	0.21	0.52	1503	13%	0.29	0.54
	Female with child	484	2.19*	0.97	399	18%	1.82†	1.06
	Rural female with child	334	3.15**	1.09	275	18%	3.03*	1.26
4	Lowest income level	873	0.78	0.61	800	8%	0.91	0.64
	Under Dibao line	1011	0.39	0.53	928	8%	0.53	0.58
	Relative poor	509	0.30	0.69	468	8%	0.64	0.74

Notes. Each pair of regression coefficients and robust standard errors is from a separate regression model with controlling for the same covariates as listed in Table 3.2, see Appendix 3.C–3.L for detailed regression covariates for each model; *Sample Reduced* means the percent of missing values for each model. Number of imputed files = 20. *** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .1$, two-tailed.

Dibao youth with a child had significantly higher depression scores. To answer Research Question 3, subgroup analyses were conducted based on whether the youth was the parent of a child (See results in Table 3.3, row 2). Results showed that Dibao youth who were parents had significantly higher depression scores (by 2.47; $p < .01$) than their non-Dibao counterparts. However, the results showed no statistically significant group differences existed in the depression scores of youth who had no children.

Higher depression scores among female Dibao youth with a child. To answer Research Question 4, subgroup analyses were conducted to compare depression scores of Dibao recipients and non-recipients among females with and without children (see results in Table 3.3, row 3). Results showed that female youth with a child who received Dibao benefits had significantly higher depression scores (by 2.19; $p < .05$) than the non-Dibao females with a child. However, the results showed no statistically significant group differences in the depression scores of female youth without a child.

Using welfare participation as a marker of low socioeconomic status allows the researcher to capture a more precise target population. The study analyses used this marker to conduct an additional subgroup analysis on rural females with a child, and found that rural female youth with a child who received Dibao benefits had significantly higher depression score (by 3.15; $p < .01$).

No significant group differences of depression scores among low-income groups. To answer Research Question 5, Table 3.3, row 4, shows the results of the subgroup analyses for the low-income population identified using different poverty thresholds. Although results showed that Dibao recipients reported higher depression scores than their non-Dibao counterparts across the three income groups, none of these values were statistically significant at the 95% level.

Column b in both Table 3.2 and Table 3.3 show the results of sensitivity test using propensity score radius matching based on the imputed datasets. The sensitivity results showed several variables had lower significance levels than the main analytic results. However, overall results of the sensitivity tests based on the matched data were consistent with the main analytic results.

Discussion

Conclusion

Overall, this study suggests that youth whose families participated in the Dibao program had significantly higher depression scores as compared with their non-Dibao recipient peers. Certain youth characteristics were related with statistically significant higher depression scores, including female youth, youth with lower education levels, youth employed full-time, youth with perceived low social status, youth from rural areas, and youth

whose mothers had low education levels. In addition, results from nine subgroup analyses found statistically significant higher depression scores among rural Dibao youth, Dibao youth with a child, and female youth with a child who received Dibao. Further, as compared with rural non-Dibao females with a child, the group of rural Dibao females who had a child was shown to be the population most at-risk for depression.

When using propensity score radius matching to reduce the potential for selection bias among the Dibao and non-Dibao groups, results showed similar trends as the analyses without using propensity score matching method. However, given that matchings were conducted only in the common support regions based on the two groups' propensity scores, the final analytic sample size of each subgroup was further reduced between 8% to 20% (see Table 3.3, column b). Therefore, the reduced sample size and balanced group differences might cause the slight differences found in the sensitivity results than the main analytic results.

Possible explanations of the mixed results from subgroup analyses

As Table 3.3, column a shows, results across these nine analyses showed that regardless of different characteristics (e.g., geographic location, with a child, and income) of Dibao recipients, as compared with their non-Dibao peers, youth from welfare recipient households had higher depression scores. These consistent results suggest that participating in the Dibao welfare program was associated with negative mental health, specifically depression. This relationship is consistent with the findings of previous studies that showed that Dibao recipients commonly suffered from stigma, which in turn, might increase their psychological burden (Gao, 2017; Li & Walker, 2016; Solinger & Hu, 2012). Notably, the Dibao program might use public “shaming” as a way of having people self-select out of the

program. As part of the background check for Dibao and before applicants can receive benefits, the government requires a list of qualified recipients to be publicly displayed in the recipient's community. This type of public announcement of who has qualified to receive welfare opens the recipients to shaming from others and is likely to cause recipients and their children to have a psychological burden associated with receiving welfare benefits (Han, 2012; Li & Walker, 2016).

Further, the Chinese traditional culture of Confucianism (which is especially prevalent in rural areas) values an individual's efforts (e.g., studying hard and working hard) and emphasizes that individuals should be self-sufficient. These traditional values are the dominant social values, and thus, disdain and stigmatize individuals who apply for public assistance programs. Typically, when people apply for welfare benefits, they are labeled as "beggars," "lazy people," or "lame ducks" (Chen, 2014; Gao, 2017; Wang, 2012). In this way, the traditional culture contributes to the stigmatization of Dibao recipients, and these cultural values offer another possible explanation of the higher depression scores found among Dibao recipients.

Rural Dibao recipients often feel highly embarrassed, because people living in rural communities often know all of their neighbors extremely well. As a result, if you are receiving Dibao in your village, chances are that everyone else in the village knows this. Unsurprisingly, this study found that rural Dibao youth therefore had statistically significant higher depression scores when compared to their rural non-Dibao peers. In the Chinese context, a prime factor influencing the lives of lower-income households is the hukou system, which has its historical roots in social order hierarchies espoused by Confucian teachings. The hukou system actually reinforces economic inequalities between rural and

urban areas. Typically, because rural areas have fewer resources for public programs, they offer limited educational and few job opportunities beyond subsistence-level agricultural work. Therefore, rural residents tend to have lower levels of education and few employable skills. For rural youth from low-income families, regardless of the shame, they are making realistic appraisals of their life situations and those appraisals might result in a higher incidence of depression.

This study found that youth who were themselves the parent of a child, especially females with a child, and rural females with a child, had significantly higher depression scores than youth without children. These findings are consistent with the existing literature that youth parenting a young child were at risk for depression, and females with newborn infants had especially high risk of post-partum depression (Zhang, Tu, Xi, Jiang, & Gao, 2001; Zhang & Wu, 2003). However, other research has shown that the main causes of post-partum depression were a lack of social supports and poverty, but did not specify welfare participation as a contributing factor (Zhang, Zhang, Zhou & Wang, 2013; Zhang & Wu, 2003). Given the present study focused on youth between the ages of 16 and 24 years, the sample included many Dibao youth, especially females, who had very young child and thus had higher risk of depression. These findings have implications for welfare policy makers because the current Dibao program does not pay much attention on welfare recipients' mental health, for example, not on the post-partum depression among young welfare recipient mothers. Therefore, to help these vulnerable populations, welfare policy makers could develop some specific supplemental benefits for the young recipient mother's mental health care.

Even used three different poverty thresholds to identify the low-income groups, this

study did not find any significant group differences (welfare vs. non-welfare) of depression scores among the three low-income groups. The possible explanation for this could be because of the low take-up rates and high rates of mis-targeting of the Dibao participation. Consistent with prior research, this study found the effectiveness of the Dibao program is compromised by low take-up rates among the eligible population and high rates of mis-targeting, which means Dibao benefits are provided to those who should not be receiving benefits (Gao, 2017; Golan et al., 2014; Li & Walker, 2016). These problems in program administration could lead to a fuzzy relationship between Dibao participation and youth depression. Therefore, researchers must be cautious when making conclusions based on these compromised participation rates. Further, researchers must be aware that they must account for targeting errors to avoid producing false significant results or false insignificant findings.

This study conducted a set of subgroup analyses to investigate sub-group differences related to geographic location, parenting status, and different poverty thresholds. Findings from subgroup analyses have important implications for policy makers. To make best use of limited resources, policy makers must develop appropriate eligibility evaluation methods, and refine the Dibao application process to reduce the effects of welfare stigma and minimize target error. In other words, the subgroup analyses are valuable to informing efforts aimed at improving the take-up rate of the Dibao program among eligible groups to ensure the program is reaching the neediest population.

Limitations and Strengths

Several limitations of this study need to be acknowledged. First, CFPS did not survey the six provinces with the highest representation of China's ethnic minorities and populations with the greatest exposure to poverty. Therefore, the results based on CFPS have low

external validity for ethnic minorities and, more broadly, for poverty policies affecting China's 55 minority groups. Second, this study conducted multiple imputation to deal with the missing data. However, conducting multiple imputation requires data to be missing at random (MAR); MAR occurs when missing data are related to observed outcomes and covariance rather than unobserved heterogeneity (Shadish, Cook, & Campbell, 2002). Thus, before conducting multiple imputation, 1,354 cases with systematic missing data were dropped, which accounted for about 23% of the initial youth sample in the CFPS 2012 survey data. Therefore, the generalization of the current study findings is further limited by these missing factors and the reduced sample size. Last, the ability to draw causal inferences in this study is limited by the use of cross-sectional data. Whereas some scholars (Pearl, 2009) hold that propensity score matching method cannot be relied on for causal inference, others (Guo & Fraser, 2015; Rubin, 1997) hold that propensity score matching methods allow researchers to make causal inferences conditionally (based on the observed variables). Readers must consider this controversy when interpreting the findings of this study.

