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**Parenting Stress and Mental Health: Evaluating the Role of Neighborhood
Social Capital**

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**Parenting Stress and Mental Health: Evaluating the Role of Neighborhood
Social Capital**

by

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Thesis

Presented to the Faculty of the Graduate School of

The University of Texas at Austin

in Partial Fulfillment

of the Requirements

for the Degree of

Master of Arts

The University of Texas at Austin

August 2022

Dedication

I dedicate this thesis to my parents – my first educators.

Acknowledgements

I would like to thank my advisor, Dr. Elizabeth Muñoz, for her support, patience, and guidance throughout this project. I have gained so much knowledge and skills, and I look forward to continuing to grow as a better scholar under her mentorship. I would also like to acknowledge my thesis committee members, Drs. Sae Hwang Han and Karen Fingerman, for their insightful and valuable feedback that allowed me to further refine my thesis. Additionally, I would like to express my gratitude to my fellow graduate cohort for their incredible support, friendship, and ongoing encouragement. I am so lucky to be with you all. Last but not least, I would like to thank my family for their unconditional support and encouragement throughout this journey. Thank you for cheering me on during my highs and lows – I would not be where I am at today without you all.

Abstract

Parenting Stress and Mental Health: Evaluating the Role of Neighborhood Social Capital

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Parenting stress is a risk factor for poor mental health in adulthood. Greater neighborhood social capital (e.g., density of non-profit organizations, voter turnout within one's neighborhood) may provide resources that can have stress-buffering effects on parental mental health. I examined (a) the associations between parenting stress and depressive and anxiety symptoms, (b) whether these associations vary by gender, and (c) by county-level social capital (Social Capital Index). I used data from the ongoing Colorado Adoption/Twin Study of Lifespan behavioral development and cognitive aging, which included parents aged 28 to 43 ($n = 349$; $M_{\text{age}} = 34.37 (4.32)$).

Participants completed measures of demographics, relationships, health, and well-being. I used hierarchical linear regression models to account for non-independence among siblings and geographic location, and controlled for relevant covariates (e.g., demographics, number of children, marital status) and parents' depressive symptoms when they were adolescents. Higher levels of parenting stress were associated with higher depression and anxiety symptoms for both mothers and fathers; these effects were consistent across levels of social capital. In follow-up analyses, I found significant urban-rural differences such that the negative effect between parenting stress and mental health outcomes was stronger for parents living in more rural

contexts. My findings suggest that parenting stress is a risk factor for greater depressive and anxiety symptoms for mothers and fathers, and provide important insights into the protective role of neighborhood-level sources of support.

Keywords: parents, parenting stress, mental health, neighborhood social capital

Table of Contents

List of Tables	9
List of Figures	10
INTRODUCTION.....	11
Theoretical Framework.....	13
Parenting Stress and Mental Health	14
The Role of Parent Gender	15
The Moderating Role of Neighborhood Social Capital	16
Density of Neighborhood Organizations	17
Neighborhood-Level Civic Engagement	18
Social Capital, Parenting Stress, and Mental Health	20
The Current Study.....	21
METHOD	21
RESULTS	29
DISCUSSION	31
REFERENCES.....	37
TABLES AND FIGURES	61
APPENDICES.....	71

List of Tables

Table 1:	Sample Descriptive Information	61
Table 2:	Bivariate Correlations of Study Variables and Covariates	62
Table 3:	Multilevel Regression Model Results for Parenting Stress x Gender Predicting Depression and Anxiety	64
Supplementary Table 1:	Associations Between Individual Parenting Stress Items on Depressive Symptoms.....	67
Supplementary Table 2:	Associations Between Individual Parenting Stress Items on Anxiety Symptoms	68
Supplementary Table 3:	Multilevel Regression Model Results for Parenting Stress × IRR Predicting Depression and Anxiety	69

List of Figures

Figure 1:	Model of Associations Between Parenting Stress and Mental Health as Moderated by Parent Gender and Neighborhood Social Capital.....	66
Supplementary Figure 1:	Predicted Depression by Parenting Stress x IRR	70

Introduction

Poor parental mental health is a major risk factor for negative child developmental outcomes, familial functioning, and parental well-being. Almost one in five U.S. adults (19.1%) reported at least one or more mental disorders (Substance Abuse and Mental Health Services Administration, 2019), and 7.2% of U.S. children under 18 years old had at least one parent with poor mental health between 2016–2018 (Wolicki et al., 2021). Stress associated with the parenting role can produce aversive psychological and physiological reactions that can be both acute and chronic, and part of an ongoing experience of daily hassles (Crnic et al., 2005; Deater-Deckard & Panneton, 2017; Pearlin, 1982, 1989). High levels of parenting stress may reflect parents' at-risk mental health status as it is a significant predictor of serious psychological health outcomes (e.g., Manuel et al., 2012). Given the prevalence of mental health disorders among parents in the U.S. (Stambaugh et al., 2017; Wolicki et al., 2021), understanding modifiable protective factors that have the potential to create supportive environments for both mothers and fathers is a both an economic and public health priority (Centers for Disease Control and Prevention, 2021).

Neighborhood contexts serve as important resources for protecting mental health, above and beyond individual characteristics (Arcaya et al., 2016; Mair et al., 2010). In particular, increasing attention has been directed to the role of neighborhood social capital, the features of social organization (e.g., trust, civic participation) that facilitate collaborative action and cooperation (Putnam, 2000), as a major feature of neighborhood social contexts (Kawachi et al., 2007; Kim et al., 2011). Parents who reside in neighborhoods characterized by greater social capital may have more availability and access to social and physical resources that exert stress-buffering effects on mental health (McDonnell & Sianko, 2021; Shuey & Leventhal, 2019).

Neighborhood social capital can also provide health-promoting benefits through psychosocial (e.g., social support) processes (Almedom, 2005; Kawachi & Berkman, 2001). To date, most existing work documents the protective role of individual-level social resources (e.g., social networks; Nomaguchi & Milkie, 2020); yet, the potential moderating effects of social resources at the neighborhood level remain less clear. This is of considerable importance given that neighborhood social contexts also play a profound role for protecting parental well-being (McDonnell & Sianko, 2021).

In the current study, I examine the structural, neighborhood-level, component of social capital which refers to the presence (or absence) of formal opportunity structures or activities in one's neighborhoods (Moore & Kawachi, 2017). This study focuses on two distinct aspects of social capital assessed at the county level: the density of neighborhood organizations (i.e., the number of membership and non-profit organizations) and neighborhood-level civic engagement (i.e., voter turnout, census response rates; Rupasingha et al., 2006). These components have been hypothesized to give rise to neighborhood social processes that may benefit mental health (Almedom, 2005; Kawachi & Berkman, 2014). Gender is another important context that contributes to differences in the effects of parenting stress in relation to mental health outcomes (Nelson-Coffey et al., 2019; Pearlin, 1989). Understanding gender differences in heterosexual couples can broaden our understanding of disparities in mental health and the effects of parenthood by gender (e.g., Ruppanner et al., 2019). Guided by the socioecological theory and stress process model (SPM), I examined the associations between parenting stress and mental health and how these differ by gender. Additionally, I evaluated whether neighborhood social capital serves a protective function against parenting stress for both mothers and fathers of young children.

Theoretical Framework

Taking a socioecological perspective, mental health outcomes are influenced by the environmental contexts in which individuals live, and these contexts can serve as risks or resources for health outcomes, including mental health (Bronfenbrenner & Morris, 2006). Additionally, the SPM posits that chronic stressors often originate from social roles which can lead to role overload and conflict, and exacerbate existing stressors, or produce new stressors (Pearlin, 1982, 1999; Pearlin et al., 2005). Over time, frequent exposure to stressors can result in cognitive and emotional fatigue which strains parents' psychological resources thereby undermining their mental health (Nomaguchi & Milkie, 2017; see Figure 1). This model also recognizes that the levels and types of parenting stress vary by social groups, one of which is gender (Pearlin, 1989). Increasing studies recognize that paternal mental health also has important implications for child developmental outcomes; thus, an examination of both mothers and fathers and how these associations vary by gender remains critical (Centers for Disease Control and Prevention, 2022; Wolicki et al., 2021).

