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How Household Economic Stress Matters: Family Functioning and Child Externalizing and Internalizing Behaviors

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By

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Table of Contents

List of Tables

List of Figures

Abstract

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Washington University in St. Louis, 2024

Professor Brett Drake, Ph.D., Chair

This dissertation investigates the multifaceted dynamics of long-term economic stress and its association with subsequent caregiver psychological well-being and children's internalizing and externalizing behaviors. For a comprehensive measure of household economic stress, this dissertation delves into the severity, duration, and fluctuation of economic stress, considering diverse income and asset profiles. The research framework utilizes and integrates a range of existing theories to create a context for understanding the intricate interplay between economic stress, caregiver mental health, and children's behavioral outcomes. Data are drawn from the Panel Study of Income Dynamics, which includes both information about household economic stress and child and caregiver well-being. This study finds that different kinds and combinations of economic stress have different associations with caregiver and child behaviors. These findings suggest the importance of family-based policies and interventions, which are able to address economic and non-economic needs across generations for economically vulnerable populations.

Introduction

Understanding the profound implications of economic stress on families, particularly on children and their caregivers, is paramount for addressing societal well-being comprehensively. Economic stress, such as financial instability or inadequate resources, can permeate every aspect of family life, creating a ripple effect that extends far beyond financial constraints. Children, often the most vulnerable members, are profoundly impacted by the environment shaped by economic stress. Their emotional, cognitive, and physical development can be significantly hindered, manifesting in increased anxiety, behavioral issues, and academic struggles. Moreover, the stress experienced by caregivers in managing economic hardships can strain familial relationships, leading to heightened tensions, decreased parental involvement, and compromised caregiving quality. Still, there are research gaps resulting from the lack of attention paid to long-term economic stress measured by income and assets and its impacts on child behavioral outcomes and their caregivers' mental health. Delving into the mechanisms behind these associations is a key to a better understanding of how to improve the current interventions and policies aiming to improve child and caregiver well-being for those living in economically vulnerable families.

This dissertation investigates the influences of household economic stress, including both household income and assets, on child behavioral development. It also explores the mechanisms underlying these associations. The *Background and Purpose* section illustrates the advantages of measuring long-term economic stress based on income and assets as well as the importance of clarifying mechanisms underlying such economic stress and its influences on child behavioral development. The next section, *Theoretical Frameworks*, illustrates the core components of the

Family Stress Model, the Family Investment Model, and Social Learning Theory. These theories provide a theoretical framework explaining the association between household economic stress and child development outcomes. The section *Empirical Evidence* shows empirical findings that bear upon the aforementioned theoretical frameworks. The next section, *the Proposed Model*, presents the proposed model based on these theoretical frameworks. In the *Research Questions and Hypotheses* section, each research question and its corresponding hypotheses are described. Following these sections, in the *Method* section, this dissertation describes the data set for use, measurement of variables, and proposed statistical analyses.

The *Results* section presents results of longitudinal latent class analyses. These results show the heterogeneity in long-term economic stress severity, duration, and fluctuation based on household income and assets. Subsequently, I present the results of a multinomial logistic regression model, which shows risk factors for suffering from long-term income and asset shortage and instability. Next, I show how long-term economic stress is directly and indirectly associated with caregiver mental health and child behavioral development outcomes. Then, I show results of direct and indirect effect comparisons. In the *Discussion* section, I present a summary of findings and implications for policies and interventions for financial security, family-based needs satisfaction and alleviation of economic inequality. Following the discussion, I present implications for theoretical framework expansion and improving existing methodologies for measuring long-term economic stress while simultaneously considering both income and assets.

Background and Purpose

As child problematic behavior is an antecedent of later problems in adulthood, including mental health issues, economic problems (Odgers et al., 2008), substance abuse (Mason et al., 2010), criminal behaviors and unstable employment (Simons et al., 2002), it is important to understand mechanisms explaining how household economic stress is associated with problematic child behavior. Clarification of these mechanisms is a key to better understanding how to interrupt the impacts of household economic stress on child development outcomes.

The association between household economic stress and subsequent child problematic behavior. According to the Centers for Disease Control and Prevention, the rate of problematic behaviors (e.g., anxiety, depression, attention-deficit/hyperactivity disorder, conduct disorders) is 22.1% among children raised in families with income below 100% of the official poverty line (Cree et al., 2018). The same rate is 18.6% and 13.9% among children raised in families with income which is 100% to 199% of the official poverty line and families with income which is above 400% of the official poverty line, respectively (Cree et al., 2018). These findings suggest child behavioral problems can be more prevalent in families facing more severe economic stress. Research routinely finds children raised in families with economic stress are more likely to develop behavioral problems, such as internalizing behavior problems (e.g., depression) or externalizing behavior problems (e.g., conduct disorder) (Ghandour et al., 2019; Kim et al., 2016; Reising et al., 2013; Slopen et al., 2010). These findings are consistent with studies from neuroscience. More specifically, poverty-related stress can also affect the regulation of neurotransmitters, such as serotonin and dopamine, which plays a critical role in mood and

behavior. Dysregulation of these neurotransmitters may contribute to increased vulnerability to mood disorders and impulsive behavior (Lipina & Posner, 2012). Early childhood is an important time for brain development, both structurally and with regard to functioning. Living in poverty can impact development, leading to poorer language, memory, executive functioning, and emotion processing, a key foundation for later behavioral development (Noble & Giebler, 2020). Kim et al. (2022) showed that the association between poverty and child internalizing and externalizing behaviors can be partly attributed to cortical morphologic changes. Together, these findings have suggested that living with economic stress could be associated with subsequent child internalizing and externalizing behavior problems.

Household economic stress: low income and assets. Economic stress refers to a state of financial hardship manifested in various ways, such as decreased income, inability to meet financial obligations or basic needs (Sabia & Burkhauser, 2012). While there are different measures of household economic stress, the relative position of household income to the poverty threshold (i.e., poverty status) is a widely used index (McKernan & Sherraden, 2008). As low-income families tend to live near or below the poverty line, they are more likely to face household economic stress (Sabia & Burkhauser, 2012). Reasons are attributable to the fact that low-income families are more likely to make trade-off between different daily needs (Torraco, 2016). In addition to income, the lack of sufficient assets such as savings also exposes families to economic stress (McKernan & Sherraden, 2008). For people living below the poverty line, assets determine one's capacity to move above the poverty line through supplementing income with existing assets. For example, for people whose income is below the poverty line by $1,000, being able to withdraw money from a savings account containing $800 can decrease the income-

poverty line gap from $1000 to $200. Withdrawing savings from a saving account that contains $1,400 would bridge the income-poverty line gap and bring the household above the poverty line by $400. Prior studies support this viewpoint by illustrating that income and assets jointly determine household economic stress. In the United States, Brandolini et al. (2010) reported that the consumption of assets enables one to reduce the income-poverty line gap or move above the poverty line. Kuypers and Marx (2018) found the same pattern in Germany and Belgium. In alignment with these studies, other studies showed that the lack of sufficient assets could prevent the income poor from satisfying daily needs (Chavez, et al., 2018; McKernan & Sherraden, 2008; Short & Ruggles, 2005). Together, these studies showed that not only low income but also assets play an important role in shaping household economic stress.