Despite the limitations, this study has several unique strengths that contribute to the literature on examining the relationship between participating in one of the world's largest welfare programs—Dibao—and youth depression. First, using the newly released Chinese nationally representative survey data allows a relatively broad generalization of the findings, and has provides a large enough sample size to ensure adequate statistical power. This national survey sample also makes it possible to conduct a variety of subgroup analyses. Second, this study used multiple imputation to reduce the potential risk of Type I errors posed by the reduction in sample size due to missing data. Using multiple imputation also increases the chance of detecting small, but significant differences in rates of youth

depression across different groups of welfare recipients (if and when such differences actually exist). Third, this study used propensity score matching methods to reduce sample selection bias, yielding more robust results. Last, in addition to the whole sample analysis, this paper presented nine subgroup analyses, allowing greater exploration and offering a more nuanced understanding of whether the relationship between welfare participation and youth depression varies by group characteristics of youth in China.

In conclusion, this study addresses a gap in the research, by examining the relationship between participation in the Dibao welfare program and youth depression levels in China. This study found youth from Dibao recipient families had significantly higher depression scores compared with youth from non-Dibao families. Moreover, the subgroup analyses conducted as part of this study helped to identify the most vulnerable populations groups for depression: rural Dibao youth, Dibao youth with a child, female Dibao youth with a child, and rural female Dibao youth with a child. The study has strong implications for policy makers in developing appropriate eligibility evaluation methods as a step toward refining the Dibao application process. The findings of this can also help inform social work practitioners in designing specific health care programs for highly vulnerable populations.

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SUMMARY

The overarching goal of this dissertation was to use welfare participation as a marker of low socioeconomic status, and thereby, create a nuanced understanding of the relationship between welfare participation and depression among the youth and young adult populations in the United States and China. To achieve this goal, three studies were conducted: (a) a systematic review, which evaluated the relationship between welfare participation and the prevalence of youth depression (Paper I); (b) an empirical study using the U.S. nationally representative Add Health data, which explored the relationship between childhood welfare participation (before age 18 years) and young adulthood depression (24 to 34 years; Paper II); and (c) an empirical study using the China Family Panel Studies survey data, which investigated the relationship between participating in the Dibao welfare program and youth depression in China (Paper III).

Key Findings

This dissertation has several notable findings that fill gaps in the literature regarding the relationship between welfare participation and depression. First, findings from the systematic review suggest that youth from welfare recipient families have higher vulnerability for depression than non-welfare recipients. Second, findings from the Add Health study indicate that childhood welfare participation in the United States is positively associated with experiencing symptoms of depression symptoms in young adulthood; however, it does not appear that welfare participation is correlated with a differentially higher risk for a clinical diagnosis of depression. In addition, results of the subgroup analyses

showed that, as compared with non-welfare counterparts, only the lowest income group of welfare recipients (i.e., the poor group; 100% below FPL) had significantly higher depression scores, whereas only the near-poor group (100%–200% FPL) had a significantly higher probability of having a clinical diagnosis of depression. Moreover, consistent with the broader epidemiological literature on depression, subgroup analyses found significant differences in depression by gender. Significantly higher depression scores were observed among female young adults from welfare families. Third, findings from the study using data from China showed that youth from Dibao-recipient families had significantly higher depression scores than their non-Dibao counterparts. In addition, results of the subgroup analyses showed significantly higher depression scores for four groups of Dibao recipients: rural Dibao youth, Dibao youth with a child, female Dibao youth with a child, and rural female Dibao youth with a child.

Using welfare participation as a marker and based on the subgroup analyses, this dissertation identified several populations with elevated risk for depression. Specifically, the U.S. study identified three vulnerable groups at-risk for depression: the poor, near-poor, and female young adults from welfare-recipient families. Similarly, the China study identified four distinct groups with heightened vulnerability for depression: rural Dibao youth, Dibao youth with a child, female Dibao youth with a child, and rural female Dibao youth with a child. Therefore, the findings from this research suggest these high-risk populations should be the target populations for future interventions.

Implications

Implications for policy. By identifying the most vulnerable populations of depression through systematic review and subgroup analyses, this dissertation recommends that policy makers, practitioners, researchers, and scholars collaborate on finding effective

and appropriate ways of improving depression and depressive symptoms among youth from welfare families. Governments should take the responsibility to help these vulnerable populations. For example, developing and funding welfare programs is one of the most common ways to ensure those in need of physical and mental health services have access to health care, regardless of their ability to self-pay. Further, this dissertation has implications for policy decisions regarding the design and implementation of welfare programs for groups with elevated vulnerability. Because poverty among youth is likely a multidimensional effect, policy makers should explore initiatives to develop social welfare programs tailored to the needs of precise target populations of intended beneficiaries that account for the recipients' developmental stage as well as short- and long-term needs. Last, this study found that some of the current welfare programs (e.g., Dibao) do not consider the effects of welfare participation on recipients' mental health. Therefore, to help the vulnerable populations identified as having elevated risk for depression (e.g., socioeconomically disadvantaged young women with a child), policy makers should develop specific supplemental benefits for mental health care.

Implications for practice. Social workers can make efforts to reduce the stigma associated with mental illness and mental health treatment. Just as welfare stigma prevents eligible persons from enrolling in welfare programs, stigma and stereotypes around mental illness create barriers that keep people from seeking out and receiving needed help. Social workers are exceptionally well trained and well positioned in society to make significant and lasting contributions toward eliminating stigma through public education and normalizing discussions of mental illness.

Further, the subgroup findings presented in this dissertation have important

implications for social work practice. The findings identified potential target populations for future interventions. Therefore, these subgroups warrant greater attention when developing anti-poverty interventions and/or mental health interventions. Specifically, findings of the subgroup analyses have great utility for social workers and mental health service providers in designing intervention or prevention programs targeted to these vulnerable populations. For example, Grote and colleagues (2015) found using a collaborative care intervention called MOMcare significantly improved depression among women in the treatment group. Given the promising findings from the MOMcare intervention, it is recommended that future efforts seeking to tailor interventions to this vulnerable population should consider designing comprehensive, integrated packages of services that incorporate cash assistance and physical health care with behavioral health care. Further, more research is warranted to test whether the integrated care package approach effectively meets the needs of socioeconomically disadvantaged populations.

Implications for future research. This dissertation research had several limitations that should be addressed in future research. First, given the nature of a dissertation, the systematic review study was conducted by a single researcher. However, to minimize the potential for errors in data extraction, overlooking relevant studies, and interpretation of the findings, it is recommended that multiple researchers should collaborate on a systematic review of this literature.

Second, given the limited literature in the topic area, this dissertation used a broad range of ages defined as “youth,” and therefore the concept of who constitutes the youth/young adult population is relatively vague. This variability makes it difficult, if not impossible, to use the findings from this research to make direct comparisons with other

studies. Therefore, it is recommended that as the literature increases in this area, researchers should strive to reach consensus on a standard definition of the age ranges comprising the youth and young adult populations. Further, researchers examining these populations should remain mindful of the value in making comparisons across studies, and therefore, be diligent in reporting the details of their methods and using consistent valid and reliable methods.

Third, although the U.S. study used nationally representative data, the limitations of the Add Health data (i.e., welfare is general category, and specific welfare programs are not identified) imposed limitations on the researcher's ability to explore the nuances of welfare participation on mental health. In contrast, the China study focused on a specific welfare program (i.e., Dibao), and thus yielded program-specific implications for policy and practice. Therefore, future research should be undertaken using a design that will collect data from specific welfare programs rather than aggregated program summaries.

Fourth, this dissertation had limited generalizability because of the missing factors and the reduced sample size. To address the missing data, multiple imputation could be an alternative approach.

Last, the U.S. and China studies have potential threat to internal validity because the two comparison groups were not randomly assigned. However, this threat was addressed by using a propensity score matching method that mimics the randomization process. Nevertheless, the propensity scores were estimated by the selected observed covariates only, which means that the potential bias missing some (unobserved) indicators could affect the findings regarding the welfare-depression relationship. Thus, the propensity score approach is vulnerable to unobserved heterogeneity. To address this limitation, other research designs should be explored, such as conducting a regression discontinuity design, or a randomized

controlled trial, and evaluating the feasibility of each design and the ethical implications of the design.

Despite the limitations, this dissertation has several unique strengths that inform future research. First, this dissertation conducted a systematic review to synthesize the evidence from the current literature regarding the relationship between welfare participation and the prevalence of youth depression, yielding a holistic understanding of the gaps in the existing literature. Second, using nationally representative survey data with a large sample size ensured the statistical power of the studies. Third, multiple imputation was used to reduce the potential risk of Type I errors posed by the reduction in sample size due to missing data. Fourth, the U.S. and China studies included several subgroup analyses to allow more depth in exploring the research questions. Moreover, the findings from the subgroup analyses offered a nuanced understanding of the ways in which the relationship between welfare participation and youth depression varies by group. Last, the U.S. and China studies conducted sensitivity tests, which allowed the researcher to test the robustness of the results from the main analytic approach, and reduced the potential bias of conclusions based on single analytic method.

In summary, this dissertation contributes to the literature on examining the welfare-depression relationship among youth and young adults. In general, youth and young adults from welfare recipient families were found to be at a higher risk of depression, but such relationship varied by subgroup. This study had significant implications for welfare policy makers, practitioners and researchers, and the findings support new programs and policies that integrate cash assistance and physical health care with behavioral health care, in order to improve life course outcomes for the most vulnerable in society.