Furthermore, and in line with the SPM, the effects of parenting stress exposure on well-being may vary depending on one's availability of support and coping resources (Pearlin et al., 1999). For example, parents residing in neighborhoods characterized by greater social capital may have more access to social support that may help them address or fulfill parenting responsibilities more effectively (McDonnell & Sianko, 2021). Lack of neighborhood resources may prevent parents from receiving support of neighbors and community resources that may be beneficial in addressing daily parenting responsibilities (Byrnes & Miller, 2012). Therefore, living in low-level social capital neighborhoods may exacerbate the effects of parenting stress, while living in neighborhoods with high social capital may buffer against the adverse effects of

parenting stress (see Figure 1). I expand upon prior work by examining the effects of parenting stress on mental health, and the role of neighborhood social capital as a potential protective resource for parents.

Parenting Stress and Mental Health

Although the effects of parenthood last throughout the life course, the nature and types of parenting tasks and demands vary depending on children's developmental stages (Hagen et al., 2013; Luthar & Ciciolla, 2015; Meier et al., 2018; Pollman-Schult, 2014). For example, early childhood may require more hands-on and time-intensive daily care (e.g., bathing and feeding), whereas adolescents may require greater management and coordination of activities, such as organizing rides to and from activities and assisting with homework (Kalil et al., 2012; Lareau & Weininger, 2008; Luthar & Ciciolla, 2015). The current study focused on the effects of parenting stress on the mental health of parents with young children (ages 4–8 years old) with a particular focus on parents who are approaching midlife.

Parenthood entails ongoing demands, including time, emotional and physical energy, economic burdens, and conflict with other social roles and relationships that can be mentally taxing (Balaji et al., 2007; Luthar & Ciciolla, 2015; Nelson-Coffey & Stewart, 2019). Indeed, certain aspects of parenting can stimulate personal growth, positive self-concept, and a sense of purpose for parents with young children (Hansen, 2012; Nomaguchi & Milkie, 2020; Pollmann-Schult, 2014). However, when the amount of child-care demands exceed resources, this may cause parents to experience role overload, conflict, and feel overwhelmed by their role as a parent (Nomaguchi & Milkie, 2017). Moreover, parental responsibilities can reduce opportunities for self-care and leisure (Craig & Mullan, 2013; Mattingly & Bianchi, 2003), and generate marital conflict, work-family strain, and constrain personal freedom for parents (e.g.,

Keizer & Schenk, 2012; Kluwer, 2010; Nomaguchi, 2012). If parents become overly involved with their children, they may also experience increased worry and guilt, as they may be too focused on their children's needs and feel they are not meeting their own idealized expectations for parenting (e.g., Rizzo et al., 2013).

Although parenting stress plays an influential role on adult development, the extant literature has largely focused on the effects of parenting stress on child developmental outcomes, and less on the parents themselves. Indeed, long-term chronic stress and daily hassles are major contributors to illness, impairment, and psychological risk in middle-aged adults (Almeida et al., 2011; Danese & McEwen, 2012; Lupien et al., 2009). The limited literature shows that parents of young children report greater psychological distress and more frequent negative emotions than individuals without children (Evenson & Simon, 2005; Umberson et al., 2013). Parenting stress has also been related to higher risk of depressive and anxiety symptoms (Farmer & Lee, 2011; Horwitz et al., 2007; Huang et al., 2014; Umberson et al., 2010). For example, in a longitudinal study, Manuel et al. (2012) tracked depressive symptoms in mothers of young children over a 5-year period and found that baseline parenting stress increased the risk of depression over the study period. Given that parenthood is a lifelong developmental task, understanding the potential consequences of parenting stress and efforts to improve parental mental health warrants further attention. In the current study, I hypothesize that high levels of parenting stress will be associated with greater depressive and anxiety symptoms in both mothers and fathers.

The Role of Parent Gender. While there are more than two gender identity categories, the extant literature has largely focused on the dichotomous definition of gender (i.e., female/mothers, male/fathers; Pierce et al., 2020). The current literature indicates that gender differences in parenting responsibilities and social norms may contribute to variations in

mothers' and fathers' mental health. In general, mothers disproportionately spend greater time in childcare responsibilities compared to fathers (Offer, 2014; Sayer, 2005). Although recent trends reveal a marked increase in paternal involvement, the gender gap in shared parenting roles and caregiving tasks still remain. Despite the substantial increase in women's labor force participation, mothers are still more likely to take the primary responsibility of parenting, and their time with children has actually increased (Bianchi, 2011; Fillo et al., 2015; Gray & Anderson, 2010; Nazarinia-Roy et al., 2014; Pleck, 2010). Mothers report taking care of their families even after working long hours (Craig & Brown, 2017) and are more likely to spend greater time on housework and childcare even when they make higher income than their spouses (OECD, 2019; Wang, 2019).

Moreover, mothers and fathers differ in the distribution of time across parenting domains, as mothers are more likely to take responsibility in the most demanding and time-consuming activities, particularly from infancy through middle childhood (Bianchi et al., 2006; Craig, 2006; Doucet, 2013; Esping-Andersen et al., 2013; Offer, 2014). Accordingly, mothers may be more susceptible to work-family conflict (Bianchi, 2000; Bianchi & Mattingly, 2003; Borelli et al., 2017) and time pressure (Milkie et al., 2009; Ruppner et al., 2019), subsequently finding their time with children less enjoyable compared to fathers (Musick et al., 2016; Nelson-Coffey et al., 2017; Poortman & Van der Lippe, 2009; Roxburgh, 2002), thus diminishing their mental health (Nelson-Coffey et al., 2019). In the current study, I hypothesize that the effects of parenting stress on mental health will be stronger for mothers than fathers, such that mothers will report higher depressive and anxiety symptoms related to parenting stress compared to fathers.

The Moderating Role of Neighborhood Social Capital

Neighborhood organizations and civic engagement are important structural sources of social capital that can serve as important protective resources against mental health (Kawachi & Berkman, 2014; Putnam, 2000; Sampson & Graif, 2009; Sharkey et al., 2017). The presence of neighborhood organizations and extent of civic engagement in a county has commonly been used as an indicator of social capital (Putnam, 1995; Rupasingha et al., 2006).

Density of Neighborhood Organizations. Greater density of neighborhood organizations is related to more resources, collective civic events, and a greater level of connectedness in a community (Putnam, 2000; Sampson, 2012) that are relevant for parents. A strong presence of neighborhood organizations, such as, business and religious organizations, reflects the community's capacity to provide necessary services and goods and translate resident-based social resources into desired policy outcomes (Delany-Brumsey et al., 2014; Sampson & Graif, 2009; Small, 2006). Some studies indicate that neighborhoods with higher density of voluntary and civic groups, for example, are more effective in mobilizing support and lobbying for resources in the event of a collective problem (e.g., natural disaster; Aldrich, 2012; Kawachi & Subramanian, 2007; Koh et al., 2008; Jose et al., 2019). Variations in the number of neighborhood organizations may also result in differences in reported individual access to community resources (Altschuler et al., 2004; Derosé & Varda, 2009; Hendryx & Ahern, 2001; Hendryx et al., 2002; Litaker et al., 2005). Moreover, the resources provided by neighborhood organizations can also be accessible for individuals in the community, regardless of their membership status (i.e., public good; Kawachi & Berkman, 2014). For example, a resident may benefit from the efforts of members who worked together to rally against cuts to services (e.g., recreational facilities or healthcare clinics) and thus still have access to nearby resources; or from the efforts of volunteers to pick up trash every week, despite not being a member of the local

organization. Therefore, a strong presence of neighborhood organizations may be beneficial for the community as a whole (Kawachi & Berkman, 2014; Sampson & Graif, 2009; Small & Gose, 2020).

Neighborhood organizations also provide stress-buffering effects against poor mental health through psychosocial mechanisms. For instance, neighborhood organizations serve as important social structures that enable parents to develop and maintain social ties in the community (Kawachi & Berkman, 2014). In turn, higher density of neighborhood organizations can provide more opportunities for social engagement and access to social support (Beyers et al., 2003; Byrnes & Miller, 2012; Kawachi & Berkman, 2001).