Long-term household economic stress. For people living in poverty, not all of them are able to escape poverty in the short time (Chen et al., 2022; Eslami et al., 2011). For example, for households living near or under the official poverty line before the Great Recession, nearly a quarter of them still lived with debts in the aftermath of the Great Recession (Federal Reserve Bank of New York, 2019). Empirical evidence shows that low chance of escaping poverty for the poor is the main reason people become trapped in persistent poverty (Chen et al., 2022). In other words, economic stress among the poor should not be considered a unitary construct as some individuals remain in poverty while others do not. These people are more likely than others to experience long-term economic stress. Together, these findings suggest that a longitudinal observation is needed to provide a more nuanced assessment of household economic stress in a way that a cross-section observation cannot.

To date, there has been no standard measure of long-term household economic stress. According to Zhang and Han (2021), there are three facets of long-term household economic stress. The first is the severity of poverty. People who experience lower ratios of income to the official poverty line, experience more severe economic stress. These people face wider gaps between income and daily needs. The second one is duration. This is simply a measure of how long people have been in poverty. The third one is the fluctuation above and below the income-poverty line ratio. People who experience more frequent income-poverty line ratio fluctuations, experience more severe unstable economic conditions. To have a more nuanced measure of one's economic stress, it is suggested to simultaneously consider poverty severity, duration, and fluctuation across time rather than a binary poverty status only at a specific time point (Zhang & Han, 2021).

Research gaps and aims. A growing body of evidence has shown the associations between household economic stress and child development outcomes may be indirect via different mechanisms, such as family processes (e.g., caregiver psychological distress) (Conger & Conger, 2002; Conger et al., 2010; Masarik & Conger, 2017). However, there are still research gaps. This dissertation hopes to fill some of these gaps through the following aims.

[1]. Little attention is paid to long-term household economic stress. Zhang and Han (2021) observed heterogeneity in household economic stress dynamics, which reflects some household experiences more severe income poverty intensity, duration, and volatility while others do not. These findings suggest the pattern of poverty intensity, duration, and volatility is not uniform for all people. Zhang and Han (2021) also observed that more severe poverty dynamics are

predictive of more severe internalizing problematic behavior. Currently, the role of assets is not considered when investigating how long-term household economic stress measured by *income and assets* affects child problematic behavior. This study aims to explore [1-1] heterogeneity in long-term household economic stress measured by *income and assets*. Such exploration can help clarify whether all families experience longitudinal economic stress in the same way and [1-2] identify mediators embedded in the paths linking long-term household economic stress and child problematic behaviors. Such exploration can help clarify whether long-term household economic stress is directly associated with child problematic behaviors or indirectly through caregiver psychological distress. Clarification of these mechanisms is a key to a better understanding of how to interrupt the influences of long-term economic stress on children and family well-being.

[2]. While parents might increase their work hours or take a second job to improve household economic well-being, this may interrupt child development outcomes given that longer time working could results in worse mental health for caregivers (Chen et al., 2023). Moreover, Proctor (2006) observed that community quality is also a prominent predictor of child problematic behavior. Despite these findings, to date, we do not understand whether these factors are more influential than long-term economic stress on child behavioral development. This study aims to compare association strength to clarify whether these factors have similar relationships to child problematic behavior. Such a comparison is a key to a better understanding of designing a more efficient intervention to address child problematic behaviors.

[3]. While internal and external problematic behavior are different from each other, it is unknown to us whether the aforementioned associations are similarly applicable to internalizing and

externalizing behaviors. This study aims to compare direct and indirect association strength to clarify whether long-term economic stress, an increase in work time, and community are similarly associated with internalizing and externalizing behaviors. Such a comparison is a key to a better understanding of designing interventions to address both internalizing and externalizing behaviors.

Theoretical Frameworks

Several theories have been proposed to explain how household economic well-being affects child problematic behavior (Masarik & Conger, 2017; Shaw & Shelleby, 2014; Yeung et al., 2002). These theories include the Family Stress Model (FSM), the Family Investment Model (FIM), and social learning theory. Each theory is described below.

The Family Stress Model. The Family Stress Model focuses on the mechanisms explaining how economic problems affect child development outcomes. It does this by highlighting the role of family processes including the emotional well-being of caregivers and interactions between family members (Conger, et al., 2010). FSM proposes that a lack of sufficient income leads to economic pressures such as unmet material needs (e.g., inadequate food or clothing), having no money to pay bills or make ends meet, and being forced to cut back on necessary daily needs (e.g., health insurance, medical care). These pressures are thought to place parents at increased risk for psychological distress (e.g., depression, anxiety, anger). In turn, psychological distress affects child development outcomes. These relationships may be due to increased harsh parenting or reduction in nurturing parenting (Conger & Conger, 2002; Conger et al., 2010; Masarik & Conger, 2017). Taken together, under the FSM framework, it is proposed that the impacts of family economic well-being on child development outcome are mediated by family processes, which include parental emotion well-being and parenting (Conger, et al., 2010).

The FSM suggests that improving household economic well-being may improve family processes and ultimately improve child development outcomes. As household economic well-

being is improved (e.g., moving out of poverty), caregiver psychological distress should be reduced. In turn, how caregivers interact with their children should support positive child development, for example, by increasing supportive parenting reducing punitive parenting (Conger & Conger, 2002; Conger et al., 2010; Masarik & Conger, 2017). Some families may have substantial difficulty in reducing economic stress. For these families, offering interventions to improve parental emotional well-being becomes an attractive option in disrupting the impacts of economic disadvantages on child development outcomes (Conger & Conger, 2002; Conger et al., 2010; Masarik & Conger, 2017).

The FSM has been applied to a wide range of different social and cultural contexts in the US, such as African-American, European-American, and Mexican-American families (Conger et al., 2010; Masarik & Conger, 2017). These findings demonstrate that the impacts of household economic stress on child development outcome are observable among families regardless of their race and family structures. In addition to the US contexts, FSM has been supported using samples from Asian contexts such as China (Zhang et al., 2020), Taiwan and Hong Kong (Mistry et al., 2008), and South Korea (Know et al, 2003). Therefore, although each study may use different measures of economic stress or child and family well-being, there is a pattern where economic stress may affect child development outcomes through family functioning across different social and cultural contexts.

The Family Investment Model. FIM proposes that parents with more economic resources (e.g. income) are able to make greater investments in the development of their offspring (Haveman & Wolfe, 1995; Mayer, 1997; Mistry et al., 2008). FIM defines parental investments as the

provision of an adequate standard of living through financial investment or time investment. For example, parents' investments may include financial investments that support child development (e.g., books, computers) and time investment such as participation in extracurricular activities and time spent on caring children's school life and events (Conger & Donnellan, 2007; Mayer, 1997; Martin et al., 2010). According to the FIM, families living with sufficient financial resources are less likely to face financial stress that forces them to make trade-offs between daily needs and financial resources invested for child development such as books. Moreover, families with more financial resources are less likely to be trapped in the process of addressing immediate material stress, a key to allowing more time and energy to be spent on child care and engagement in child's daily activities (Haveman & Wolfe, 1995; Mayer, 1997; Mistry et al., 2008). Chen et al. (2023) supports this viewpoint by reporting that economic stress per se and an increase in working time to compensate for economic stress both affects child problematic behaviors.