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APPENDIX 2.A

Results of Regression Using Full Sample

Depression scores	Multiple Imputation + Greedy Matching			Multiple Imputation Only			Multiple Imputation + Radius Matching		
	Coef.	SE	p	OR	SE	p	OR	SE	p
Childhood welfare participation	0.447	0.189	0.020	0.472	0.144	0.001	0.486	0.177	0.007
Individual Level									
Age	-0.093	0.054	0.088	-0.022	0.029	0.455	-0.115	0.051	0.025
Male	-0.902	0.202	0.000	-0.791	0.092	0.000	-0.897	0.183	0.000
<i>Race</i>									
Black	0.602	0.238	0.013	0.514	0.154	0.001	0.555	0.237	0.021
Hispanic	-0.168	0.363	0.644	-0.003	0.206	0.990	-0.203	0.329	0.537
Other	0.101	0.381	0.792	0.495	0.179	0.006	0.197	0.312	0.528
Good general health	-0.930	0.376	0.015	-0.937	0.221	0.000	-0.813	0.368	0.029
Parental Level									
<i>Health status</i>									
Fair	-0.027	0.289	0.925	0.190	0.168	0.261	0.032	0.243	0.896
Poor	0.310	0.465	0.508	0.514	0.300	0.090	0.499	0.437	0.257
Education level	-0.145	0.053	0.008	-0.136	0.026	0.000	-0.143	0.046	0.003
<i>Employment status</i>									
Unemployed, not looking for a job	-0.153	0.278	0.585	-0.252	0.138	0.070	-0.231	0.234	0.327
Unemployed, looking for a job	-0.125	0.408	0.760	-0.046	0.227	0.839	-0.097	0.330	0.769
Employed part time	0.279	0.365	0.448	0.033	0.138	0.813	0.256	0.325	0.433
<i>Health insurance type</i>									
Private coverage	-0.544	0.308	0.080	-0.614	0.244	0.013	-0.506	0.274	0.068
Prepaid health plan	-0.232	0.365	0.527	-0.381	0.253	0.134	-0.248	0.300	0.411
Other	-0.558	0.397	0.164	-0.569	0.295	0.057	-0.597	0.340	0.082
Uninsured	-0.349	0.334	0.298	-0.402	0.266	0.134	-0.371	0.300	0.219
Household Level									
<i>Family Structure</i>									
Single parent	0.153	0.253	0.547	0.350	0.115	0.003	0.180	0.215	0.404
Two parents, one biological	0.191	0.374	0.611	0.346	0.191	0.072	0.166	0.292	0.570
Other	0.698	0.329	0.036	0.899	0.190	0.000	0.882	0.326	0.008
Household income	-0.003	0.004	0.425	-0.001	0.001	0.382	-0.003	0.004	0.399
Household size	0.067	0.052	0.205	0.069	0.028	0.016	0.066	0.047	0.168
Neighborhood unsafety	-0.961	0.309	0.003	-1.091	0.171	0.000	-1.016	0.264	0.000
Constant	9.689	1.036	0.000	8.460	0.579	0.000	9.914	0.946	0.000

Note. SE = Standard Error.

APPENDIX 2.B

Results of Logistic Regression Using Full Sample

Diagnosed Depression	Multiple Imputation + Greedy Matching			Multiple Imputation Only			Multiple Imputation + Radius Matching		
	OR	SE	p	OR	SE	p	OR	SE	p
Childhood welfare participation	1.256	0.186	0.128	1.260	0.123	0.017	1.326	0.139	0.007
Individual Level	1.079	0.040	0.041	1.056	0.022	0.009	1.084	0.035	0.012
Age									
Male	0.471	0.081	0	0.449	0.030	0	0.477	0.058	0
Race	0.579	0.092	0.001	0.520	0.055	0	0.561	0.080	0
Black									
Hispanic	0.653	0.180	0.123	0.660	0.105	0.009	0.672	0.142	0.06
Other	0.724	0.205	0.256	0.715	0.108	0.027	0.705	0.182	0.176
Good general health	0.754	0.169	0.21	0.701	0.088	0.005	0.795	0.149	0.221
Parental Level	0.826	0.182	0.386	0.913	0.120	0.487	0.755	0.147	0.15
Health status									
Fair									
Poor	0.898	0.349	0.782	1.117	0.267	0.643	0.915	0.275	0.767
Education level	0.993	0.035	0.833	0.987	0.020	0.508	1.004	0.034	0.897
Employment status	0.913	0.176	0.638	0.964	0.103	0.73	0.941	0.150	0.701
Not working, not looking for a job									
Not working, looking for a job	1.052	0.263	0.841	1.063	0.188	0.73	1.051	0.237	0.825
Employed part time	1.155	0.250	0.506	1.106	0.113	0.321	1.191	0.211	0.323
Health insurance type	0.774	0.166	0.233	0.832	0.130	0.239	0.812	0.141	0.231
Individual or group private coverage									
Prepaid health plan	1.039	0.273	0.886	0.956	0.173	0.804	1.044	0.226	0.842
Others	1.166	0.356	0.615	1.091	0.248	0.701	1.239	0.333	0.426
None insurance	1.068	0.238	0.77	1.095	0.201	0.622	1.100	0.212	0.622
Household Level	1.262	0.311	0.347	1.309	0.172	0.041	1.289	0.231	0.157
Family Structure									
Others									
Single parent	1.137	0.214	0.496	1.079	0.110	0.455	1.130	0.176	0.434
Two parents, one biological	1.211	0.240	0.334	1.153	0.137	0.231	1.104	0.168	0.516
Household income	1.002	0.003	0.461	1.001	0.001	0.093	1.002	0.002	0.413
Household size	1.002	0.041	0.954	0.967	0.023	0.146	0.992	0.031	0.786
Neighborhood (unsafe)	0.877	0.173	0.505	0.832	0.097	0.115	0.825	0.130	0.223

Note. OR = Odds Ratio; SE = Standard Error.

APPENDIX 2.C

Regression Results Based on Full Original Samples (No Multiple Imputation, No Propensity Score Matching)

	Diagnosed Depression			Depression Scores		
	OR	SE	p	Coef.	SE	p
Childhood Welfare participation	1.219	0.138	0.083	0.594	0.175	0.001
Individual Level	1.047	0.027	0.072	-0.023	0.033	0.480
Age						
Male	0.466	0.037	0.000	-0.693	0.104	0.000
<i>Race</i>	0.656	0.138	0.047	0.562	0.265	0.036
Black						
Hispanic	0.772	0.274	0.468	0.492	0.305	0.109
others	1.208	0.322	0.480	0.616	0.340	0.072
Good general health	1.386	0.244	0.066	-0.061	0.235	0.796
Parental Level	1.233	0.059	0.000	0.443	0.073	0.000
<i>Health status</i>						
Fair						
Poor	0.901	0.126	0.458	0.158	0.188	0.403
Education level	1.179	0.300	0.519	0.357	0.301	0.237
<i>Employment status</i>	1.008	0.021	0.690	-0.137	0.028	0.000
Not working not looking for a job						
Not working, looking for a job	1.076	0.206	0.703	0.252	0.264	0.342
Employed part time	1.164	0.170	0.302	0.337	0.194	0.086
<i>Health insurance type</i>	1.036	0.122	0.764	0.308	0.149	0.041
Individual or group private coverage						
Prepaid health plan	0.856	0.152	0.385	-0.657	0.278	0.019
Others	0.975	0.194	0.898	-0.461	0.277	0.099
None insurance	1.051	0.267	0.846	-0.649	0.332	0.053
Household Level						
<i>Family Structure</i>						
Single parent	0.857	0.172	0.444	-0.752	0.285	0.009
Two parents one biological	0.974	0.216	0.906	-0.720	0.347	0.040
Others	1.066	0.222	0.758	-0.528	0.306	0.086
Household Income	0.818	0.157	0.297	-1.035	0.281	0.000
Household Size	0.983	0.025	0.483	0.083	0.038	0.029
Neighborhood unsafety	0.801	0.106	0.095	-0.997	0.213	0.000
Constant	-	-	-	7.260	0.718	0.000

Note. OR = Odds Ratio; SE = Standard Error.

APPENDIX 2.D

Results of Ordinary Least Squares Regression on Male Groups

Depression Scores	Multiple Imputation + Greedy Matching			Multiple Imputation + Radius Matching		
	<i>Coef.</i>	<i>SE</i>	<i>p</i>	<i>Coef.</i>	<i>SE</i>	<i>p</i>
Childhood Welfare participation	0.442	0.261	0.094	0.454	0.240	0.062
<i>Individual Level</i>						
Age	-0.053	0.081	0.512	-0.084	0.079	0.289
<i>Race</i>						
Black	0.571	0.384	0.142	0.732	0.363	0.047
Hispanic	-0.364	0.535	0.498	-0.355	0.462	0.443
others	0.025	0.540	0.964	0.027	0.422	0.949
Good general health	-0.813	0.575	0.161	-0.840	0.528	0.115
<i>Parental Level</i>						
<i>Health status</i>						
Fair	-0.123	0.405	0.763	-0.118	0.354	0.74
Poor	0.653	0.689	0.346	0.550	0.721	0.448
Education level	-0.156	0.075	0.042	-0.189	0.063	0.003
<i>Employment status</i>						
Not working not looking for a job	-0.474	0.384	0.222	-0.624	0.357	0.084
Not working, looking for a job	-0.329	0.642	0.611	-0.465	0.532	0.385
Employed part time	0.246	0.485	0.614	0.209	0.432	0.63
<i>Health insurance type</i>						
Individual or group private coverage	-0.637	0.504	0.21	-0.654	0.442	0.142
Prepaid health plan	-0.366	0.554	0.51	-0.407	0.478	0.397
Others	-0.863	0.582	0.142	-0.860	0.516	0.1
None insurance	-0.610	0.478	0.205	-0.570	0.443	0.202
<i>Household Level</i>						
<i>Family Structure</i>						
Single parent	0.120	0.357	0.737	0.097	0.310	0.754
Two parents one biological	-0.293	0.430	0.499	-0.305	0.324	0.348
Others	0.491	0.534	0.361	0.405	0.481	0.402
Household Income	-0.002	0.006	0.736	-0.001	0.005	0.798
Household Size	0.017	0.077	0.827	0.021	0.071	0.772
Neighborhood unsafety	-0.767	0.480	0.114	-0.641	0.411	0.122
Constant	8.505	1.366	0	9.066	1.350	0