In addition, a strong presence of neighborhood organizations has been related to higher levels of generalized trust towards neighbors (Glanville & Paxton, 2007) and positive perceptions of neighborhood surroundings (Thoits, 1986; Turney & Harknett, 2010), helping to alleviate the negative emotional or behavioral reactions to parenting stress (Kawachi & Berkman, 2001). Greater trust among neighbors may also facilitate communities to develop and enforce shared social norms of behavior that can lower disorder and crime rates (Brisson & Roll, 2012; Sampson, 2001; Sharkey et al., 2017; Wo, 2019). Therefore, neighborhoods with a greater presence of neighborhood organizations may have lower rates of neighborhood disorder (e.g., crime), greater organizational resources, and more opportunities for social connections, all of which have been associated with positive mental health outcomes (Delany-Brumsey et al., 2014; Kawachi & Berkman, 2001; Sampson et al., 2002; Small & McDermott, 2006; Small & Stark, 2005).

Neighborhood-Level Civic Engagement. The second component of the social capital indicator includes the level of civic engagement in the neighborhood, indicative of actions in

place to improve a community, that may be beneficial for parents (Rupasingha et al., 2006). Social capital theory suggests that political participation in the form of voting turnout and census response rates, are key indicators of civic engagement that demonstrate individuals' willingness and ability to incur individual costs to address societal objectives (Putnam et al., 1993; Putnam, 2004). Voting participation and completing census forms require time, and reflects one's sense of mutual responsibility for larger social and political issues, even without the likelihood of personal gain (Putnam, 1993). According to this perspective, areas characterized by stronger individual commitment to society, such as greater voter turnout or census completion rates, may reflect the community's ability to marshal its residents to resolve collective problems (Ding et al., 2020; Putnam, 2000).

Community-level civic engagement may shape neighborhood environments in ways that impact health-related behaviors and well-being. Accordingly, some empirical evidence demonstrates that high voter turnout may be related to health outcomes, including sexually transmitted infection risk, self-rated health, and pediatric inpatient bed-day rates (Brown et al., 2020; Islam et al., 2006; Haley et al., 2019; Kim & Kawachi, 2006; Kim et al., 2015; Noguchi-Shinohara et al., 2021). Voting plays a critical role in shaping residents' access to resources that support mental health (e.g., health care services) through the distribution of social and structural resources to communities (Haley et al., 2019; Navarro et al., 2006). Residents living in communities with higher voting participation may be more well-informed of community health problems and actively engage in collective action to resolve problems (Islam et al., 2006). High voter turnout may also reflect greater sense of duty and concern with public affairs to promote the public good (Rice & Feldman, 1997; Smith, 2002) and thus be more effective in advancing agendas and policies through bringing resources into the community (Scribner et al., 2007). In

sum, greater neighborhood-level civic engagement reflects the community's willingness and ability to resolve collective problems that provide health-promoting benefits to the community as a whole.

Social Capital, Parenting Stress, and Mental Health

Neighborhoods high in social capital can be protective against the negative effects of parenting stress on mental health through greater resources and psychosocial mechanisms. For instance, studies show that neighborhood organizations play a major role in providing access to opportunities and outside services (e.g., childcare services, healthcare, grocery stores; Hothi et al., 2008; Leventhal et al., 2015; Small, 2006; Wilson, 1987). Greater presence of neighborhood organizations may also provide more opportunities and key structures to develop and maintain social ties in the community through interactions with other individuals within organizations (Kawachi & Berkman, 2001). Indeed, the ability to leverage interdependent networks and mobilize support for one's family is a key protective resource for parental psychological well-being (Hansen, 2005; Nomaguchi & Milkie, 2020).

Greater neighborhood social capital reflects the community's ability to facilitate collective action and formally organized efforts to address concerns regarding order and safety of communities (Altschuler et al. 2004; McDonell & Sianko, 2021). Greater collective action can build a sense of trust and norms of reciprocity among residents (Putnam, 2000), helping to alleviate parents' worries about their children's safety (Carpiano & Kimbro, 2012; McDonell, 2007; Shuey & Leventhal, 2019) and enhance their perceived availability of support and perceptions of neighborhood surroundings (Byrnes & Miller, 2012; Christie-Mizell & Erickson, 2007; Rhoad-Drogalis et al., 2020; Zhang et al., 2015). More positive perceptions of their neighborhood surroundings can allow parents to feel more supported in the community

(Tendulkar, 2012; Maguire-Jack & Wang, 2016) and engage in more positive parenting behaviors (Shuey & Leventhal, 2017), providing parents with greater sense of mastery and perceived control in times of stress (Christie-Mizell & Erickson, 2007; Pearlin, 1982; Wilson, 1996).

The Current Study

The current study advances prior work by examining the associations between parenting stress and mental health in both mothers and fathers, and the moderating effects of neighborhood social capital on these associations. The SPM posits that stress associated with key social roles can have negative consequences for mental health, and that these associations can vary by one's social group membership and access to resources (Pearlin et al., 2005). In line with the SPM, I first hypothesized that higher levels of parenting stress will be associated with higher depressive and anxiety symptoms among parents (Hypothesis 1), and that this association will be stronger for mothers compared to fathers (Hypothesis 1a). Integrating the socioecological model (Bronfenbrenner & Morris, 2006), I expand upon the SPM by examining the potential moderating effects of macro-level resources for protecting parental mental health. For my second hypothesis, I predicted that there will be significant moderating effects of neighborhood social capital, such that the association between parenting stress and mental health symptoms will be mitigated by greater neighborhood social capital (Hypothesis 2).

Methods

Participants

I utilized data from the ongoing Colorado Adoption/Twin Study of Lifespan behavioral development and cognitive aging (CATSLife; Wadsworth et al., 2019) which has combined two parent studies: the Colorado Adoption Project (CAP), which began in 1977 (Plomin & DeFries,

1983; Rhea, Bricker, et al., 2013a) and the Longitudinal Twin Study (LTS), which began in 1985 (Rhea, Gross, et al., 2013). Data collection for CATSLife is ongoing and the current study involves an analysis of data collected as of September 2021, which entails 1278 participants.

The present analytic sample consists of CATSLife participants who reported having child(ren) and completed the parenting stress questionnaire. These parents primarily identified as White (93.12%) with a mean age of 34.37 ($SD = 4.32$; range: 28 – 43), and 59.6 % were female.

Procedure

Participants completed an online survey that encompassed measures of their demographic background, relationships, health, and well-being, including the parenting stress questionnaire. Participants also provided their mailing address and consented to their address being geocoded to obtain information about their neighborhoods. In-person assessments were also conducted to collect biomarker, health, and cognitive function data, that were not used in the current analysis. The protocol was approved by the two respective institutional review boards of the University of Colorado at Boulder, and the University of California at Riverside. The current study primarily focused on data from the online survey portion of CATSLife and self-reported home addresses.

The present study included participants into the analysis if the following criteria were met: (1) participants reported having child(ren) who were no less than 18 years apart, (2) completed the parental stress measure, (3) completed the depressive and anxiety symptoms measures, and (4) had available data on the moderator and covariates of interest. The criteria yielded 349 participants for the final analytic sample size.

Measures

Depressive Symptoms. To assess symptoms associated with depression, participants indicated how much they have felt or experienced a list of symptoms during the past week using

the General Distress: Depression subscale derived from the Mood and Anxiety Symptom Questionnaire (MASQ; Watson & Clark, 1991) (e.g., “Felt like a failure”). Each item was rated using a scale from 1 = *very slightly* or not at all to 5 = *extremely* (see Appendix B). The scale consisted of four items and were summed to create a composite measure ($\alpha = .86$). I subtracted 1 from all the respondents to ensure that the possible total score was from 0 to 16.

Anxiety Symptoms. Anxiety symptoms were measured by three items using the General Distress: Anxiety subscale from the Mood and Anxiety Symptom Questionnaire (MASQ; Watson & Clark, 1991) (e.g., “Was unable to relax”). Participants indicated how much they have felt or experienced these symptoms during the past from a scale from 1 = *very slightly* or not at all to 5 = *extremely* (see Appendix B). Items were summed to create a composite measure ($\alpha = .53$). I subtracted 1 from all the respondents to ensure that the possible total score was from 0 to 12.