Social Learning Theory. The core concept of social learning theory is that real-life experiences, especially experiences at home, play an important role in shaping child behavior (Bandura, 1977). Social learning theory moves beyond the specific reinforcement or punishment contingencies as described by theorists such as Skinner, and includes more emphasis on observation and modeling. More specifically, child development is shaped by children's own observation and learning about their living environments. Therefore, for children growing up in poverty, their observation and modeling are more likely to overlap with risk factors (e.g., delinquency and violence witness in a disadvantaged community) that form their problematic behaviors (Proctor, 2006).

Because early childhood is a critical period for brain development, early childhood experiences and learning process are especially important (Carcea & Froemke, 2019). Brain plasticity decreases with time, as structural change is easier and more common in one's early years as compared to later years. Adverse experiences during one's early years, such as living in poverty, can disrupt normal brain development and have long-lasting effects, including structural ones (Blair & Raver, 2016; Johnson et al., 2016; Hackman & Farah, 2009). Such disruptions in brain structure and function can reduce a child's ability to learn and interact with their environment (Carcea & Froemke, 2019). In such cases, children's cognitive and socio-emotional development are affected, with possible implications for later problematic behaviors. Also, poverty often leads to limited access to essential resources, such as nutritious food, quality healthcare, early education, and a safe and stimulating environment. These resources are crucial for optimal brain development, and their absence can hinder cognitive and socio-emotional growth (Johnson & Markowitz, 2018). Given the overlapping nature of these risk factors, exposure to poverty in early childhood could lead to problematic behaviors.

Why this dissertation does not include other theories in the model? Determinants of child problematic behavior are so complex that it is impossible to embed all theories into a single model. Even if it were possible to design a very complex model taking the contributions of all theories into account, there is no perfect data set that contains all variables necessary to evaluate such a model empirically. Statistically, it is also impossible to embed every factor from all theories in a single model due to model convergence issues as well as residuals that cannot be reduced to zero. In this research, I am focusing on the theories mentioned above, which are aligned with other studies investigating mechanisms explaining how household economic stress

is associated with child problematic behavior (Conger & Conger, 2002; Conger et al., 2010; Masarik & Conger, 2017; Shaw & Shelleby, 2014). A model integrating these theories is able to provide implications to address family stress that matters caregiver and child well-being, particularly for those facing economic stress. Future studies are encouraged to expanded this study by incorporating more complex theoretical frameworks to illustrate the associations between long-term economic stress and child problematic behaviors.

Literature Review: Empirical Evidence

This section builds upon the prior section, which suggested a series of theoretically derived pathways which may explain how household economic stress affects child problematic behavior through family functioning. This section reviews the existing evidence relating to these potential pathways.

The impact of economic stress on caregiver psychological distress. According to the FSM, high levels of financial stress among the economically disadvantaged are likely to cause higher levels of psychological distress. Specifically, poor individuals and families experience more chronic and frequent shortages of income, causing difficulty meeting daily needs. For these people, a lack of adequate income can bring about high levels of stress, as they struggle to meet even basic daily needs. Additionally, poor individuals and families are also more likely to live in neighborhoods with less resources and higher rates of poverty, which are also risk factors for developing psychological distress. Economic stressors such as these can therefore be important factors influencing family and caregiver functioning, and through them, the potential for children to develop problematic behaviors (Conger & Conger, 2002; Conger et al., 2010; Masarik & Conger, 2017).

Research suggests that living with household economic stress is associated with an increase in psychological disorders (Lipman & Boyle, 2008). Poverty often precedes the development of mental health issues, such as depression and anxiety. Mental health issues are more likely to be observed among people whose income is below the poverty line (Hudson, 2005). Unmet material

needs, hardships in making ends meet, and financial cutbacks induced by low income predicted depressive symptoms, feelings of discouragement, and hopelessness among African-American caregivers (Landers-Potts et al., 2015). Low income-to-needs ratios were also observed to be associated with more depression, somatization, anxiety, and hostility. Similar relationships between economic hardship and psychological distress have been reported in families from multiple ethnicities. This study included not only White American and African American participants but also English-speaking Hispanics and Asian Americans (Iruka et al., 2012).

Evidence has also shown that improvement to economic well-being is conducive to one's mental health. Costello et al. (2003) observed that increases in household income, or escaping poverty, are linked to the improvement in psychological problems such as aggression. Similarly, Lee et al. (2013) observed that reductions in chronic family economic stress reduces both short-term and long-term parental psychological distress. Therefore, it is reasonable to expect that changes in the overall level of economic well-being could affect mental health (Murali & Oyebode, 2004; Santiago et al., 2013).

The impact of caregiver psychological distress on child problematic behaviors. Early childhood is an important developmental stage. During this stage, children begin to actively explore the environment surrounding them and develop a sense of interaction with significant others around them. For younger children, the main source of these experiences is the interaction between them and their caregivers. Consistent with social learning theory, caregiver emotional well-being is a key component shaping how children behave, such as showing empathy, working cooperatively, and initiating play with others (Spruijt et al., 2019). Aznar and Tenenbaum (2013) observed that

how a caregiver expresses emotion toward children aged 4 to 6 years old predicts the child's social competence. Breaux et al. (2018) showed that parental emotional socialization is predictive of emotional regulation skills among children aged 9 to 13. Specifically, parental use of supportive emotional socialization practices may help teach children emotional awareness and understanding (Cole et al., 2009). Evidence also suggests that the same mechanism operates in adolescence, as emotional well-being of the caregiver plays an important role in shaping adolescent behavior (Wadsworth & Compas, 2002; Ponnet, 2014). Some posit these relationships are due to the fact that the youth become more aware of social and economic affairs of their family over time (Chase-Lansdale & Brooks-Gunn, 2014).

The impact of investment on child development outcomes. According to the FIM, child investment contains both financial investment and time investment. It has been proposed that sufficient financial resources and time spent on child care and more engagement in child's daily activities are keys to child development (Haveman & Wolfe, 1995; Mayer, 1997; Mistry et al., 2008). Felfe et al. (2016) observed that spending more time with children was positively associated with better school performance and a reduction in emotional problems and peer-relation problems. Strong et al. (2005) reinforced the same viewpoint by reporting a positive association between parental participation in activities with children and positive child behavior. These benefits were found to persist through adolescence. Furthermore, Jeong et al. (2016) looked at children in low-, middle- and high-income countries and found a general association between increased engagement and better child development outcomes. To address household economic stress, parents could increase work hours or take a second job. Chen et al. (2023) observed that such increase in working time could influence child behavioral problems given it

could expose parents to more severe psychological distress. Together, these empirical findings suggest that child investment in the forms of financial resources and time plays an important role in shaping child development outcomes.