Note. SE = Standard Error

APPENDIX 2.E

Logistic Regression Results Based on Female Group

Diagnosed Depression	Multiple Imputation + Greedy Matching			Multiple Imputation + Radius Matching		
	OR	SE	p	OR	SE	p
Childhood Welfare participation	1.342	0.225	0.082	1.381	0.189	0.019
Individual Level						
Age	1.099	0.050	0.04	1.118	0.045	0.005
<i>Race</i>						
Black	0.518	0.114	0.003	0.506	0.095	0
Hispanic	0.609	0.163	0.065	0.633	0.137	0.035
others	0.738	0.287	0.437	0.811	0.256	0.507
Good general health	0.846	0.210	0.501	0.876	0.197	0.557
Parental Level						
<i>Health status</i>						
Fair	0.895	0.232	0.67	0.808	0.163	0.293
Poor	0.934	0.413	0.878	0.935	0.342	0.853
Education level	0.992	0.045	0.866	1.006	0.038	0.87
<i>Employment status</i>						
Not working not looking for a job	0.687	0.174	0.143	0.732	0.142	0.111
Not working, looking for a job	0.935	0.277	0.82	0.936	0.260	0.813
Employed part time	0.949	0.245	0.839	1.015	0.229	0.947
<i>Health insurance type</i>						
Individual or group private coverage	0.773	0.217	0.36	0.758	0.178	0.24
Prepaid health plan	0.971	0.318	0.929	0.987	0.263	0.962
Others	1.049	0.440	0.909	1.072	0.409	0.855
None insurance	1.158	0.332	0.609	1.131	0.281	0.621
Household Level						
<i>Family Structure</i>						
Single parent	1.189	0.283	0.466	1.138	0.217	0.499
Two parents one biological	1.381	0.382	0.245	1.245	0.252	0.279
Others	1.490	0.387	0.126	1.394	0.309	0.135
Household Income	1.001	0.004	0.682	1.001	0.003	0.754
Household Size	1.038	0.052	0.452	1.036	0.041	0.37
Neighborhood unsafety	0.861	0.183	0.482	0.817	0.161	0.306

Note. OR = Odds Ratio; SE = Standard Error.

APPENDIX 2.F

OLS Regression Results Based on Female Group

Depression Scores	Multiple Imputation + Greedy Matching			Multiple Imputation + Radius Matching		
	<i>Coef.</i>	<i>SE</i>	<i>p</i>	<i>Coef.</i>	<i>SE</i>	<i>p</i>
Childhood Welfare participation	0.494	0.286	0.088	0.489	0.246	0.05
<i>Individual Level</i>						
Age	-0.131	0.076	0.09	-0.136	0.063	0.033
<i>Race</i>						
Black	0.584	0.327	0.077	0.517	0.314	0.103
Hispanic	0.026	0.471	0.956	-0.048	0.422	0.911
others	0.271	0.538	0.617	0.469	0.436	0.284
Good general health	-0.823	0.434	0.062	-0.811	0.412	0.052
<i>Parental Level</i>						
<i>Health status</i>						
Fair	0.152	0.418	0.718	0.224	0.335	0.506
Poor	0.111	0.586	0.851	0.324	0.686	0.639
Education level	-0.124	0.071	0.086	-0.111	0.061	0.073
<i>Employment status</i>						
Not working not looking for a job	0.098	0.393	0.803	0.127	0.369	0.732
Not working, looking for a job	-0.031	0.521	0.953	0.106	0.496	0.831
Employed part time	0.234	0.453	0.607	0.239	0.461	0.604
<i>Health insurance type</i>						
Individual or group private coverage	-0.403	0.414	0.334	-0.372	0.364	0.31
Prepaid health plan	-0.163	0.545	0.766	-0.098	0.471	0.835
Others	-0.307	0.591	0.606	-0.364	0.495	0.464
None insurance	-0.159	0.466	0.734	-0.179	0.390	0.647
<i>Household Level</i>						
<i>Family Structure</i>						
Single parent	0.276	0.388	0.479	0.233	0.307	0.451
Two parents one biological	0.850	0.512	0.1	0.727	0.433	0.096
Others	0.983	0.469	0.039	1.210	0.471	0.012
Household Income	-0.004	0.006	0.495	-0.004	0.006	0.451
Household Size	0.099	0.072	0.175	0.099	0.069	0.155
Neighborhood unsafety	-1.321	0.373	0.001	-1.303	0.344	0
Constant	9.834	1.534	0	9.791	1.245	0

Note. SE = Standard Error.

APPENDIX 2.G

Logistic Regression Results Based on Male Group

Diagnosed Depression	Multiple Imputation + Greedy Matching			Multiple Imputation + Radius Matching		
	OR	SE	p	OR	SE	p
Childhood Welfare participation	1.181	0.326	0.548	1.150	0.305	0.598
Individual Level						
Age	1.062	0.077	0.408	1.046	0.069	0.499
<i>Race</i>						
Black	0.693	0.217	0.242	0.752	0.217	0.325
Hispanic	0.698	0.387	0.517	0.650	0.327	0.392
others	0.537	0.325	0.306	0.545	0.264	0.21
Good general health	0.704	0.292	0.398	0.686	0.230	0.261
Parental Level						
<i>Health status</i>						
Fair	0.749	0.302	0.473	0.634	0.225	0.2
Poor	0.810	0.526	0.746	0.777	0.449	0.663
Education level	0.992	0.078	0.915	0.987	0.061	0.837
<i>Employment status</i>						
Not working not looking for a job	1.399	0.523	0.371	1.451	0.454	0.235
Not working, looking for a job	1.358	0.775	0.593	1.270	0.637	0.634
Employed part time	1.670	0.664	0.198	1.602	0.581	0.194
<i>Health insurance type</i>						
Individual or group private coverage	0.838	0.463	0.75	0.893	0.397	0.798
Prepaid health plan	1.111	0.628	0.852	1.123	0.522	0.803
Others	1.384	0.876	0.609	1.441	0.757	0.487
None insurance	0.879	0.450	0.802	0.987	0.383	0.973
Household Level						
<i>Family Structure</i>						
Single parent	1.013	0.316	0.967	1.098	0.298	0.73
Two parents one biological	0.923	0.327	0.821	0.897	0.251	0.697
Others	0.920	0.429	0.859	0.918	0.297	0.791
Household Income	1.003	0.005	0.602	1.003	0.005	0.565
Household Size	0.929	0.073	0.348	0.919	0.057	0.175
Neighborhood unsafety	0.832	0.311	0.625	0.823	0.252	0.525

Note. OR = Odds Ratio; SE = Standard Error.

APPENDIX 2.H

Results of Ordinary Least Squares Regression Based on Poor Group

Depression Scores	Multiple Imputation + Greedy Matching			Multiple Imputation + Radius Matching		
	<i>Coef.</i>	<i>SE</i>	<i>p</i>	<i>Coef.</i>	<i>SE</i>	<i>p</i>
Childhood Welfare participation	0.934	0.436	0.037	0.865	0.356	0.017
<i>Individual Level</i>						
Age	-0.066	0.123	0.595	-0.086	0.118	0.464
Male	-0.721	0.402	0.077	-0.734	0.351	0.04
<i>Race</i>						
Black	0.806	0.566	0.158	0.719	0.499	0.153
Hispanic	-0.350	0.624	0.576	-0.183	0.567	0.748
others	-0.391	0.744	0.601	-0.151	0.613	0.806
Good general health	-0.767	0.716	0.287	-0.741	0.659	0.264
<i>Parental Level</i>						
<i>Health status</i>						
Fair	-0.327	0.486	0.503	-0.211	0.423	0.62
Poor	0.600	0.732	0.416	0.897	0.729	0.224
Education level	-0.051	0.090	0.569	-0.065	0.090	0.472
<i>Employment status</i>						
Not working not looking for a job	-0.283	0.583	0.628	-0.359	0.554	0.519
Not working, looking for a job	0.131	0.786	0.868	0.090	0.590	0.879
Employed part time	0.079	0.766	0.918	0.109	0.723	0.88
<i>Health insurance type</i>						
Individual or group private coverage	-0.904	0.644	0.166	-0.802	0.503	0.114
Prepaid health plan	-0.974	0.745	0.196	-0.843	0.613	0.172
Others	-0.399	0.784	0.613	-0.530	0.662	0.425
None insurance	-0.520	0.594	0.385	-0.500	0.500	0.32
<i>Household Level</i>						
<i>Family Structure</i>						
Single parent	-0.331	0.518	0.524	-0.341	0.501	0.498
Two parents one biological	-0.337	0.667	0.615	-0.344	0.596	0.565
Others	0.867	0.758	0.256	0.836	0.686	0.226
Household Size	0.107	0.092	0.244	0.103	0.083	0.218
Neighborhood unsafety	-1.288	0.566	0.026	-1.420	0.532	0.009
Constant	9.214	2.094	0	9.613	1.942	0

Note. SE = Standard Error.