Parenting Stress. Participants completed the Parental Stress Scale (Berry & Jones, 1995) to assess the stress levels experienced by parents in addition to positive aspects of parenting. A shorter version of four items (e.g., “I feel overwhelmed by the responsibility of being a parent”) was adapted for this study using a five-point scale ranging from 1 = *strongly disagree* to 5 = *strongly agree* (see Appendix A for full list of items). Items related to positive aspects of parenting were reverse-coded. Items were summed into a composite measure, with higher scores indicating higher levels of parenting stress ($\alpha = .67$). The scores were centered at the grand mean whereby the zero point represented the average parenting stress score.

Social Capital Index (SCI). Participants’ addresses were geocoded to obtain a geographic identifier related to the county they lived in at the time of data collection. The measure of social capital index was obtained from the updated, publicly available, 2014

Northeast Regional Center for Rural Development which combines data from 10 sources that are suggested to increase social capital (Northeast Regional Center for Rural Development, 2019; Rupasingha et al., 2006). These sources include the total number of available membership organizations in each county: a) religious organizations, (b) civic organizations, (c) business organizations, (d) political organizations, (e) professional organizations, (f) labor organizations, (g) bowling centers, (h) fitness centers, (i) golf clubs; and (i) sports organizations. This index also includes other important facets believed to contribute to social capital: the percentage of voters who voted in the presidential elections (Alesina & La Ferrara, 2000), the county-level response rate to the Census Bureau's decennial census (Knack, 2002), and the number of tax-exempt non-profit organizations from the National Center for Charitable Statistics. To calculate, the creators of the Social Capital Index extracted the first factor from the last three variables as well as a factor from the aggregate of all above variables dividing by the population per 1,000. These four factors were then used to form a standardized first principal component ($M=0$, $SD=1$) (see Northeast Regional Center for Rural Development, 2019) and the census tract for each participants' residential address was linked to these data, with higher scores indicating greater social capital.

Control Variables. Participants also provided background information including age, gender (0 = female; 1 = male), race/ethnicity (0 = non-Hispanic White; 1 = Non-White), educational attainment (from 0 = less than high school to 4 = more than college), employment status (0 = not employed; 1 = employed), marital status (from 0 = married to 4 = never married/other), adoption status (0 = non-adopted; 1 = adopted), project (0 = CAP; 1 = LTS), number of living children, and child(ren)'s age. To obtain the child(ren)'s age, I calculated the difference between the year parents completed the study and the birth year of the oldest and

youngest child. In addition, the recent global coronavirus disease 2019 (COVID-19) introduced a new range of significant stressors for many parents and children (Brown et al., 2020). Given that few participants completed the study during the COVID-19 pandemic, I also controlled for whether parents completed the study prior to or during the pandemic (0 = during the COVID-19 pandemic; 1 = pre-COVID-19 pandemic).

Additional covariates in models evaluating the moderating role of SCI included the Index of Relative Rurality, and individual-level social support. Access to social capital may vary by rurality or urbanicity (Beaudoin & Thorson, 2004; Fischer, 1982). For example, urban neighborhoods are more likely to have greater business and social organizations promote social participation (Meng & Chen, 2014), whereas rural neighborhoods may have greater voluntary associations (Putnam, 2000; Rupasingha et al., 2006; Sorensen, 2012). Thus, I also accounted for the Index of Relative Rurality (IRR), a continuous measure of rurality ranging from 0 (most urban areas) to 1 (most rural areas) (Inagami et al., 2016; Waldorf, 2006; Waldorf & Ayong, 2015) which combines population size, density, percentage of urban residents, and the distance to the nearest metropolitan area; this index was calculated at the county level. To account for individual-level sources of support, I also controlled for social support received from family members (Walen & Lachman, 2000). Geographic location was also accounted as an additional level of analysis as described in the Analytic Strategy section below.

Leveraging the longitudinal nature of CAP and LTS, I also controlled for pre-parenthood depression ($M = 1.55$, $SD = 2.47$; range = 0–15) and anxiety ($M = 0.72$, $SD = 1.19$; range = 0–7) measured when the participants were 16 years old. Adolescence (age 16) mental health was assessed via the Child Behavior Checklist (CBCL; Achenbach, 1991; Achenbach, Dumenci, & Rescorla, 2003), a widely used, standardized measure for examining parent-reported behavioral

problems and competencies of children 6-18 years of age. Accounting for pre-parenthood mental health allowed me to control for potential vulnerability to depression or anxiety, further enhancing the validity of the associations between parenting stress and mental health that I tested in this study.

Analytic Strategy

I used the SAS 9.4 (SAS Inc, Cary NC) to run all descriptive analyses and to fit hierarchical/multilevel models utilizing Proc Mixed and maximum likelihood estimation. First, I conducted preliminary analyses for parenting stress, depression, and anxiety symptoms. To test my hypotheses, I conducted hierarchical linear regression analyses to account for family clustering and adjust for the reduction of standard errors due to data dependency from having twins and siblings in the data. I included a random estimate representative of a family variable to account for this family clustering. In the models that tested my second hypothesis, I conducted a three-level multilevel regression analysis to control for clustering by geographic location, thus allowing me account for the fact that there may be data dependency among participants who lived in the same county. For all models, I grand-mean centered the covariates and adjusted for participant age, gender, marital status, education, employment status, number of living child(ren), child(ren)'s age, pandemic, adoption status, project type, and pre-parenthood depression and anxiety symptoms collected at age 16. In addition to these covariates, I also controlled for IRR and family support for the SCI interaction effects models.

To test hypothesis 1a, I examined whether parenting stress is associated with mental health outcomes. I regressed the depressive and anxiety symptoms on the sum parenting stress measure, respectively, and followed up by fitting a regression of the mental health variables on each of the individual parenting stress items. The predictor variable was the participants'

parenting stress scores whereas the depressive and anxiety scores were the outcomes in separate models. Note that I fitted a hierarchical linear model to account for family clustering, but I only present the results from the fixed effects. The following equation exemplifies my regression model for depression. The same model was applied for anxiety scores.

$$Depression = B_0 + B_1PS + B_2COVS$$

Here, B_0 represents the average depression score when all other predictors are zero; B_1 is the slope for parenting stress indicative of the change in depression for every one unit change in parenting stress, and B_2 represents the effect of the covariates included in the analysis (i.e., age, gender, race/ethnicity, educational attainment, employment status, marital status, number of children, child(ren)'s age, pandemic, adoption status, project type, and pre-parenthood depressive and symptoms).

To test the moderating effects of gender on the associations between parenting stress and mental health outcomes (hypothesis 1b), I created interaction terms between the grand-mean centered parenting stress sum score and gender (0 = female; 1 = male). The following equation exemplifies my regression model for depression. The same model was applied for anxiety scores.

$$Depression = B_0 + B_1PS + B_2Gender + B_3PS \times Gender + B_4COVS$$

Here, B_0 represents the average depression score when all other predictors are zero; B_1 , and B_2 are the main effects of parenting stress and gender on depressive symptoms, respectively. B_3 is the interaction term between parenting stress and gender, indicative of the extent to which the effect of stress on depression varies for females versus males. B_4 represents the effect of the covariates included in the analysis (i.e., age, gender, race/ethnicity, educational attainment, employment status, marital status, number of children, child(ren)'s age, pandemic, adoption status, project type, and pre-parenthood depressive symptoms).

Finally, I examined whether social capital index moderated the association between parenting stress and mental health (i.e., depression and anxiety) by testing the main effect of social capital index and the interaction of social capital index by parenting stress. The moderation model equation is as follows:

$$Depression = B_0 + B_1PS + B_2SCI + B_3PS \times SCI + B_4COVS$$

Here, B_0 represents the average depression score when all other predictors are zero; B_1 and B_2 , are the slopes indicative of the change in depression for every one unit change in parenting stress and one standard deviation change in social capital index, respectively. B_3 is the interaction between parenting stress and social capital index indicative of the extent to which the effect of parenting stress on depression changes as a function of social capital. Lastly, B_4 represents the effects of the covariates included in the analysis (i.e., age, gender, race/ethnicity, educational attainment, employment status, marital status, number of children, child(ren)'s age, pandemic, IRR, pre-parenthood depressive and anxiety symptoms, adoption status, project type, and family support).