The impact of community on child problematic behavior. Low-income families often live in poorer communities, so that families living in poverty experience the overlapping nature of personal economic stress living in an economically stressed community (Proctor, 2006). Although the FIM acknowledges the importance of neighborhood economic factors, they are rarely assessed in empirical tests of the model. This omission is important because residential quality, a key component of FIM, is associated with youth development (McBride Murry et al., 2011; Simons et al., 2016). Research has found that youth who live in areas of concentrated disadvantage have little social capital, poor physical and mental health, and high rates of substance use (Sonenstein, 2014); lower educational attainment (Wickrama & Noh 2010); and higher rates of delinquency (Simons et al., 2005). All these factors could be associated with problematic behaviors. Evidence also shown that living in a disadvantaged community can expose children to social norms that could impact their behavioral development. Proctor (2006) showed that how an adolescent perceives or anticipates the positions of others (e.g., agreement, approval) plays an important role in determining his or her tendency to engage in the behavior. Compared to children not living in a disadvantaged community, children living in a disadvantaged one are more likely to be exposed unhealthy social norms (e.g., the use of violence). These children could thus overestimate the value of a problematic behavior such as physical violence or underestimate value of a healthy behavior such as avoiding contact with peers who might put them at risk (Proctor, 2006). Together, these studies suggest that community

plays an important role in shaping children's behaviors.

It is also important to note that community quality could be associated with parenting (Proctor, 2006). For caregivers living in a disadvantaged community, there may be less social support to meet challenges. Such stress could be carried into parenting, perhaps resulting in punitive parenting (Proctor, 2006). Values and expectations rooted in a community could also determine parenting styles. Evidence supports this viewpoint by reporting significant association between living in a disadvantaged community and harsh parenting (Roche et al., 2007). Children exposed to punitive parenting could therefore develop problematic behavioral issues, such as internalizing behaviors (e.g., depression) or externalizing behaviors (e.g., aggressive behaviors). For example, Neppl et al. (2015) observed that punitive parenting toward children not only predicts externalizing problems in early childhood but that those problems persist into adolescence. Shaw and Shelleby (2014) and Simons et al. (2016) found that a lack of warm parenting leads to increases in conduct disorders during childhood and adolescence. With regard to the development of internalizing problems, evidence demonstrates that punitive parenting and lack of warm parenting are also predictors of internalizing symptoms in early childhood (Zhang, 2014), middle childhood (Landers-Potts, 2015) and adolescence (White et al., 2015).

Indirect effects. Empirical studies have found that caregiver psychological distress can play an important role in mediating the impacts of economic stress on children's problematic behavior. For example, Yeung et al. (2002) demonstrated that maternal depression mediates the impact of household economic stress on children's externalizing problematic behavior. Zhang and Han (2021) made a similar observation that parental depressive symptoms linked the impacts of

income poverty to internalizing and externalizing behavior issues among children. Sosu & Schmidt (2017) reinforced a similar viewpoint by reporting stress induced by household economic deprivation at age 1 plays an important role in shaping children's conduct disorders at age 4.

Compared to the influences of family investment process proposed by the FIM, the family stress process proposed by the FSM is more robust and generalizable to different populations and different model structures (Conger & Conger, 2002; Conger et al., 2010; Masarik & Conger, 2017). Simons et al. (2016) observed that the impact of low income on children's conduct disorders are mediated by family stress processes, such as caregiver depression, instead of the family investment process. Similarly, Iruka et al. (2012) reported that compared to parent-child activities, improvement in caregiver psychological distress and reduction in negative parenting plays a more prominent role in shaping children's cognitive development. These studies suggest that family stress processes could be the main mechanism explaining the impacts of household economic stress on child problematic behavior, rather than family investment processes.

While a systematic review demonstrated household economic stress affects child development outcomes via family stress processes (e.g., caregiver psychological distress) or investment processes (e.g., time spent with children) (Masarik & Conger, 2017), little attention is paid to long-term household economic stress. Zhang and Han (2021) performed one of the first studies which investigated how longitudinal household economic stress measured in income poverty intensity, duration, and volatility affect child internalizing problematic behavior, caregiver psychological distress and time spent with children. That study observed that child problematic

behaviors are more severe in families with more intensive long-term household economic stress. Such long-term stressors are not observable when using only variables reflecting short-term economic stress. While Zhang and Han (2021) already explored the association between household long-term economic stress and child problematic behavior, this study breaks new ground by considering the role of assets in long-term economic stress. Currently, the manner in which long-term household economic stress measured by income and assets affects child problematic behavior is understudied. Examination of these research gaps enables us to figure out which children are more vulnerable to persistent poverty and how to interrupt the impact of persistent poverty on child development through potential mediators.

The Proposed Model

There are several theories which consider the impacts of household economic stress on child development outcome. These theories, do not all share the same mechanism linking household economic stress to child development outcomes. It is desirable, therefore, to attempt to integrate these different models into a unified structure which can incorporate a broader range of constructs and relationships simultaneously. Such a model would draw upon the FSM, the FIM, and social learning theory. A model accounting for the impacts of household economic stress on child development would include indirect processes: 1) the impacts of long-term household economic stress on caregiver psychological distress, which is consistent with FSM and 2) the impacts of parental psychological distress on child problematic behaviors, which is consistent with FSM. To differentiate time investment from financial investment, this research also includes status of working longer for children in the model. Given that it could be associated with subsequent caregiver psychological distress that matters child development (Chen et al., 2023), the association between working longer status and caregiver psychological distress is included. As community is an important factor predictive of caregiver psychological distress, parenting, and child problematic behaviors (Proctor, 2006; Roche et al., 2007; Simons et al., 2016), these paths are also included in the model, consistent with the FIM. As living with economic stress could expose parents to more intensive instability in day-to-day family routines, such stress could be carried into parenting (Roubinov & Boyce, 2017). Therefore, the association between economic stress and punitive parenting is hypothesized. As caregivers could be affected by child behavioral development, the reciprocal associations between caregiver psychological distress and child problematic behaviors are included in the proposed model (Figure 1).

The Research Questions and Hypotheses

Research question 1: Is there heterogeneity in longitudinal household economic stress dynamics as measured by income and assets? In other words, will a longitudinal latent class analysis show distinct groups with respect to the above variables?

Research question 2: Who are at higher risk of suffering from severe economic stress (multi logit model)

Research question 3: Are there indirect effects in the path linking longitudinal household economic stress and child problematic behavior through caregiver psychological distress?

Research question 4: Are longitudinal household economic stress, an increase in work time, and community associated with child behavior similarly. In other words, do they seem to have similar or different association strengths?

Research question 5: Are aforementioned results different for internalizing and externalizing behavior outcomes?

Based on empirical findings showing that not all families recover from economic stress within the same time period (Eslami et al., 2011), this study hypothesizes there could be heterogeneity in long-term household economic stress. As Chen et al. (2022) observed that socioeconomically vulnerable populations are at higher risk of falling into poverty and at lower chance of escaping poverty, this study hypothesizes that people with socioeconomically vulnerable features are more likely to suffer from more severe economic stress. Regarding key mediators, the FSM proposes that caregiver psychological distress could be the key mediator linking household economic stress to problematic child behaviors (Conger & Conger, 2002; Conger et al., 2010; Masarik &

Conger, 2017). Given that lower community quality and an increase in work hours could lead to caregiver psychological distress that affects child behavioral issues (Chen et al., 2023; Simons et al., 2016), it is hypothesized that caregiver psychological distress could also be a mediator in these paths. As this research is among the first exploring how long-term household economic stress based on income and assets is associated with child problematic behaviors, there is no prior evidence indicating whether results would be equally applicable to both internalizing and externalizing behaviors. Given the nature in differences between internalizing and externalizing behaviors (Chen et al., 2023), results may be different relative to each. Given there is no prior work, either theoretical or empirical, investigating whether longitudinal household economic stress, an increase in work time, and community factors are similarly associated with child problematic behavior, this study cannot hypothesize which will be stronger.