APPENDIX 2.I

Results of Logistic Regression Based on Poor Group

Diagnosed Depression	Multiple Imputation + Greedy Matching			Multiple Imputation + Radius Matching		
	OR	SE	p	OR	SE	p
Childhood Welfare participation	1.269	0.324	0.353	1.339	0.319	0.223
Individual Level						
Age	1.065	0.086	0.431	1.080	0.080	0.303
Male	0.488	0.160	0.03	0.462	0.136	0.009
<i>Race</i>						
Black	0.707	0.267	0.358	0.593	0.183	0.091
Hispanic	1.422	0.618	0.419	1.381	0.494	0.368
others	0.530	0.436	0.442	0.633	0.444	0.516
Good general health	1.245	0.650	0.675	1.273	0.547	0.575
Parental Level						
<i>Health status</i>						
Fair	0.594	0.270	0.257	0.618	0.223	0.186
Poor	1.228	0.624	0.686	1.130	0.512	0.787
Education level	1.113	0.081	0.141	1.146	0.076	0.041
<i>Employment status</i>						
Not working not looking for a job	0.829	0.363	0.67	0.792	0.267	0.489
Not working, looking for a job	1.443	0.734	0.473	1.182	0.474	0.677
Employed part time	1.307	0.577	0.544	1.204	0.508	0.66
<i>Health insurance type</i>						
Individual or group private coverage	0.931	0.411	0.872	0.904	0.324	0.78
Prepaid health plan	1.106	0.626	0.859	1.107	0.600	0.852
Others	0.779	0.639	0.762	0.787	0.489	0.7
None insurance	0.919	0.365	0.833	0.922	0.312	0.811
Household Level						
<i>Family Structure</i>						
Single parent	1.352	0.550	0.459	1.318	0.439	0.408
Two parents one biological	0.461	0.291	0.222	0.449	0.238	0.133
Others	1.728	0.872	0.28	1.671	0.803	0.288
Household Size	1.006	0.059	0.92	1.025	0.050	0.623
Neighborhood unsafety	0.849	0.339	0.683	0.794	0.250	0.464

Note. OR = Odds Ratio; SE = Standard Error.

APPENDIX 2.J

Results of Ordinary Least Squares Regression Based on Near-Poor Group

Depression Scores	Multiple Imputation + Greedy Matching			Multiple Imputation + Radius Matching		
	<i>Coef.</i>	<i>SE</i>	<i>p</i>	<i>Coef.</i>	<i>SE</i>	<i>p</i>
Childhood Welfare participation	0.287	0.347	0.412	0.291	0.325	0.374
<i>Individual Level</i>						
Age	-0.073	0.089	0.416	-0.086	0.083	0.299
Male	-1.430	0.366	0	-1.412	0.336	0
<i>Race</i>						
Black	0.456	0.465	0.331	0.548	0.424	0.199
Hispanic	0.150	0.579	0.797	0.208	0.485	0.67
others	0.596	0.679	0.382	0.620	0.626	0.325
Good general health	-0.278	0.529	0.601	-0.336	0.495	0.499
<i>Parental Level</i>						
<i>Health status</i>						
Fair	0.472	0.551	0.396	0.448	0.461	0.335
Poor	-0.201	0.913	0.827	-0.056	0.683	0.935
Education level	-0.187	0.084	0.03	-0.167	0.078	0.035
<i>Employment status</i>						
Not working not looking for a job	0.107	0.476	0.824	0.163	0.440	0.712
Not working, looking for a job	-0.741	0.764	0.337	-0.684	0.731	0.354
Employed part time	0.455	0.523	0.388	0.468	0.419	0.268
<i>Health insurance type</i>						
Individual or group private coverage	-0.258	0.597	0.667	-0.203	0.503	0.688
Prepaid health plan	0.283	0.675	0.676	0.343	0.568	0.548
Others	-1.120	0.717	0.123	-1.070	0.589	0.073
None insurance	-0.252	0.658	0.704	-0.250	0.517	0.631
<i>Household Level</i>						
<i>Family Structure</i>						
Single parent	0.447	0.425	0.297	0.438	0.383	0.256
Two parents one biological	0.145	0.605	0.812	0.146	0.497	0.77
Others	0.703	0.697	0.319	0.665	0.653	0.315
Household Size	-0.047	0.118	0.689	-0.023	0.097	0.81
Neighborhood unsafety	-0.717	0.550	0.199	-0.544	0.418	0.196
Constant	9.005	1.751	0	8.831	1.543	0

Note. SE = Standard Error.

APPENDIX 2.K

Results of Logistic Regression Based on Near-Poor Group

Diagnosed Depression	Multiple Imputation + Greedy Matching			Multiple Imputation + Radius Matching		
	<i>OR</i>	<i>SE</i>	<i>p</i>	<i>OR</i>	<i>SE</i>	<i>p</i>
Childhood Welfare participation	1.890	0.544	0.03	1.935	0.439	0.004
<i>Individual Level</i>						
Age	1.104	0.083	0.19	1.136	0.081	0.074
Male	0.353	0.093	0	0.335	0.076	0
<i>Race</i>						
Black	0.476	0.173	0.043	0.513	0.163	0.038
Hispanic	0.302	0.149	0.016	0.306	0.114	0.002
others	0.573	0.276	0.249	0.571	0.254	0.211
Good general health	0.723	0.335	0.486	0.697	0.261	0.336
<i>Parental Level</i>						
<i>Health status</i>						
Fair	0.648	0.263	0.287	0.575	0.250	0.206
Poor	0.575	0.474	0.505	0.664	0.424	0.524
Education level	0.969	0.067	0.644	0.958	0.060	0.489
<i>Employment status</i>						
Not working not looking for a job	0.874	0.335	0.725	0.895	0.264	0.706
Not working, looking for a job	0.751	0.450	0.634	0.661	0.388	0.483
Employed part time	0.951	0.375	0.899	0.934	0.304	0.834
<i>Health insurance type</i>						
Individual or group private coverage	0.707	0.304	0.423	0.740	0.256	0.384
Prepaid health plan	1.310	0.638	0.581	1.268	0.506	0.552
Others	1.352	0.779	0.602	1.421	0.718	0.488
None insurance	0.946	0.415	0.899	0.988	0.394	0.976
<i>Household Level</i>						
<i>Family Structure</i>						
Single parent	1.073	0.371	0.84	0.979	0.282	0.942
Two parents one biological	1.432	0.570	0.368	1.310	0.443	0.425
Others	1.144	0.555	0.782	0.994	0.402	0.989
Household size	1.024	0.088	0.783	1.008	0.073	0.912
Neighborhood unsafety	0.927	0.396	0.86	0.848	0.307	0.651

Note. OR = Odds Ratio; SE = Standard Error.

APPENDIX 2.L

Results of Ordinary Least Squares Regression for Subgroup Analysis of Non-Poor Group

Depression Scores	Multiple Imputation + Greedy Matching			Multiple Imputation + Radius Matching		
	<i>Coef.</i>	<i>SE</i>	<i>p</i>	<i>Coef.</i>	<i>SE</i>	<i>p</i>
Childhood welfare participation	0.381	0.336	0.261	0.351	0.252	0.167
Individual level						
Age	-0.122	0.079	0.126	-0.119	0.071	0.097
Male	-0.580	0.299	0.057	-0.550	0.228	0.018
<i>Race</i>						
Black	0.260	0.453	0.57	0.178	0.333	0.594
Hispanic	-0.065	0.640	0.919	-0.059	0.508	0.909
Other	0.086	0.623	0.891	0.124	0.396	0.756
Good general health	-1.563	0.595	0.01	-1.502	0.486	0.003
Parental level						
<i>Health status</i>						
Fair	-0.172	0.568	0.764	-0.103	0.426	0.809
Poor	-0.005	1.171	0.997	0.063	0.975	0.949
<i>Education level</i>	-0.139	0.078	0.081	-0.156	0.068	0.026
<i>Employment status</i>						
Not working, not looking for a job	-0.024	0.479	0.961	-0.194	0.333	0.561
Not working, looking for a job	0.226	0.886	0.8	0.256	0.655	0.698
Employed part time	0.452	0.533	0.399	0.350	0.421	0.408
<i>Health insurance type</i>						
Individual/ group private	-0.002	0.697	0.997	0.102	0.568	0.858
Prepaid health plan	0.241	0.720	0.739	0.203	0.650	0.756
Other	0.269	0.817	0.743	0.332	0.714	0.644
Uninsured	0.236	0.817	0.774	0.204	0.670	0.762
Household Level						
<i>Family Structure</i>						
Single parent	0.161	0.416	0.7	0.359	0.319	0.262
Two parents one biological	0.298	0.492	0.547	0.478	0.413	0.249
Other	0.788	0.573	0.174	0.977	0.452	0.033
Household Size	0.032	0.134	0.811	0.056	0.105	0.599
Neighborhood unsafety	-0.984	0.540	0.073	-0.988	0.407	0.017
Constant	9.923	1.739	0	9.762	1.357	0

Note. SE = Standard Error.