Supplementary Analyses

I examined whether IRR moderated the association between parenting stress and mental health (i.e., depression and anxiety) by testing the main effect of IRR and the interaction of IRR by parenting stress. The moderation model equation is as follows:

$$Depression = B_0 + B_1PS + B_2IRR + B_3PS \times IRR + B_4COVS$$

Here, B_0 represents the average depression score when all other predictors are zero; B_1 and B_2 , are the slopes indicative of the change in depression for every one unit change in parenting stress (B_1) and from least to most rural, or vice versa IRR (B_2). B_3 is the interaction between parenting stress and IRR indicative of the extent to which the effect of parenting stress on depression

changes as a function of IRR. Lastly, B_4 represents the effects of the covariates included in the analysis (i.e., age, gender, race/ethnicity, educational attainment, employment status, marital status, number of children, child(ren)'s age, pandemic, SCI, pre-parenthood depressive and anxiety symptoms, adoption status, project type, and family support).

Results

Table 1 displays the descriptive statistics of the key variables. On average, participants reported low levels of parenting stress ($M = 7.29$, $SD = 2.73$), anxiety ($M = 4.75$, $SD = 1.88$), and depressive symptoms ($M = 6.71$, $SD = 3.21$). The median number of children was 2 ($M = 1.82$; $SD = 0.84$) with the average age of firstborn at 6.87 years old ($SD = 4.82$, $Mdn = 6$) and age of youngest child at 4.24 years old ($SD = 3.77$, $Mdn = 3$). Most participants resided in counties with low levels of social capital ($M = -0.56$, $SD = 0.66$, range: -1.99 – 3.34) and more urban than rural contexts; Index of Relative Rurality = 0.36). I present bivariate correlations among all variables of interest in Table 2. The average anxiety and depressive symptoms were both positively correlated with parenting stress, age of firstborn, adolescence anxiety and depressive symptoms, (r s range = $.11$ – $.20$, $p < .001$). Family support was negatively correlated with average anxiety ($r = -.18$, $p < .001$) and depressive symptoms ($r = -.19$, $p < .001$). Parenting stress was positively correlated with the number of living children, age of first child, age, education, adolescence anxiety and depressive symptoms (r s range = $.11$ – $.21$, $p < .001$), and negatively correlated with gender, marital status, and family support (r s range = $-.15$ – $-.11$, $p < .01$). Social capital index was positively correlated with the average depressive symptoms ($r = .11$, $p < .05$), age of firstborn ($r = .16$, $p < .01$), and age ($r = .22$, $p < .001$).

Predictive models are presented in Table 3. Higher levels of parenting stress were associated with greater depressive ($b = .20$ (.06), $p < .01$) and anxiety ($b = .10$ (.04), $p < .01$)

symptoms, even after accounting for parents' mental health status in adolescence. An evaluation of the individual parenting stress items indicated that those who reported feeling less happy in their role as a parent reported greater depressive ($b = .66 (.23), p < .01$) and anxiety symptoms ($b = .28 (.13), p < .05$) (see Supplementary Tables 1 and 2). Parents who reported feeling more overwhelmed by the responsibility of being a parent were also more likely to have greater depressive ($b = .65 (.15), p < .001$) and anxiety symptoms ($b = .23 (.09), p < .05$). Feeling less close to their children was not significantly related to depressive ($b = .27 (.17), p = .06$) nor anxiety symptoms ($b = .27 (.17), p = .11$). Additionally, having greater perceptions of their children as a major source of stress was also not significantly associated with depressive ($b = -.02 (.14), p = .89$) nor anxiety symptoms ($b = .11 (.08), p = .19$).

As shown in Table 3, I did not find any significant moderating effects by gender on depressive ($b = .19 (.11), p = .99$) nor anxiety symptoms ($b = .01 (.08), p = .89$). Lastly, the results, shown in Table 3, did not indicate any significant moderating effects by SCI for depressive ($b = .07 (.07), p = .35$) nor anxiety symptoms ($b = .07 (.04), p = .08$).

Supplementary Analyses

Supplementary analyses examined the effects of IRR as another contextual source of resilience. As shown in Supplementary Table 2, I found a moderating effect of IRR on the link between parenting stress and depression, such that the negative effects of parenting stress on depression were exacerbated for parents living in more rural than urban contexts ($b = 1.82 (.71), p < .05$). I present simple slopes analyses for the moderation effects in Supplementary Figure 1. Simple slope tests revealed that when parents lived in more rural contexts and experienced high levels of parenting stress, the level of depressive symptoms increased ($b = 1.11, p = .002$). In contrast, when parents lived in more urban contexts, parenting stress was unrelated to depressive

symptoms ($b = -.15, p = .58$). I did not find any significant moderating effects of IRR on the link between parenting stress and anxiety symptoms ($b = .82 (.41), p = .05$).

Discussion

Parental mental health has important implications for child development, family well-being, and the long-term health trajectories of the parents themselves. Given the detrimental consequences of poor parental mental health (Luciano et al., 2014; Reupert et al., 2007; Wilson & Durbin, 2010), understanding risks and modifiable factors associated with parental well-being is imperative for creating supportive environments for parents. To advance prior work, I examined the effects of multiple dimensions of parenting stress on adult mental health outcomes, and the role of social neighborhood capital as a potential resource for protecting parental mental well-being.

My first major finding was that parents who experienced more parenting stress were more likely to report greater depressive and anxiety symptoms. Consistent with my first hypothesis, my findings lend support to the stress process model which posits that stressors stemmed from the parenting role can have negative consequences for individual mental health (Pearlin, 1983, 1989). As Pearlin (1989) suggested, parental strain consists of multiple dimensions that should be examined separately. In the current analyses, I found that parents who feel less happy in their role as parents and more overwhelmed by the parental responsibility were more likely to experience greater depressive and anxiety symptoms. Given that most parents in the current study had young children, it is possible that parents were more involved with child-centered daily routines consisting of more time-intensive, hands-on tasks (e.g., feeding, bathing; Meier et al., 2018) that may result in less time for self-care and leisure. Reduced time to care for

their own needs may thus result in parents' greater feelings of isolation and burden (Craig & Mullan, 2013; Lareau & Weininger, 2008).

Surprisingly, although poor parent-child relationships can negatively impact parental mental health (Gunderson & Barrett, 2017; Luthar & Ciciolla, 2016; Nomaguchi & Brown, 2011), feeling less close to their children was not significantly related to depressive and anxiety symptoms. Parenting younger children may consist of more physically demanding tasks; yet, these duties may be less emotionally challenging and leave parents feeling more competent (Musick et al., 2016). In addition, parents may enjoy sharing how young children interact with the world and the novelty of parenting is higher during the early stages of child development which is linked with greater parental well-being (Kohler et al., 2005). Thus, given that my sample primarily consisted of parents with young children, the cognitive and behavioral conditions that emerge during the early stages of childhood may potentially protect parents from the effects of certain aspects of parenting stress on their mental well-being.

Parent Gender

I expected the adverse effects of parenting stress to be stronger for mothers compared to fathers. Contrary to my expectation, I did not find any significant gender differences in the association between parenting stress and mental health. Prior evidence suggests gender differences in the types and levels of parental responsibilities and stressors (Doucet, 2013; Meier et al., 2018), and quantity of involvement with children (Nazarinia-Roy et al., 2015; OECD, 2019; Parke & Cookston, 2019). However, although mothers still spend greater time with their children, recent trends indicate that father's time spent with children have increased substantially with higher expectations for father to be involved in childcare duties while being primary breadwinners of the family (Cotter & Pepin, 2017; Pleck, 2010). For instance, some studies show

increases in the number of hours fathers spend with their children (Bianchi et al., 2006), investments toward childcare contributions (Hook & Wolfe, 2012; Maume, 2011), and fulfillment of the primary care provider role in families of employed mothers (U.S. Census Bureau, 2008). Fathers also report experiencing more stress from the financial costs of parenthood (Pollmann-Schult, 2014) and workplace inflexibility compared to mothers (Nomaguchi & Johnson, 2016). An examination of mean differences in parenting stress scores showed that both mothers and fathers reported similar levels of parenting stress further corroborating the nonsignificant gender interaction. The nonsignificant results imply that the adverse effects of parenting stress have similar consequences for mental health, regardless of the gender differences in the domains of involvement.

Moreover, some evidence also shows educational and economic differences in the amount of paternal involvement, whereby more well-educated and higher socioeconomic status fathers are moving towards more equal participation and involvement in parenting compared to those with lower educational attainment and limited employment opportunities (Furstenberg, 2014). Most participants in my sample were well-educated and had higher socioeconomic status; therefore, it is also possible that the parents in the current study shared similar parental expectations and responsibilities, regardless of gender.