Method

Data. This study uses the Panel Study of Income Dynamics (PSID), a longitudinal data set based on interviews of families conducted annually between 1968 and 1997 and biennially ever since 1997. Data collection is based on stratification and clustering sampling strategy. This research is a secondary data analysis following children and their families through the 2015, 2017 and 2019 PSID Main Study and 2019 and 2020 Child Development Supplements (CDS). Use of these data waves ensures the temporal order of variables embedded in the proposed model. In the 2015, 2017 and 2019 PSID Main Study, subjects were surveyed using a broad range of household economic well-being indicators, including 2015-2019 income and assets. The PSID Main Study also contained measures of caregiver demographic characteristics such as age, gender, race, marital status, education, and employment information. The CDS contain measures of 2019 and 2020 caregiver psychological distress as well as internalizing and externalizing behaviors in 2020. "Caregivers" refers to a people who is primarily responsible for raising children and youth in a household, such as biological parents. As caregivers may have more than one child, the one/many data-merge strategy was applied for data combination (parental information was merged with all their children). The combined data set that integrates the PSID Main Study and the CDS thus provided comprehensive measures of child and family well-being suitable for analyses in this study. This article does not contain any studies with human participants or animals. All data utilized in this study are de-identified secondary data from the PSID.

This study includes families completing the 2015, 2017 and 2019 PSID Main Study as well as child behavior assessment interviews in the 2019 and 2020 CDS. For families that have two or

more children, one child was randomly selected for the analytic sample to assure independence of observations. Among these families, this study found no statistically significant differences between the randomly chosen children and their counterparts either in child characteristics (e.g., age, gender) or behavioral problem scores. As the analyses of this study requires a complete picture containing both of household economic well-being as well as child and family well-being, families completing both PSID Main Study and Child Development Survey are sampled, which is aligned with Chen et al. (2023). The final sample included 615 children (M_{age}=11.4, SD=3.3, female=48.3%) from 615 families (one child per family was sampled). Further information about demographic characteristics is shown in Table 1.

Measures. In this research, variables include income and assets used to construct long-term household economic stress, "working longer" status, caregiver psychological distress, community quality, internalizing problematic behavior, and externalizing problematic behaviors. Covariates used for demographic control include caregiver age, gender, race, marital status, dual-parenting status, residential areas, child age, and child gender.

Income and assets are respectively measured as the ratios of income and assets to the official poverty threshold for the family's size, which accounts for the fact that the number of family members could vary between households. The PSID measures household income based on total money income from all family members, while household assets are calculated as the sum of all family members' saving accounts and other assets (e.g., stocks).

Working longer is a binary variable measured by a question asking "Have you ever increased

your work hours, or taken a second job primarily because you wanted to make life better for your children." Response was dichotomous (0=No; 1=Yes).

Community quality is a continuous variable that reflects the degree to neighborhood as a place appropriate to live and raise children (0=poor, 1=fair, 2=good, 3=very good, 4=excellent). It is a variable reflect caregiver's subjective perspective. A higher score indicates a better community quality.

Caregiver psychological distress is a continuous variable based on the Kessler Psychological Distress Scale, which was designed to assess severity of psychological distress based on summed item scores (Kessler et al., 2002). These items assessed whether a caregiver felt nervous, hopeless, restless, that everything was an effort, feeling sad or worthless (0=none of the time, 1=a little of time, 2=some of the time, 3=most of the time, 4=all of the time). Items used to construct caregiver psychological distress found to have acceptable reliability ($\alpha = 0.74$). A higher score indicates higher distress.

Punitive parenting was measured as a continuous variable that reflects the frequency of scolding or threatening toward children in a week. This variable is provided in the 2019 CDS, but not in the 2020 CDS.

Internalizing and externalizing behaviors were measured as continuous variables that respectively reflect the summed number of behavioral problems based on ten internalizing behavior items (e.g., social withdrawal) and ten externalizing behavior items (e.g., aggression)

surveyed by the PSID, which were based on the Strengths and Difficulties Questionnaire developed by Goodman et al. (1998). Items used to construct internalizing and externalizing behavior were found to have acceptable reliability (Cronbach's alpha greater than 0.8). A higher score indicates more behavioral problems.

Covariates used in this study included caregiver characteristics and child characteristics. Caregiver characteristics included age (years), race (non-Hispanic White American, non-Hispanic African American, Hispanic, and Others), employment status (employed or not), and educational attainment (in years). Child characteristics included age (years) and gender (female or male). Covariates used in this study also included household characteristics, including two-parents household status, where two parents with child/children residing in the same household (two-parent household or not), and residential area (metro area or not).

Analytic approaches. This study investigates heterogeneity of household economic stress using a longitudinal latent class analysis. Consistent with Zhang and Han (2021), indicators utilized for the latent class analysis includes poverty severity, duration, and fluctuation. Measures of income and asset poverty are based on the relative position of income and assets to the poverty thresholds, respectively. For income, the poverty threshold is the official poverty threshold. For assets, following definitions pioneered by Caner and Wolff (2004) and Haveman and Wolf (2004), the poverty threshold is one quarter of the official poverty line, which reflects whether one's assets are sufficient for meeting needs for a period of three months. Measures of poverty severity, duration, and fluctuation are listed below. Consistent with Zhang and Han (2021), by assessing the ratio of income to the income poverty threshold and the ratio of assets to the asset

poverty threshold, the severity of income poverty and asset poverty is defined in the following way: not poor (ratio≥ 2), near poor (2>ratio≥1), poor (1>ratio≥0.5), extreme poor (ratio<0.5). This categorization is applied to define income poverty and asset poverty severity in the 2015 data wave, the 2017 data wave, and the 2019 data wave. In terms of assessment of duration of income poverty and asset poverty, consistent with Zhang and Han (2021), I estimate the number of data waves that ratio of income to the income poverty threshold is below one and number of data waves that ratio of assets to the asset poverty threshold is below one. In terms of household economic well-being fluctuation, consistent with Zhang and Han (2021), I assess the number of times that household economic resources changed by more than 33% than the previous data wave.

It is possible that COVID may have and an influence on PSID measures taken during the 19/20 timeframe. This study follows Putnick and Bornstein (2016) in conducting measurement invariance tests to investigate whether measures of caregiver psychological distress and child problematic behaviors are invariant across the 2019 and 2020 CDS. The Satorra-Bentler scaled chi-squared test is used to compared to the hypothesized model (e.g., factor loadings are freely estimated in aforementioned measures in the 2019 and 2020 CDS) and null model (factor loadings are fixed as same in aforementioned measures in the 2019 and 2020 CDS). Statistically, the results are not significantly different (p>0.05), which suggests aforementioned measures are invariant across the 2019 and 2020 CDS. This gives us evidence that the COVID epidemic may not have had a large effect on the PSID measures used in the current work.

For analyses, this study uses the three-step approach suggested by Asparouhov and Muthén

(2014). In the first of the three steps, I estimate the class membership of long-term household

economic well-being using the latent class indicator variables mentioned above (i.e., intensity,

duration, and fluctuation of income poverty and asset poverty at all time points). These analyses

are conducted using longitudinal latent class analysis models (LLCA).