APPENDIX 2.M

Logistic Regression Results Based on Non-Poor Group

Diagnosed Depression	Multiple Imputation + Greedy Matching			Multiple Imputation + Radius Matching		
	<i>OR</i>	<i>SE</i>	<i>p</i>	<i>OR</i>	<i>SE</i>	<i>p</i>
Childhood welfare participation	1.094	0.251	0.697	1.006	0.199	0.976
<i>Individual Level</i>						
Age	1.060	0.078	0.432	1.065	0.055	0.224
Male	0.585	0.162	0.058	0.560	0.113	0.005
<i>Race</i>						
Black	0.616	0.208	0.156	0.606	0.159	0.058
Hispanic	0.519	0.280	0.227	0.558	0.245	0.186
Other	0.718	0.409	0.561	0.830	0.341	0.65
Good general health	0.585	0.205	0.127	0.604	0.171	0.076
<i>Parental Level</i>						
<i>Health status</i>						
Fair	1.225	0.513	0.63	1.166	0.387	0.644
Poor	0.912	0.897	0.926	0.908	0.636	0.89
Education level	0.959	0.057	0.483	0.960	0.050	0.436
<i>Employment status</i>						
Not working, not looking for a job	1.226	0.433	0.565	1.201	0.336	0.514
Not working, looking for a job	1.023	0.676	0.973	1.127	0.550	0.806
Employed part time	1.032	0.379	0.933	1.070	0.274	0.791
<i>Health insurance type</i>						
Individual or group private coverage	0.689	0.334	0.444	0.754	0.288	0.462
Prepaid health plan	0.910	0.471	0.855	0.852	0.352	0.699
Others	0.921	0.611	0.902	0.994	0.506	0.99
Uninsured	1.302	0.675	0.612	1.281	0.547	0.562
<i>Household Level</i>						
<i>Family structure</i>						
Single parent	0.775	0.242	0.416	0.855	0.203	0.51
Two parents, one biological	1.108	0.345	0.742	1.201	0.258	0.394
Others	1.070	0.491	0.884	1.099	0.354	0.771
Household size	0.932	0.093	0.479	0.907	0.064	0.169
Neighborhood unsafety	0.904	0.325	0.78	0.907	0.260	0.734

Note. *OR* = Odds Ratio; *SE* = Standard Error.

APPENDIX 3.A

Quarterly Average Rural and Urban Dibao Line by Mainland China Province, 2011 (Unit: Yuan)

		Urban					Rural					Gap
		Q1	Q2	Q3	Q4	Rank	Q1	Q2	Q3	Q4	Rank	Q _{4U} -Q _{4R}
Eastern China 9 provinces	Beijing	480	480	500	500	2	335	352	383	383	1	117
	Tianjin	450	474	478	480	3	321	327	330	330	3	250
	Liaoning	303	311	311	312	8	154	159	161	162	9	150
	Shanghai	450	505	505	505	1	300	360	360	360	2	145
	Jiangsu	344	345	381	386	5	248	250	291	300	4	86
	Zhejiang	380	397	407	429	4	251	266	276	294	5	135
	Fujian	235	249	258	274	20	133	135	137	143	11	132
	Shandong	298	303	308	314	9	126	130	134	142	14	172
	Guangdong	262	270	274	286	16	177	182	188	196	7	90
Central China 10 provinces	Hebei	287	289	292	310	12	119	122	125	139	16	171
	Shanxi	246	265	267	269	19	106	113	114	118	22	150
	Jilin	237	241	243	254	23	117	117	119	123	17	131
	Heilongjiang	248	257	270	278	18	111	114	119	124	19	154
	Anhui	268	272	285	297	14	124	130	134	149	13	148
	Jiangxi	291	301	301	308	11	130	136	136	142	12	166
	Henan	207	218	228	233	29	90	96	101	105	26	129
	Hubei	298	266	273	294	13	133	109	112	121	18	173
	Hunan	225	231	237	243	24	92	98	109	114	23	129
Hainan	256	265	277	300	15	177	184	195	216	6	84	
Western China 12 provinces	Neimenggu	310	326	330	344	7	159	175	181	199	8	145
	Guangxi	228	230	233	241	25	99	100	100	102	25	139
	Chongqing	259	259	259	298	17	135	136	136	157	10	141
	Sichuan	216	223	232	242	27	93	98	103	110	24	132
	Guizhou	233	235	268	271	21	108	109	119	121	21	150
	Yunnan	208	215	222	248	28	80	83	89	122	27	126
	Xizang	306	356	356	356	6	76	76	80	81	31	275
	Shanxi	296	301	303	306	10	119	127	128	134	15	172
	Gansu	198	203	204	207	30	83	88	89	91	29	116
	Qinghai	245	256	260	236	22	108	116	120	121	20	115
	Ningxia	213	230	240	244	26	77	83	88	95	30	149
	Xinjiang	180	184	190	200	31	85	86	90	91	28	110
<i>Mean</i>		279	289	296	305		144	150	156	164		141

Note. Q1, Q2, Q3, Q4 = Quarter 1, Quarter 2, Quarter 3, Quarter 4; Q_{4U}-Q_{4R} = Urban Quarter 4 Dibao line - Rural Quarter 4 Dibao line; Exchange rate (on 05/03/2017): 1 US dollar = 6.89 yuan

APPENDIX 3.B

Chinese Cities Applied the Same (or Similar; < 50) Urban-Rural Dibao Line by the End of 2016

	Province	City	Urban	Rural	Urban-Rural	
Eastern China (26)	Beijing	Beijing	800	800	0	
	Shanghai	Shanghai	880	880	0	
	Jiangsu (7)		Nanjing	743	720	24
			Wuxi	729	705	24
			Changzhou	710	710	0
			Suzhou	810	810	0
			Yangzhou	572	549	23
			Zhenjiang	606	606	0
			Taizhou	590	557	33
	Zhejiang (6)		Hangzhou	732	698	35
			Ningbo	693	693	0
			Jiaxing	664	658	6
			Huzhou	635	635	0
			Shaoxing	634	628	7
			Zhoushan	664	664	0
	Guangdong (9)		Guangzhou	840	840	0
			Shenzhen	800	N/A	0
			Zhuhai	630	630	0
			Foshan	630	630	0
			Jiangmen	600	587	13
			Zhaoqing	578	528	50
			Huizhou	570	570	0
			Dongguan	610	610	0
			Zhongshan	629	629	0
	Fujian (2)		Xiamen	610	610	0
			Putian	533	533	0
Central China (4)	Anhui (2)	Hefei	487	440	47	
		Tongling	518	476	42	
	Hubei	Xianning	354	312	42	
Hunan	Changsha	448	408	40		
Western China (2)	Sichuan	Chengdu	505	494	11	
	Xinjiang	Changji	400	400	0	

APPENDIX 3.C

Regression Results of Urban Sample

Variables	(a) Imputed (N = 1,705)			(b) Imputed with Radius Matching (n =1,427)		
	β	Robust SE	P	β	Robust SE	P
Dibao	0.05	0.51	0.925	-0.01	0.56	0.985
Urban Hukou	-0.03	0.33	0.928	0.34	0.66	0.605
age	0.01	0.09	0.886	-0.04	0.16	0.806
Gender (1=male)	-1.67	0.30	0.000	-1.66	0.55	0.003
Minority (1=yes)	0.75	1.32	0.568	1.23	2.29	0.591
Highest Education Level						
(ref: Primary and less)						
Middle	-0.30	0.48	0.538	-0.43	0.98	0.663
High	-0.77	0.54	0.157	-0.91	1.06	0.391
Bachelor and higher	-0.99	0.65	0.128	-1.48	1.39	0.287
Life Status (ref: Full time employed)						
Full time student	-0.74	0.42	0.075	-1.76	0.88	0.044
Not employed not student	-0.14	0.42	0.728	-0.44	0.90	0.624
Has child	-0.72	0.60	0.231	-1.26	1.44	0.382
Income (log)	0.18	0.13	0.153	0.09	0.23	0.695
Perceived social class level (ref: Low)						
Middle	-1.36	0.35	0.000	-1.85	0.62	0.003
High	-1.29	0.49	0.008	-2.12	0.98	0.031
Both parents eat at home	0.06	0.48	0.907	0.16	0.83	0.851
Mother's education level (ref: illiteracy)						
Primary	-0.78	0.50	0.116	-1.09	0.94	0.249
Middle	-1.63	0.50	0.001	-2.95	0.94	0.002
High	-1.45	0.58	0.013	-2.20	1.02	0.031
Mother's age (ref: < 46)						
46-55	-0.45	0.34	0.177	-0.08	0.68	0.902
> 55	0.19	0.73	0.790	-1.48	1.08	0.172
Family size	0.19	0.10	0.063	0.23	0.17	0.180
Urban	0.00	0.00	.	0.00	0.00	.
Constant	11.84	2.19	0.000	15.06	3.95	0.000

Note. Number of imputed files = 20. Robust SE = Robust Standard Error.