The Role of Neighborhood Social Capital

Past studies have found associations between neighborhood-level social capital and various health outcomes, including mortality (Kawachi et al., 1997; Yang et al., 2009; Weaver & Rivello, 2007), self-rated health (Kim et al., 2011), and mental health (Almedom, 2005; Dev & Kim, 2020; Scheffler et al., 2007). My findings did not support my hypothesis that neighborhood social capital would alleviate the effects of parenting stress on mental health outcomes. My

measure of neighborhood social capital was a total composite index of multiple indicators (i.e., number of organizations, voter turnout, census response rate, number of non-profit organizations). One possible explanation is that different features of social capital may be more important for parents depending on the developmental periods of their children (Leventhal et al., 2015). For example, the availability and accessibility to local resources, such as affordable, quality childcare, may particularly be most critical for parents with younger children (Young, 2019), whereas neighborhood social organization and norms may be more relevant for parents with older children as children gain more autonomy (Shuey & Leventhal, 2019). Moreover, social capital measured at different levels of analysis reflect the influences of different social processes (e.g., state, tract) (Lochner et al., 1999; Scheffler et al., 2007). I utilized a social capital index assessed at the county level which may mainly reflect the influence of socially focused organizational structures in these neighborhoods (Rupasingha et al., 2006; Yang et al., 2011). County boundaries are much broader than Census tract or block boundaries, which may reflect greater accessibility. Additional studies assessing the independent contributions of each marker of the social capital index and at other levels of analysis warrant further consideration.

Although the effects of parenting stress on mental health were consistent across SCI, supplementary analyses revealed significant moderating effects by county-level IRR, whereby the adverse effects of parenting stress on depression were stronger for parents living in more rural than urban counties. Rural neighborhoods often lack high quality and availability of resources that negatively affect individual health (Bitsko et al., 2016; Meit et al., 2014). Parents living in more rural contexts may experience greater challenges in accessing health-related information, quality services, and resources for themselves and their children (Anderson et al., 2015; Robinson et al., 2017). In addition, rural-residing parents may face poorer neighborhood

conditions, more environmental barriers, and limited amenities (e.g., lack of sidewalks, public transportation; Levasseur et al., 2015; McIlhenny et al., 2009; Strosnider et al., 2017). These neighborhoods are also often characterized by lack of social support and greater social isolation (Bitsko et al., 2016; Strosnider et al., 2017). Such barriers may hinder parents' ability to fulfill their parental responsibilities effectively and to gain access to social resources on a more daily basis. Contrary the county-level measure of SCI, measuring level of rurality at the county level may be indicative of a greater lack of access to resources compared to measures of IRR at the Census tract/block level as those who live in more rural tracts, but are surrounded by more urban tracts, may still have access to resources through their neighboring tracts. These results reveal the importance of taking levels of measurement (i.e., County, Census tract, Census block) to account when quantifying neighborhood-level resources and contexts.

Limitations and Strengths

This study has several limitations worth considering. One limitation of the current study is that the sample is predominantly well-educated, non-Hispanic White. Future work on more racially and socioeconomically diverse samples will help to shed light on the generalizability of my findings. Second, social capital is a complex construct that consists of multiple dimensions, including both objective and subjective features (Moore & Kawachi, 2017). In the current study, I only examined an objective and structural component of social capital, but other facets of social capital (e.g., social participation, neighborhood cohesion) may have different and more proximal implications for parental health outcomes (Carpiano & Kimbro, 2012). Finally, on average, individuals in the current sample reported low levels of parenting stress. Additional research is needed to evaluate whether the effects of social capital may have different effects for parents with high levels of parenting stress.

Despite these limitations, the current study advances prior work by examining social resources for protecting parental mental well-being. First, my findings underscore the adverse effects of parenting stress on anxiety and depression for both mothers and fathers, even after accounting for child variables and pre-parenthood mental health symptoms. In addition, I expand on the SPM to incorporate ecological-level protective resources by utilizing SCI and IRR, both of which are valuable yet underutilized tools, to empirically test potential moderating resources at the contextual level.

Conclusion

Parenting stress is an ongoing process that plays a profound role on individuals' mental health trajectories. The neighborhoods in which parents reside have the ability to create supportive environments that can help reduce parenting strains and allow parents to thrive. Understanding modifiable resources for protecting parental mental health in the context of broader environmental influences is a critical step for developing neighborhood-level interventions to improve the community social environment. My findings shed light on the adverse effects of parenting stress on mental health outcomes, and geographic differences on these links.

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Table 1*Sample Descriptive Information*

	Participants (<i>n</i> = 349)		
	<i>M</i>	<i>SD</i>	<i>Range</i>
<u>Parental mental health</u>			
Depressive symptoms	2.71	3.21	0–16
Anxiety symptoms	1.75	1.88	0–10
Age	34.37	4.32	28–43
Parenting stress	7.29	2.73	4–20
<u>Geographic measures</u>			
SCI	0.00	1.00	0–1
# of living children	1.82	0.84	1–6
<u>Child age</u>			
Age of firstborn	6.87	4.82	0–21
Age of youngest	4.24	3.77	0–20
<u>Adolescence mental health</u>			
Depressive symptoms	1.55	2.47	0–15
Anxiety symptoms	0.72	1.19	0–7
Family support	21.36	2.93	9–24
		<i>Proportions</i>	
Female		.60	
White		.93	
<u>Education</u>			
High school or less		.01	
High school		.12	
Some college		.25	
College		.38	
More than college		.24	
Married		.81	
Employed		.85	
Adopted		.24	

Note. IRR = Index of Relative Rurality; SCI = Social Capital Index.

Table 2*Bivariate correlations of study variables and covariates*

	1	2	3	4	5	6	7	8	9
1. Average anxiety symptoms	–								
2. Average depressive symptoms	0.53***	–							
3. Average parenting stress	0.14**	0.20***	–						
4. SCI	0.03	0.11*	0.02	–					
5. IRR	0.07	0.04	0.05	0.02	–				
6. Gender (0 = female)	-0.02	-0.01	-0.15**	0.00	-0.00	–			
7. # of living children	0.08	0.04	0.21***	0.08	0.08	0.05	–		
8. Age of firstborn	0.19***	0.11*	0.16**	0.16**	0.11*	0.01	0.46***	–	
9. Age of youngest child	0.16**	0.07	0.01	0.07	0.01	0.013	-0.04	0.75***	–
10. Age	0.08	0.10	0.18***	0.22***	-0.05	0.07	0.29***	0.55***	0.44***
11. Race/Ethnicity status (0 = non-Hispanic White)	-0.07	-0.02	-0.09	-0.09	-0.16**	-0.02	0.01	-0.00	-0.03
12. Education	-0.16**	-0.05	0.11*	0.00	-0.14**	-0.16**	-0.06	-0.23***	-0.21***
13. Marital status	0.10	0.01	-0.11*	0.02	0.02	0.11*	-0.22***	0.16**	0.30***
14. Employment status (0 = not employed)	0.15**	0.14*	0.04	0.03	0.05	-0.16**	0.19***	0.00	-0.09
15. Adolescence anxiety	0.14**	0.13*	0.13*	0.03	0.04	-0.12*	0.02	0.15**	0.12*
16. Adolescence depression	0.20***	0.18***	0.14*	-0.04	0.08	-0.04	0.01	0.16**	0.16**
17. Family support	-0.18***	-0.19***	-0.13*	-0.04	-0.04	-0.16**	-0.04	-0.15**	-0.15**
18. COVID-19 pandemic (0 = during pandemic)	0.09	0.03	0.00	0.03	0.07	0.01	0.06	0.09	0.09
19. Adoption status (0 = non-adopted)	-0.006	-0.02	0.07	0.00	0.07	0.07	0.15**	0.42***	0.33***

Note. $n = 349$. IRR = Index of Relative Rurality ; SCI = Social Capital Index.