LLCA models the joint distribution of the repeated outcome measures directly with a latent class

variable, which characterizes both the within-person variation at Level 1 the between person

differences that had been handled at Level 2 (Feldman et al., 2009). In LLCA, the time- and

class-specific probability of scoring in or above category (j) using the outcome (y) is modeled

directly, so the thresholds (τ's) are indexed by time (t) and class (k), where there are k latent

classes and an individual (i) is assigned to the class C_j (Feldman et al., 2009):

$$\text{pr}(y_{ti} \geq j \mid k) = \frac{\exp\left[-\tau_{tjk}\right]}{1 + \exp\left[-\tau_{tjk}\right]}$$

and

$$\text{pr}(y_{ti} \geq j) = \sum_{k=1}^{k} \left[\left(\frac{\exp\left[-\tau_{tjk}\right]}{1 + \exp\left[-\tau_{tjk}\right]}\right)\text{pr}(C_j = k)\right]$$

In the second step, based on goodness-of-fit statistics indexes and interpretation that enables

observation of differences between classes, I determine the most likely class membership of

long-term household economic well-being and assigned class membership to each household

based on the posterior probabilities. The first step and the second step based on the longitudinal

latent class analysis can answer the Research Question 1. If there are two or more class

memberships are detected, the results indicate the existence of heterogeneity in longitudinal

economic stress measured by income and asset poverty severity, duration, and fluctuation. In other words, heterogeneity indicates not all families experience economic stress in the same way.

In the third step, key factors embedded in the proposed model (outcomes) are regressed on the class memberships (predictors) using the SEM while including sociodemographic characteristics for control. To assess potential mediation effects, this study investigates not only direct effects but also indirect effects. For bias corrections in indirect effect estimation, this study uses the bias-corrected bootstrapping approaches (Tibbe & Montoya, 2022). Following Tibble and Montoya (2022), steps from 3-1 to 3-7 shown below are used for estimation of the 95% confidential intervals of the indirect effects using the bias-corrected bootstrapping approaches:

Step 3-1: Resample B times using the original sample.

Step 3-2: Estimate the indirect effects in each bootstrapped sample

Step 3-3: Order the B bootstrap indirect effects from the smallest to the largest one to form a distribution

Step 3-4: Calculate the proportion of bootstrap indirect effects that are less than the indirect effect using the original sample. Subsequent, I convert it to a z-score, $\hat{Z}_{adj}$, where C denotes a coefficient of an association between two variables embedded in the model. Φ^{-1} is the inverse of the normal cumulative distribution function and $G^*(\prod_{n=1}^{n} C_n)$ is the cumulative distribution function of the bootstrap sampling distribution evaluated at the sample indirect effect.

$$Z_{adj} = \Phi^{-1}[G^*\left(\prod_{n=1}^{n} C_n\right)]$$

In practice, given G* is not accessible to us, this dissertation follows Tibble and Montoya (2022) to estimate $\hat{Z}_{adj}$ using:

$$Z_{adj} = \Phi^{-1}(\frac{\#\{(\prod_{n=1}^{n} C_n)^* < (\prod_{n=1}^{n} C_n)\}}{B})$$

where $\#\{(\prod_{n=1}^{n} C_n)^* < (\prod_{n=1}^{n} C_n)\}$ is the number of bootstrap indirect effect estimation in the observed bootstrap sampling distribution, which is less than the estimation using the original sample; B is the total number of bootstrap indirect effect estimates collected. These estimation processes show that $\hat{Z}_{adj}$ corresponds to the proportion of bootstrap estimates, which are less than the original sample estimate using the observed bootstrap sampling distribution.

Step 3-5: Add (2 x $\hat{Z}_{adj}$) to $Z_{\alpha/2}$ and $Z_{(1-\alpha/2)}$, which represent the $[(\alpha/2 \times 100)]^{th}$ and $[(1-\alpha/2) \times 100]^{th}$ percentiles of the standard normal distribution, respectively. α is the acceptable type I error level for the analysis.

Lower bound: (2 x $\hat{Z}_{adj}$) + ($Z_{\alpha/2}$)

Upper bound: (2 x $\hat{Z}_{adj}$) + ($Z_{(1-\alpha/2)}$)

Step 3-6: Transform $[(2 \times \hat{Z}_{adj}) + (Z_{\alpha/2})]$ and $[(2 \times \hat{Z}_{adj}) + (Z_{(1-\alpha/2)})]$ to probabilities using the

standard normal cumulative distribution function.

Step 3-7: Use probabilities calculated in Step 3-6 as the percentiles at which to replace the lower

and upper limits of the (1-α) x 100% of the bootstrapping sampling distribution generated in Step

3-3.

Lower bound: $\Phi\left[(2 \times \hat{Z}_{\text{adj}}) + (Z_{\alpha/2})\right]$

Upper bound: $\Phi\left[(2 \times \hat{Z}_{\text{adj}}) + (Z_{(1-\alpha/2)})\right]$

Such SEM mediation effect analyses can answer Research Question 2. If statistical significance

of the mediation effects is detected, the results indicate caregiver psychological distress is a

mediator embedded in the association between longitudinal economic stress and child

problematic behavior. To answer Research Question 3, this dissertation conducts an analysis

using a multinomial logistic regression model. To answer Research Questions 4 and 5, the Wald

Chi-square test is conducted. Based on Judge et al (1991), the Wald Chi-square test is

$$W = (Rb - r)'(RVR')^{-1}(Rb - r)$$

Let the variance-covariance matrix be V and the estimated coefficient vector be b. Within this

Wald Chi-square test, R is the matrix of constraints and of rank q, namely the set of q linear

hypotheses to be tested jointly.

$$W \sim X_q^2$$

is used for estimation of the significance level of the hypothesis coefficient-comparison test. The significance levels are examined using Z statistics, a chi-squared distribution with q degrees of freedom. If statistical significance of the Wald Chi-square test is detected, the results indicate the existence of association strength difference. These analyses help clarify whether longitudinal economic stress, an increase in work time, and community quality are associated with child problematic behavior similarly and whether these results are similarly applicable to internalizing and externalizing behaviors.

For fitness estimation of the proposed model using SEM, because the Chi-square test is sensitive to sample size, model fit is measured using the Chi-square value divided by its degrees of freedom. While there is no universally agreed upon criterion for model fit, values below 2 (Marsh & Hocevar, 1985) or 5 (Schumacker & Lomax, 2004) indicate a reasonable model fit. As suggested by Hu and Bentler (1999), several indicators of model fit were also employed in this study. These include the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), the Root Mean Square Error of Approximation (RMSEA) with a 90% confidence interval (CI), and the standardized root mean square residual (SRMR). Values of the CFI and TLI greater than 0.90 indicate acceptably good fit. For the RMSEA, an upper bound of the 90% CI below 0.08 indicates good fit (Bowen & Guo, 2011). For the SRMR, values less than 0.08 and 0.1 indicate good and acceptable fit, respectively (Kline, 2016; Wang & Wang, 2012). The Full-Information Maximum likelihood (FIML) estimation is employed for the SEM in this study.