APPENDIX 3.D

Regression Results Of Rural Sample

Variables	(a) Imputed (N = 2,487)			(b) Imputed with Radius Matching (n = 2,209)		
	β	Robust SE	P	β	Robust SE	P
Dibao	0.98	0.41	0.016	1.01	0.44	0.022
Urban Hukou	-0.34	0.53	0.519	-0.03	0.86	0.970
age	-0.10	0.07	0.134	-0.11	0.12	0.363
Gender (1=male)	-1.22	0.26	0.000	-1.11	0.47	0.019
Minority (1=yes)	-0.07	0.57	0.903	-0.13	0.88	0.885
Highest Education Level						
(ref: Primary and less)						
Middle	-0.78	0.31	0.011	-0.98	0.52	0.058
High	-0.90	0.40	0.024	-0.76	0.68	0.268
Bachelor and higher	-1.34	0.58	0.020	-1.97	1.08	0.068
Life Status (ref: Full time employed)						
Full time student	-0.45	0.36	0.211	-0.19	0.63	0.768
Not employed not student	0.07	0.32	0.822	0.29	0.57	0.617
Has child	-0.17	0.40	0.678	0.83	0.80	0.301
Income (log)	-0.05	0.11	0.654	-0.01	0.18	0.953
Perceived social class level (ref: Low)						
Middle	-1.26	0.31	0.000	-0.87	0.51	0.089
High	-2.60	0.39	0.000	-2.90	0.70	0.000
Both parents eat at home	-0.13	0.40	0.748	-0.17	0.64	0.796
Mother's education level (ref: illiteracy)						
Primary	-0.96	0.31	0.002	-1.16	0.49	0.017
Middle	-1.86	0.35	0.000	-2.10	0.66	0.001
High	0.14	0.54	0.792	0.98	1.13	0.386
Mother's age (ref: < 46)						
46-55	0.02	0.29	0.954	0.01	0.52	0.979
> 55	0.26	0.56	0.638	-0.21	1.00	0.833
Family size	-0.01	0.07	0.943	-0.01	0.12	0.937
Urban	0.00	0.00	.	0.00	0.00	.
Constant	17.68	1.68	0.000	17.19	2.90	0.000

Note. Number of imputed files = 20. Robust SE = Robust Standard Error.

APPENDIX 3.E

Regression Results of Youth Had No Child

Variables	(a) Imputed (N = 3,511)			(b) Imputed with Radius Matching (n = 3,072)		
	β	Robust SE	P	β	Robust SE	P
Dibao	0.35	0.35	0.318	0.37	0.37	0.315
Urban Hukou	-0.34	0.28	0.231	-0.03	0.51	0.950
age	-0.05	0.06	0.433	-0.06	0.11	0.584
Gender (1=male)	-1.40	0.21	0.000	-1.30	0.38	0.001
Minority (1=yes)	0.11	0.68	0.876	0.46	1.21	0.703
Highest Education Level						
(ref: Primary and less)						
Middle	-0.74	0.30	0.013	-1.01	0.49	0.038
High	-1.08	0.35	0.002	-0.93	0.62	0.135
Bachelor and higher	-1.28	0.44	0.004	-1.55	0.88	0.079
Life Status (ref: Full time employed)						
Full time student	-0.54	0.28	0.056	-0.71	0.53	0.184
Not employed not student	-0.02	0.30	0.946	-0.04	0.55	0.946
Has child	0.00	0.00	.	0.00	0.00	.
Income (log)	0.02	0.09	0.842	0.02	0.16	0.922
Perceived social class level (ref: Low)						
Middle	-1.27	0.25	0.000	-1.24	0.42	0.003
High	-2.29	0.34	0.000	-2.78	0.65	0.000
Both parents eat at home	-0.18	0.34	0.598	-0.29	0.54	0.600
Mother's education level (ref: illiteracy)						
Primary	-0.81	0.30	0.006	-1.14	0.50	0.022
Middle	-1.75	0.31	0.000	-2.49	0.56	0.000
High	-0.86	0.40	0.032	-1.52	0.72	0.036
Mother's age (ref: < 46)						
46-55	-0.21	0.24	0.373	0.06	0.45	0.888
> 55	0.53	0.52	0.312	-0.76	0.83	0.364
Family size	0.11	0.07	0.111	0.12	0.11	0.277
Urban	-0.57	0.24	0.017	-0.63	0.46	0.173
Constant	15.72	1.43	0.000	16.48	2.48	0.000

Note. Number of imputed files = 20. Robust SE = Robust Standard Error.

APPENDIX 3.F

Regression Results of Youth Had A Child

Variables	(a) Imputed (N = 681)			(b) Imputed with Radius Matching (n = 548)		
	β	Robust SE	P	β	Robust SE	P
Dibao	2.47	0.84	0.003	2.27	0.96	0.019
Urban Hukou	0.98	1.06	0.358	-0.58	2.23	0.795
age	-0.08	0.17	0.620	-0.18	0.34	0.591
Gender (1=male)	-1.87	0.66	0.005	-1.84	1.33	0.167
Minority (1=yes)	0.12	0.94	0.895	-0.30	1.47	0.837
Highest Education Level						
(ref: Primary and less)						
Middle	-0.38	0.54	0.485	-0.24	1.00	0.813
High	-0.15	0.76	0.845	-1.56	1.32	0.240
Bachelor and higher	-1.95	1.49	0.191	-3.95	2.23	0.078
Life Status (ref: Full time employed)						
Full time student	0.00	0.00	.	0.00	0.00	.
Not employed not student	-0.09	0.52	0.862	0.02	0.98	0.982
Has child	0.00	0.00	.	0.00	0.00	.
Income (log)	0.13	0.21	0.539	0.05	0.33	0.880
Perceived social class level (ref: Low)						
Middle	-1.30	0.54	0.016	-1.31	1.02	0.200
High	-1.18	0.70	0.091	-1.65	1.42	0.245
Both parents eat at home	0.48	0.67	0.480	0.73	1.33	0.587
Mother's education level (ref: illiteracy)						
Primary	-1.24	0.56	0.028	-0.60	0.99	0.544
Middle	-1.26	0.67	0.059	-1.19	1.35	0.379
High	-1.19	1.26	0.346	2.63	2.45	0.283
Mother's age (ref: < 46)						
46-55	-0.07	0.55	0.900	-0.68	0.99	0.495
> 55	-0.28	0.86	0.743	-0.38	1.71	0.826
Family size	-0.16	0.13	0.220	-0.11	0.23	0.624
Urban	-0.83	0.52	0.113	-1.35	1.12	0.228
Constant	15.85	4.18	0.000	19.00	8.15	0.020

Note. Number of imputed files = 20. Robust SE = Robust Standard Error.

APPENDIX 3.G

Regression Results of Female Had No Child

Variables	(a) Imputed (N = 1,733)			(b) Imputed with Radius Matching (n = 1,503)		
	β	Robust SE	P	β	Robust SE	P
Dibao	0.21	0.52	0.684	0.29	0.54	0.593
Urban Hukou	-0.01	0.42	0.982	0.91	0.78	0.245
age	0.03	0.09	0.691	0.07	0.16	0.647
Gender (1=male)	0.00	0.00	.	0.00	0.00	.
Minority (1=yes)	-0.03	1.01	0.978	-0.16	1.85	0.930
Highest Education Level						
(ref: Primary and less)						
Middle	-0.87	0.43	0.043	-1.00	0.70	0.157
High	-1.07	0.52	0.038	-1.02	0.93	0.275
Bachelor and higher	-1.03	0.67	0.122	-2.64	1.31	0.044
Life Status (ref: Full time employed)						
Full time student	-0.20	0.41	0.629	-0.19	0.80	0.817
Not employed not student	-0.17	0.43	0.686	-0.08	0.81	0.925
Has child	0.00	0.00	.	0.00	0.00	.
Income (log)	-0.07	0.14	0.627	-0.23	0.25	0.365
Perceived social class level (ref: Low)						
Middle	-0.96	0.36	0.008	-0.99	0.65	0.126
High	-1.97	0.49	0.000	-2.56	0.92	0.005
Both parents eat at home	0.37	0.47	0.427	0.21	0.77	0.789
Mother's education level (ref: illiteracy)						
Primary	-1.17	0.42	0.006	-2.26	0.75	0.003
Middle	-2.43	0.45	0.000	-3.52	0.79	0.000
High	-1.58	0.59	0.007	-3.65	1.08	0.001
Mother's age (ref: < 46)						
46-55	-0.36	0.35	0.304	-0.23	0.67	0.733
> 55	0.20	0.87	0.822	-1.09	1.83	0.550
Family size	0.11	0.10	0.267	0.09	0.16	0.586
Urban	-0.37	0.34	0.284	-0.26	0.69	0.707
Constant	14.39	2.04	0.000	15.99	3.56	0.000

Note. Number of imputed files = 20. Robust SE = Robust Standard Error.

APPENDIX 3.H

Regression Results of Female Had A Child

Variables	(a) Imputed (N = 484)			(b) Imputed with Radius Matching (n = 399)		
	β	Robust SE	P	β	Robust SE	P
Dibao	2.18	0.96	0.024	1.81	1.06	0.087
Urban Hukou	1.30	1.20	0.278	-0.68	2.26	0.763
age	-0.07	0.20	0.746	-0.29	0.43	0.508
Gender (1=male)	0.00	0.00	.	0.00	0.00	.
Minority (1=yes)	0.23	1.21	0.848	-0.22	1.88	0.906
Highest Education Level						
(ref: Primary and less)						
Middle	-0.44	0.67	0.510	-0.12	1.15	0.917
High	0.02	0.99	0.985	-1.74	1.73	0.317
Bachelor and higher	-2.24	1.76	0.205	-4.32	2.52	0.088
Life Status (ref: Full time employed)						
Full time student	0.00	0.00	.	0.00	0.00	.
Not employed not student	-0.10	0.64	0.879	-0.39	1.12	0.724
Has child	0.00	0.00	.	0.00	0.00	.
Income (log)	0.20	0.26	0.443	0.28	0.42	0.512
Perceived social class level (ref: Low)						
Middle	-1.31	0.67	0.052	-0.68	1.20	0.572
High	-0.82	0.85	0.335	0.19	1.58	0.906
Both parents eat at home	0.28	0.80	0.726	-0.19	1.56	0.903
Mother's education level (ref: illiteracy)						
Primary	-1.03	0.70	0.143	-0.48	1.14	0.674
Middle	-1.30	0.83	0.116	-0.23	1.60	0.888
High	-1.09	1.43	0.447	2.79	2.58	0.280
Mother's age (ref: < 46)						
46-55	-0.65	0.70	0.353	-0.97	1.20	0.417
> 55	-1.13	1.06	0.286	-1.74	1.73	0.316
Family size	-0.15	0.15	0.337	-0.21	0.24	0.378
Urban	-0.57	0.61	0.355	-1.58	1.29	0.222
Constant	15.07	4.93	0.002	20.40	9.71	0.037

Note. Number of imputed files = 20. Robust SE = Robust Standard Error.