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

Table 2 Continued*Bivariate correlations of study variables and covariates*

	10	11	12	13	14	15	16	17	18	19
1. Average anxiety symptoms										
2. Average depressive symptoms										
3. Average parenting stress										
4. SCI										
5. IRR										
6. Gender (0 = female)										
7. # of living children										
8. Age of firstborn										
9. Age of youngest child										
10. Age	–									
11. Race/Ethnicity status (0 = non-Hispanic White)	-0.03	–								
12. Education	0.22***	-0.08	–							
13. Marital status	-0.07	0.04	-0.34***	–						
14. Employment status (0 = not employed)	-0.11*	-0.08	-0.13*	-0.03	–					
15. Adolescence anxiety	0.03	0.01	-0.17	0.12*	0.10	–				
16. Adolescence depression	0.06	-0.02	-0.19***	0.17**	0.11*	0.66***	–			
17. Family support	-0.01	0.04	0.17**	-0.05	-0.08	-0.04	-0.19***	–		
18. COVID-19 pandemic (0= during pandemic)	0.05	-0.03	-0.04	0.06	0.02	0.07	0.06	0.06	–	
19. Adoption status (0 = non-adopted)	0.52***	0.12*	-0.01	-0.01	-0.13*	0.11*	0.10	-0.03	0.05	–

Note. $n = 349$. IRR = Index of Relative Rurality ; SCI = Social Capital Index.

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

Table 3*Multilevel Regression Model Results for Parenting Stress × Gender Predicting Depression and Anxiety (n = 349)*

	<u>Depression</u>						<u>Anxiety</u>					
	Main effect only		Parenting stress × Gender		Parenting stress × SCI		Main effect only		Parenting stress × Gender		Parenting stress × SCI	
	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Fixed effects												
Intercept	3.08**	0.93	3.08**	0.93	2.74**	0.92	2.00***	0.54	1.99***	0.54	1.81***	0.52
Parenting stress	0.20**	0.06	0.19	0.11	0.18**	0.07	0.10**	0.04	0.09	0.07	0.06	0.04
× Gender ^a	–	–	-0.20	0.37	–	–	–	–	0.01	0.08	–	–
× SCI	–	–	–	–	0.07	0.07	–	–	–	–	0.07	0.04
Gender ^a	-0.21	0.93	-0.21	0.37	-0.07	0.37	0.21	0.22	0.21	0.22	–	–
SCI	–	–	–	–	0.30	0.17	–	–	–	–	-0.00	0.10
<u>Covariates</u>												
Age	0.08	0.09	0.08	0.09	0.05	0.09	0.01	0.06	0.01	0.06	0.02	0.06
Marital status	-0.29	0.49	-0.29	0.49	-0.26	0.49	0.13	0.28	0.13	0.28	0.32	0.28
Race/Ethnicity ^b	0.34	0.67	0.33	0.68	0.30	0.69	-0.15	0.39	-0.15	0.39	-0.19	0.41
Education	-0.09	0.21	-0.09	0.21	-0.01	0.21	-0.28*	0.12	-0.28*	0.12	-0.22	0.12
Employment status ^c	1.10*	0.51	1.10*	0.51	0.98	0.51	0.54	0.29	0.53	0.29	0.30	0.29
# of living children	-0.46	0.31	-0.46	0.31	-0.36	0.31	-0.06	0.17	-0.05	0.17	0.02	0.18
Age of firstborn	0.13	0.20	0.13	0.08	0.09	0.08	0.03	0.05	0.03	0.05	0.02	0.05
Age of youngest	-0.08	0.22	-0.08	0.09	-0.05	0.09	-0.01	0.05	-0.01	0.05	0.02	0.05
Adolescence mental health	0.16*	0.07	0.16*	0.07	0.14*	0.07	0.11*	0.08	0.11	0.08	0.07	0.08
COVID-19 Pandemic ^d	0.35	1.40	0.35	1.40	0.58	1.40	1.32	0.82	1.32	0.82	1.33	0.82
Project ^e	-0.19	0.79	-0.19	0.79	-0.13	0.79	0.38	0.46	0.37	0.46	0.24	0.47
Adoption status ^f	-0.78	0.48	-0.78	0.48	0.60	0.48	-0.43*	0.28	-1.88*	0.85	-0.39	0.28
Family support	–	–	–	–	-0.11	0.06	–	–	–	–	-0.05	0.03
IRR	–	–	–	–	0.09	1.80	–	–	–	–	0.58	1.07

Note. Fixed effects from multilevel model presented on table. ^a0 = *female* and 1 = *male*. ^b0 = *non-Hispanic White* and 1 = *non-White*. ^c0 = *not employed* and 1 = *employed*. ^d0 = *during pandemic* and 1 = *pre-pandemic*. ^e0 = *CAP* and 1 = *LTS*. ^f0 = *non-adopted* and 1 = *adopted*. IRR = Index of Relative Rurality ; SCI = Social Capital Index.
p* < .05. *p* < .01. ****p* < .001.

Figure 1

Model of Associations Between Parenting Stress and Mental Health as Moderated by Parent Gender and Neighborhood Social Capital

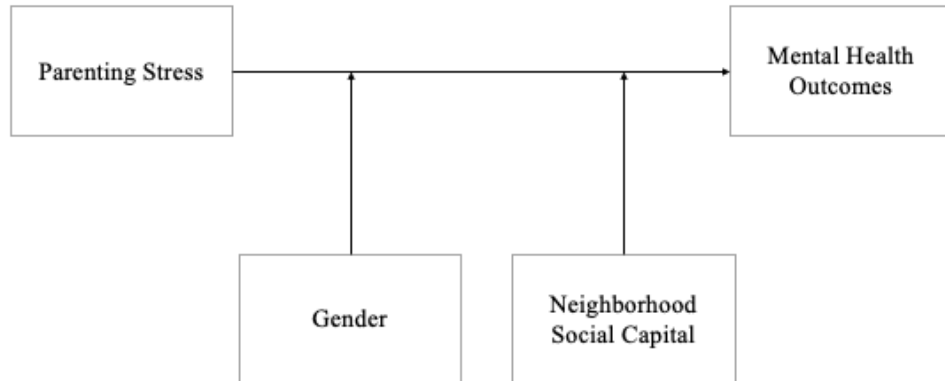


Figure 1. Conceptual model linking parenting stress and mental health outcomes as moderated by gender and neighborhood social capital contexts.

Supplementary Table 1

Associations Between Individual Parenting Stress Items on Depressive Symptoms ($n = 349$)

	<u>Feeling happy in</u> <u>role as parent</u>		<u>Feeling close to</u> <u>child(ren)</u>		<u>Child(ren) as</u> <u>major source of</u> <u>stress</u>		<u>Feeling</u> <u>overwhelmed by</u> <u>parental</u> <u>responsibility</u>	
	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Fixed effects								
Intercept	2.52**	0.92	2.65**	0.93	2.72**	0.94	2.33*	0.91
Parenting stress	0.66**	0.23	0.58	0.29	-0.02	0.14	0.65***	0.15
<u>Covariates</u>								
Age	0.06	0.09	0.08	0.09	0.08	0.09	0.08	0.09
Gender ^a	-0.03	0.37	-0.03	0.37	-0.02	0.37	-0.41	0.37
Marital status	-0.35	0.49	-0.38	0.49	-0.35	0.50	-0.37	0.48
Race/Ethnicity ^b	0.19	0.67	0.23	0.68	0.14	0.69	0.29	0.67
Education	-0.03	0.21	-0.02	0.22	-0.04	0.22	-0.09	0.21
Employment status ^c	1.09*	0.51	1.06*	0.51	1.08*	0.51	-1.22*	0.49
# of living children	-0.43	0.31	-0.41	0.31	-0.40	0.31	-0.45	0.30
Age of firstborn	0.15	0.08	0.14	0.08	0.15	0.08	0.14	0.08
Age of youngest	-0.11	0.09	-0.11	0.09	-0.11	0.09	0.14	0.08
Adolescence depression	0.17*	0.07	0.18*	0.07	0.19**	0.07	0.15*	0.07
COVID-19 pandemic ^d	0.71	1.41	0.58	1.42	0.41	1.43	0.33	1.39
Project ^e	-0.07	0.79	-0.07	0.79	-0.04	0.80	-0.22	0.78
Adoption status ^f	-0.89	0.49	-0.82	0.48	-0.83	0.48	-0.73	0.47

Note. Fixed effects from multilevel model presented on table. ^a0 = female and 1 = male. ^b0 = non-Hispanic White and 1 = non-White. ^c0 = not employed and 1 = employed. ^d0 = during pandemic and 1 = pre-pandemic. ^e0 = CAP, 1 = LTS. ^f0 = non-adopted and 1 = adopted. * $p < .05$. ** $p < .01$. *** $p < .001$.