Schafer and Graham (2002) showed that the FIML estimation for treatment of missing data produces unbiased estimates when the pattern of missing data is missing completely at random

(MCAR) or missing at random (MAR). The rate of missing variables in this study is 8.1% or lower. In performing Little's MCAR and the covariate dependent missingness tests, it was confirmed that the missing data pattern in this study is MAR, which results in an unbiased estimation based on the FIML estimation.

For parameter estimation, this study utilizes maximum likelihood with robust standard errors (MLR) applied with FIML. Maximum likelihood estimation is a method for finding the parameter values that maximize the likelihood function of the observed data, given the model. Robust standard errors are a way to estimate the variance-covariance matrix of the parameter estimates more robustly, by using a sandwich estimator that accounts for the non-normality of the parameter estimates. By combining FIML with MLR, I can estimate the parameters of the proposed SEM model using all available information from the data, while also accounting for the non-normality of the parameter estimates. This can lead to more accurate and reliable estimates of the model parameters (Langøy et al., 2019).

Results

Class memberships. Class memberships were examined in order to explore the heterogeneity in long-term economic stress. In response to research question 1, in Table 2, longitudinal latent class analysis shows heterogeneity in economic stress severity, duration, and fluctuation across time. Three different patterns of long-term economic stress are observed. In Table 2, the VLMR and ALMR tests show that the model containing four or more classes did not fit the data in a significantly better way than the model containing three classes. For this reason, models containing two or three classes were considered. Given the higher values of log-likelihood and entropy as well as lower values of AIC, BIC, and SABIC, I concluded that the three-class solution is more appropriate than the two-class solution to identify the heterogeneity of economic stress across time.

For households in class 1, table 3-1 shows that economic stress is featured as frequent experience in income fluctuation. Additionally, households in class 1 are at high risk of experiencing two spells of income poverty within the observation window, while class 2 and class 3 most commonly experience no income spells in poverty. Regarding household assets, table 3-2 shows that households in class1 are at high risk of experiencing constant asset poverty, regardless of intensive asset fluctuation across time. In general, economic stress for class 1 is characterized by intensive income fluctuation over time and generally not escaping income poverty permanently. Members of class 1 also have few assets that cannot buffer such income shortage. Figure 2, figure 3, and figure 4 show the probability scales of poverty severity, duration, and fluctuation of class 1, respectively.

For households in class 2, table 3-1 shows that economic stress is featured as high probability of experiencing stable income across time. Additionally, households in class 2 are at high probability of having sufficient income which is constantly two times the income poverty threshold within the observation window. Regarding household assets, table 3-2 shows that households in class 2 are at high risk of experiencing constant asset poverty, regardless of intensive asset fluctuation across time. In general, economic stress experienced by households in class 2 is featured as stable income which is constantly two times the income poverty threshold, whereas household assets are constantly low no matter how assets fluctuate across time. Figure 2, figure 3, and figure 4 show the probability scales of poverty severity, duration, and fluctuation of class 2, respectively.

For households in class 3, table 3-1 shows that economic stress is featured as high probability of experiencing stable income across time. Additionally, households in class 3 are at high probability of experiencing sufficient income which is constantly two times the income poverty threshold within the observation window. Regarding household assets, table 3-2 shows that while households in class 3 are at high probability of experiencing intensive asset fluctuation across time, they are at high probability of experiencing assets which are constantly two times the asset poverty threshold within the observation window. Figure 2, figure 3, and figure 4 show the probability scales of poverty severity, duration, and fluctuation of class 3, respectively.

Multinomial logistic regression model. Table 4 shows that specific demographic characteristics are significantly associated with the risk of experiencing more severe economic stress. Results

show that being employed, having a college degree, or dual-parenting is associated with a higher

chance of being assigned to the class 2 (i.e., stable and sufficient income, but long-term asset

insufficiency and instability) than class 1 (long-term income and asset insufficiency and

instability). Results also show that being older, male, White, employed, having a college degree,

or dual-parenting is associated with a higher chance of being assigned to class 3 (i.e., stable and

sufficient income and asset) than class 1 (long-term income and asset insufficiency and

instability).

Model fitness. Multiple model fitness indexes show that the application of longitudinal latent

class analysis to SEM fits data well. First, the Chi-square test shows there is no statistically

significant difference between the proposed model in this study and the saturated model that

assumes every association between any pair of two variable exists. This result justifies the use of

the current model. Also, the ratio of the Chi-square value divided by its degrees of freedom is

lower than 2 (Marsh & Hocevar, 1985) and 5 (Schumacker & Lomax, 2004), which indicates a

reasonable model fit. Additionally, values of the CFI and TLI are both greater than 0.90, which

indicate acceptably good fit. For the RMSEA, an upper bound of the 90% CI of the proposed

model is 0.033, which is below the recommended level of 0.08 (Bowen & Guo, 2011). Together,

multiple model fitness indexes show that the current model has a good model fit.

Direct effects. Table 5 shows direct effects embedded in the proposed model. Compared to class

1 economic stress, the association between class 2 economic stress and 2019 caregiver

psychological distress is statistically less intensive ($\beta = -1.70$, $p<0.01$). Compared to class 1

economic stress, the association between class 2 economic stress and 2019 child internalizing

behaviors is statistically less intensive (β = -0.85, $p<0.05$). Compared to class 1 economic stress, the association between class 2 economic stress and 2019 child externalizing behaviors is statistically less intensive (β = -1.02, $p<0.05$).

Compared to class 1 economic stress, the association between class 3 economic stress and 2019 caregiver psychological distress is statistically less intensive (β = -2.15, $p<0.001$). Compared to class 1 economic stress, the association between class 3 economic stress and 2019 child internalizing behaviors is statistically less intensive (β = -1.64, $p<0.001$). Compared to class 1 economic stress, the association between class 3 economic stress and 2019 child externalizing behaviors is statistically less intensive (β = -2.17, $p<0.001$). This study also observed that a better community quality is associated with less 2019 caregiver psychological distress (β = -0.31, $p<0.05$) and 2019 child internalizing behaviors (β = -0.38, $p<0.05$).

Table 5 also shows that child and caregiver well-being in the 2019 data wave is statistically associated with subsequent child and caregiver well-being in the 2020 data wave. This study observed that 2019 caregiver psychological distress is significantly associated with more severe 2020 caregiver psychological distress (β = 0.65, $p<0.001$), child internalizing behaviors (β = 0.15, $p<0.001$), and child externalizing behaviors (β = 0.10, $p<0.05$). This study also observed that 2019 child internalizing behaviors is statistically associated with more severe 2020 caregiver psychological distress (β = 0.18, $p<0.01$) and child internalizing behaviors (β = 0.60, $p<0.001$). The 2019 child externalizing behavior is statistically associated with 2020 child externalizing behavior (β = 0.65, $p<0.001$). The 2019 punitive parenting is statistically associated with more severe 2020 child externalizing behavior (β = 0.09, $p<0.01$).

Indirect effects. In respond to research question 3, table 6-1 shows different indirect paths explaining 2020 child internalizing behaviors. Compared to economic stress experienced by households in class 1, economic stress experienced by households in class 2 has a stronger indirect association with 2020 child internalizing behaviors through 2019 caregiver psychological distress (β = -0.30, p<0.01) and 2019 child internalizing behaviors (β = -0.52, p<0.05). Compared to economic stress experienced by households in class 1, economic stress experienced by households in class 3 has a stronger indirect association with 2020 child internalizing behaviors through 2019 caregiver psychological distress (β = -0.33, p<0.01) and 2019 child internalizing behaviors (β = -0.99, p<0.001). A better community quality is associated with less severe 2020 child internalizing behaviors through 2019 child internalizing behaviors (β = -0.23, p<0.01).