APPENDIX 3.I

Results of Regression on Rural Females With a Child

Variables	(a) Imputed (N = 334)			(b) Imputed with Radius Matching (n = 275)		
	β	SE	P	β	SE	P
Dibao	3.15	1.09	0.004	3.03	1.26	0.017
Urban Hukou	1.42	2.17	0.515	-0.03	3.55	0.992
age	0.06	0.25	0.802	-0.28	0.48	0.556
Gender (1=male)	0.00	0.00	.	0.00	0.00	.
Minority (1=yes)	0.02	1.35	0.987	-0.07	2.05	0.974
Highest Education Level						
(ref: Primary and less)						
Middle	-0.28	0.82	0.732	-0.05	1.24	0.971
High	-0.33	1.25	0.791	0.20	1.85	0.915
Bachelor and higher	-2.30	2.43	0.344	-4.57	3.33	0.173
Life Status (ref: Full time employed)						
Full time student	0.00	0.00	.	0.00	0.00	.
Not employed not student	-0.05	0.77	0.943	-0.31	1.25	0.807
Has child	0.00	0.00	.	0.00	0.00	.
Income (log)	0.02	0.32	0.938	0.23	0.42	0.589
Perceived social class level (ref: Low)						
Middle	-0.97	0.88	0.271	0.25	1.40	0.861
High	-1.57	1.00	0.118	0.35	1.41	0.805
Both parents eat at home	0.06	1.05	0.956	-0.88	1.63	0.59
Mother's education level (ref: illiteracy)						
Primary	-0.78	0.86	0.362	0.40	1.35	0.765
Middle	-1.17	1.07	0.274	-0.28	1.88	0.881
High	-0.78	1.59	0.625	4.50	2.22	0.044
Mother's age (ref: < 46)						
46-55	-0.81	0.82	0.322	-1.76	1.35	0.195
> 55	-1.39	1.21	0.252	-1.43	1.67	0.392
Family size	-0.03	0.20	0.899	-0.12	0.28	0.677
Urban	0.00	0.00	.	0.00	0.00	.
Constant	12.79	5.97	0.033	19.05	10.83	0.081

Note. Number of imputed files = 20. Robust SE = Robust Standard Error.

APPENDIX 3.J

Results of Regression on Youth Household Income Under Lowest 25%

Variables	(a) Imputed (N = 873)			(b) Imputed with Radius Matching (n = 800)		
	β	Robust SE	P	β	Robust SE	P
Dibao	0.77	0.61	0.207	0.90	0.64	0.159
Urban Hukou	1.43	0.76	0.058	2.03	1.15	0.078
age	-0.10	0.12	0.408	-0.16	0.20	0.428
Gender (1=male)	-1.60	0.42	0.000	-2.50	0.64	0.000
Minority (1=yes)	-0.88	0.90	0.328	-0.17	1.65	0.920
Highest Education Level						
(ref: Primary and less)						
Middle	-1.14	0.50	0.024	-0.56	0.77	0.465
High	-0.85	0.74	0.252	-0.07	1.16	0.954
Bachelor and higher	-2.51	1.13	0.027	-1.50	1.86	0.420
Life Status (ref: Full time employed)						
Full time student	-1.36	0.64	0.034	-1.88	1.06	0.077
Not employed not student	0.19	0.56	0.739	-0.51	0.95	0.593
Has child	-1.14	0.67	0.088	-1.07	1.20	0.373
Income (log)	-0.26	0.17	0.132	-0.18	0.29	0.542
Perceived social class level (ref: Low)						
Middle	-0.26	0.48	0.595	-0.02	0.78	0.982
High	-1.66	0.64	0.010	-2.10	1.06	0.047
Both parents eat at home	0.11	0.60	0.853	-0.36	0.94	0.702
Mother's education level (ref: illiteracy)						
Primary	-0.80	0.52	0.126	-0.11	0.78	0.886
Middle	-1.49	0.63	0.018	-1.78	1.03	0.086
High	-0.72	1.10	0.516	-2.57	1.47	0.080
Mother's age (ref: < 46)						
46-55	-0.16	0.49	0.744	1.48	0.78	0.059
> 55	1.28	0.75	0.091	2.26	1.26	0.073
Family size	0.17	0.13	0.180	0.30	0.19	0.115
Urban	-1.61	0.50	0.001	-2.13	0.80	0.008
Constant	18.14	2.66	0.000	18.29	4.27	0.000

Note. Number of imputed files = 20. Robust SE = Robust Standard Error.

APPENDIX 3.K

Results of Regression of Relative Poor Youth

Variables	(a) Imputed (N = 1,011)			(b) Imputed with Radius Matching (n = 928)		
	β	SE	P	β	SE	P
Dibao	0.39	0.53	0.468	0.53	0.58	0.356
Urban Hukou	0.84	0.62	0.172	1.02	0.96	0.290
age	-0.15	0.11	0.198	-0.13	0.18	0.452
Gender (1=male)	-1.65	0.39	0.000	-1.84	0.61	0.003
Minority (1=yes)	-1.04	0.92	0.256	-0.45	1.72	0.793
Highest Education Level (ref: Primary and less)						
Middle	-0.90	0.50	0.068	-0.75	0.75	0.317
High	-0.38	0.69	0.580	-0.25	1.04	0.812
Bachelor and higher	-0.18	0.93	0.848	-0.47	1.63	0.772
Life Status (ref: Full time employed)						
Full time student	-1.31	0.60	0.030	-1.69	0.94	0.074
Not employed not student	-0.33	0.52	0.525	-1.13	0.84	0.175
Has child	-0.42	0.66	0.526	-0.65	1.16	0.573
Income (log)	-0.13	0.16	0.427	-0.18	0.28	0.504
Perceived social class level (ref: Low)						
Middle	-1.37	0.46	0.003	-1.50	0.71	0.035
High	-2.11	0.61	0.001	-2.63	0.98	0.007
Both parents eat at home	0.22	0.55	0.693	-0.39	0.84	0.648
Mother's education level (ref: illiteracy)						
Primary	-1.37	0.51	0.007	-0.98	0.75	0.190
Middle	-2.51	0.57	0.000	-2.89	0.89	0.001
High	-1.38	0.88	0.117	-2.26	1.33	0.089
Mother's age (ref: < 46)						
46-55	-0.02	0.45	0.961	1.11	0.74	0.135
> 55	0.63	0.78	0.420	0.97	1.13	0.394
Family size	0.12	0.12	0.296	0.19	0.17	0.253
Urban	-1.33	0.42	0.002	-1.84	0.66	0.005
Constant	19.24	2.52	0.000	19.92	3.90	0.000

Note. Number of imputed files = 20. Robust SE = Robust Standard Error.

APPENDIX 3.L

Regression Results of Youth Household Income Under Dibao Line

Variables	(a) Imputed (<i>N</i> = 2,217)			(b) Imputed with Radius Matching (<i>n</i> = 1,922)		
	β	SE	<i>P</i>	β	SE	<i>P</i>
Dibao	0.30	0.69	0.668	0.64	0.74	0.387
Urban Hukou	0.94	0.86	0.277	1.32	1.23	0.284
age	-0.42	0.15	0.006	-0.33	0.23	0.149
Gender (1=male)	-0.97	0.55	0.078	-1.27	0.74	0.088
Minority (1=yes)	-1.77	1.37	0.196	-0.93	2.60	0.722
Highest Education Level						
(ref: Primary and less)						
Middle	-0.48	0.74	0.515	0.01	0.95	0.988
High	0.31	0.98	0.748	0.27	1.33	0.840
Bachelor and higher	0.07	1.37	0.957	0.89	2.45	0.717
Life Status (ref: Full time employed)						
Full time student	-2.48	0.85	0.004	-2.13	1.21	0.080
Not employed not student	-0.36	0.77	0.644	-0.17	1.11	0.880
Has child	-0.49	0.91	0.592	-0.11	1.50	0.939
Income (log)	-0.32	0.20	0.111	-0.47	0.34	0.163
Perceived social class level (ref: Low)						
Middle	-0.61	0.63	0.332	-1.22	0.87	0.163
High	-1.62	0.83	0.052	-3.38	1.08	0.002
Both parents eat at home	0.54	0.74	0.465	0.20	0.98	0.837
Mother's education level (ref: illiteracy)						
Primary	-2.08	0.76	0.006	-1.53	0.95	0.109
Middle	-2.89	0.86	0.001	-3.40	1.21	0.006
High	-1.74	1.42	0.221	-4.09	1.81	0.024
Mother's age (ref: < 46)						
46-55	-0.32	0.66	0.621	0.55	0.91	0.547
> 55	1.17	1.05	0.265	0.22	1.34	0.872
Family size	0.29	0.18	0.104	0.37	0.22	0.104
Urban	-0.94	0.59	0.114	-1.19	0.83	0.153
Constant	24.51	3.35	0.000	23.43	4.56	0.000

Note. Number of imputed files = 20. Robust SE = Robust Standard Error.