Supplementary Table 2

Associations Between Individual Parenting Stress Items on Anxiety Symptoms ($n = 349$)

	<u>Feeling happy in role as parent</u>		<u>Feeling close to child(ren)</u>		<u>Child(ren) as major source of stress</u>		<u>Feeling overwhelmed by parental responsibility</u>	
	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Fixed effects								
Intercept	1.74**	0.54	1.79**	1.90	1.77**	0.54	1.68**	0.54
Parenting stress	0.28*	0.13	0.27	0.17	0.11	0.08	0.23*	0.09
<u>Covariates</u>								
Age	0.00	0.06	0.01	0.06	0.01	0.06	0.01	0.06
Gender ^a	0.30	0.22	0.27	0.17	0.26	0.22	0.17	0.22
Marital status	0.09	0.28	0.08	0.28	0.14	0.29	0.09	0.28
Race/Ethnicity ^b	-0.24	0.39	-0.23	0.39	-0.19	0.39	-0.22	0.39
Education	-0.25*	0.12	-0.25*	0.12	-0.27*	0.12	-0.28*	0.12
Employment status ^c	0.54	0.29	0.08	0.28	0.54	0.29	0.55	0.29
# of living children	-0.04	0.18	-0.03	0.18	-0.05	0.18	-0.05	0.17
Age of firstborn	0.04	0.04	0.04	0.05	0.03	0.05	0.04	0.05
Age of youngest	-0.02	0.05	-0.02	0.05	-0.01	0.05	-0.01	0.05
Adolescence anxiety	0.12	0.08	0.13	0.08	0.13	0.83	0.11	0.08
COVID-19 pandemic ^d	1.46	0.82	1.42	0.83	1.22	0.83	1.32	0.82
Project ^e	0.42	0.46	0.42	0.46	0.38	0.46	0.38	0.46
Adoption status ^f	-0.47	0.28	-0.45	0.28	-0.43	0.26	-0.41	0.28

Note. Fixed effects from multilevel model presented on table. ^a0 = female and 1 = male. ^b0 = non-Hispanic White and 1 = non-White. ^c0 = not employed and 1 = employed. ^d0 = during pandemic and 1 = pre-pandemic. ^e0 = CAP and 1 = LTS. ^f0 = non-adopted and 1 = adopted. * $p < .05$. ** $p < .01$. *** $p < .001$.

Supplementary Table 3

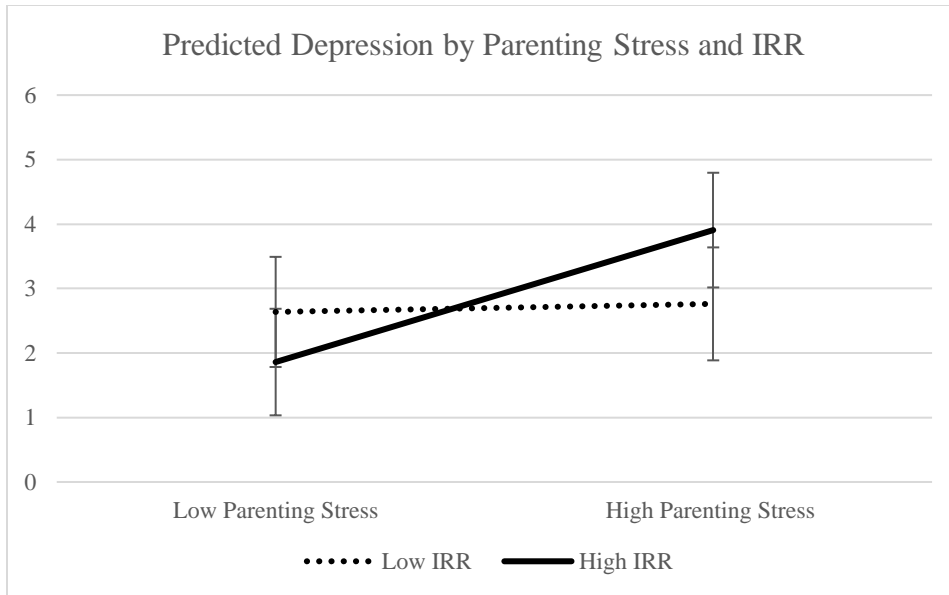
Multilevel Regression Model Results for Parenting Stress \times IRR Predicting Depression and Anxiety ($n = 349$)

	<u>Depression</u>				<u>Anxiety</u>			
	Main effect only		Interaction effect		Main effect only		Interaction effect	
	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Fixed effects								
Intercept	3.08**	0.93	2.99**	0.91	2.00***	0.54	1.94***	0.53
Parenting stress	0.20**	0.06	0.19**	0.07	0.10**	0.04	0.08*	0.04
\times IRR	–	–	1.82*	0.71	–	–	0.82	0.41
IRR	–	–	0.94	1.82	–	–	0.92	1.08
<u>Covariates</u>								
Age	0.08	0.09	0.07	0.97	0.01	0.17	0.03	0.06
Gender ^a	-0.21	0.93	-0.05	0.37	0.21	0.22	0.29	0.22
Marital status	-0.29	0.49	0.24	0.48	0.13	0.28	0.33	0.28
Race/Ethnicity status ^b	0.34	0.67	0.37	0.68	-0.15	0.39	-0.12	0.41
Education	-0.09	0.21	-0.02	0.21	-0.28	0.12	-0.24	0.12
Employment status ^c	1.10*	0.51	0.82	0.51	0.54	0.29	0.27	0.29
# of living children	-0.46	0.31	-0.31	0.31	-0.06	0.17	0.03	0.18
Age of firstborn	0.13	0.20	0.06	0.08	0.03	0.05	0.00	0.05
Age of youngest	-0.08	0.22	-0.04	0.09	-0.01	0.05	0.02	0.05
Adolescence mental health	0.16*	0.07	0.18*	0.07	0.11*	0.08	0.07	0.08
COVID-19 pandemic ^d	0.35	1.40	0.49	1.38	1.32	0.82	1.32	0.81
Project ^e	-0.19	0.79	-0.35	0.79	0.38	0.46	0.15	0.47
Adoption status ^f	-0.78	0.48	-0.57	0.47	-0.43*	0.28	-0.38	0.28
Family support	–	–	-0.10	0.06	–	–	-0.05	0.03
SCI	–	–	0.33	0.17	–	–	-0.00	0.10

Note. Fixed effects from multilevel model presented on table. ^a0 = female and 1 = male. ^b0 = non-Hispanic White and 1 = non-White. ^c0 = not employed and 1 = employed. ^d0 = during pandemic and 1 = pre-pandemic. ^e0 = CAP and 1 = LTS. ^f0 = non-adopted and 1 = adopted. IRR = Index of Relative Rurality ; SCI = Social Capital Index.

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

Supplementary Figure 1



Appendix A

The Parental Stress Scale

Instructions

How much do you agree or disagree with the following statements?

Items

1. ...I am happy in my role as parent.^R
2. ...I feel close to my child(ren).^R
3. ...The major source of stress in my life is my child(ren).
4. ...I feel overwhelmed by the responsibility of being a parent.

Note. ^R= reverse-coded item.

Scale Coding

Items are presented of a scale from 1 = (*strongly disagree*) to 6 = (*strongly agree*).

Appendix B

Mood and Anxiety Symptom Questionnaire (MASQ; General Distress: Depressive and Anxiety Symptoms)

Instructions

Below is a list of feelings, sensations, problems, and experiences that people sometimes have. Read each item and then mark the appropriate choice in the space next to that item. Use the choice that best describes how much you have felt or experienced things this way during the past week, including today.

Items

General Distress: Depressive Symptoms

Felt like a failure.
Blamed myself for a lot of things.
Was disappointed in myself.
Felt pessimistic about the future.

General Distress: Anxiety Symptoms

Had diarrhea.
Had an upset stomach.
Was unable to relax.

Scale Coding

Items are presented of a scale from 0 = (*Very slightly or not at all*) to 4 = (*Extremely*).