Table 6-2 shows different indirect paths explaining 2020 child externalizing behaviors. Compared to economic stress experienced by households in class 1, economic stress experienced by households in class 2 has a stronger indirect association with 2020 child externalizing behaviors through 2019 caregiver psychological distress (β = -0.16, p<0.05) and 2019 child externalizing behaviors (β = -0.66, p<0.05). Compared to economic stress experienced by households in class 1, economic stress experienced by households in class 3 has a stronger indirect association with 2020 child externalizing behaviors through 2019 caregiver psychological distress (β = -0.21, p<0.05) and 2019 child externalizing behaviors (β = -1.40, p<0.001).

Table 6-3 showed different indirect paths explaining 2020 caregiver psychological distress. Compared to economic stress experienced by households in class 1, economic stress experienced by households in class 2 has a stronger indirect association with 2020 caregiver psychological distress through 2019 caregiver psychological distress (β = -1.11, $p<0.001$). Compared to economic stress experienced by households in class 1, economic stress experienced by households in class 3 has a stronger indirect association with 2020 caregiver psychological distress through 2019 caregiver psychological distress (β = -1.40, $p<0.001$) and 2019 child internalizing behaviors (β = -0.30, $p<0.05$). A better community quality is associated with less severe 2020 caregiver psychological distress through 2019 child internalizing behaviors (β = -0.20, $p<0.05$) and 2019 caregiver psychological distress (β = -0.07, $p<0.05$).

The Wald Chi-square test. In respond to research question 4 and 5, this study conducts the Wald Chi-square test for direct and indirect effect comparison. In comparing direct effects, it is evident that class 3 economic stress exhibits a more pronounced association with 2019 child internalizing behaviors than class 2 economic stress ($p<0.01$) and community ($p<0.05$). The strength of association between class 2 economic stress and 2019 child internalizing behavior is not statistically different from the strength of association between community quality and 2019 child internalizing behavior. This study observed similar findings when 2019 child externalizing behavior is the outcome. The class 3 economic stress exhibits a more pronounced association with 2019 child externalizing behaviors than class 2 economic stress ($p<0.01$) and community quality ($p<0.01$). The strength of association between class 2 economic stress and 2019 child externalizing behavior is not statistically different from the strength of association between community quality and 2019 child externalizing behavior. The class 3 economic stress and the

class 2 economic stress exhibit a more pronounced association with 2019 caregiver psychological distress than community quality (p<0.01), while class 3 and class 2 economic stress have no significantly different strength of associations with 2019 caregiver psychological distress.

In comparing indirect effects using the Wald Chi-square test, this study observed that paths linking economic stress, 2019 caregiver psychological, and 2020 child problematic behaviors are not significantly different by behavior types (i.e., internalizing, externalizing behaviors). Extending working time has no significant indirect associations with child internalizing and externalizing behaviors. The indirect association linking class 3 economic stress to 2020 child internalizing behavior through 2019 child internalizing behavior is stronger than the indirect associations linking class 2 economic stress ($p<0.05$) and community quality ($p<0.05$) to 2020 child internalizing behavior through 2019 child internalizing behavior. The indirect association linking class 3 economic stress to 2020 child externalizing behavior through 2019 child externalizing behavior is stronger than the indirect association linking class 2 economic stress to 2020 child externalizing behavior through 2019 child externalizing behavior ($p<0.01$).

Discussion

Summary of findings

Direct effects. This study found that economic stress induced by long-term income and asset poverty is associated with subsequent caregiver psychological distress and both child internalizing and externalizing behaviors. The post-estimation results showed that dosage effects are strongest when a family is simultaneously experiencing income and asset poverty. Such an association becomes less intensive when a family only experiences asset shortage but has sufficient income. The association is weaker when a family has sufficient income and assets. These findings suggest the importance of simultaneously addressing income and asset shortage in order to support child behavioral development.

Additionally, this study found that caregiver psychological distress and both child internalizing and externalizing behaviors tend to be stable over time. The study also found a potential reciprocal association between caregiver psychological distress and child internalizing behaviors. These findings suggest the importance of addressing both caregiver and child well-being issues, rather than either alone, to prevent these factors from reinforcing each other over time.

Comparisons of direct effects show that asset poverty alone (i.e., class 2 economic stress) and community quality do not have significantly different associations with child problematic behavior. Compared to either class 2 economic stress or community quality, class 3 economic stress has stronger associations with child problematic behavior. Such differences in association

strength are observable regardless of child problematic behavior types (i.e., internalizing, externalizing behaviors). Simultaneous income and asset poverty (i.e., class 3 economic stress) and asset poverty alone (i.e., class 2 economic stress) have do not have significantly different associations with caregiver psychological distress. Compared to community quality, both class 3 and class 2 economic stress have stronger associations with caregiver psychological distress. These findings suggest that mechanisms explaining child problematic behaviors could be different from those explaining caregiver psychological distress in the context of facing economic stress and community quality issues.

Indirect effects. Economic stress appears to have cross-generational influences in a family, namely the path linking economic stress, 2019 caregiver psychological well-being, and 2020 child behavioral development. Such findings persist regardless of child problematic behavior types (i.e., internalizing, externalizing behaviors). These findings are aligned with the theoretical framework proposed by family stress model (Conger & Conger, 2002; Conger et al., 2010; Masarik & Conger, 2017). Indirect effect comparison results show that the strength of these family stress processes does not significantly differ by child problematic behavior types. These findings suggested that alleviation of economic stress could be similarly helpful in addressing child internalizing and externalizing behaviors through an improvement in caregiver psychological well-being.

This study also found that economic stress is associated with child problematic behaviors, which could persist over time given the significant auto-regression effects. The indirect association (the path linking economic stress to 2020 child problematic behavior through 2019 child problematic

behavior) is strongest when economic stress includes both income and asset shortage. Such indirect effects are less intensive when economic stress includes asset shortage only while being least intensive when a family is living with living with sufficient income and assets. These findings suggest that addressing income and asset shortage could be useful in reducing long term child problematic behaviors.

Implications: the need of an intervention to secure stable income and assets

When considering policy relating to economic stress, we need to do a better job of considering income and asset poverty severity, duration, and fluctuation. By understanding the severity, duration, and fluctuation of economic stress, policymakers can tailor interventions to address specific aspects. For example, a family facing prolonged economic stress may benefit from long-term investment strategies rather than short-term investment strategies, while a family with fluctuating incomes (e.g., sometimes poor, sometimes not) may require more flexible support mechanisms rather than a support that assumes persistent poverty or non-poverty status. Such policy implications are especially important for efficient use of resources. Put simply, economic stress is different for different people and must be treated differently.

Families belonging to class 1 could simultaneously face income and asset shortages in the long-term. There are several reasons this may be so. For example, compared to families not living in low-income status, daily expenditures comprise a higher portion of income for families living in low-income status. Therefore, due to financial overextension, there may be little income left for wealth accumulation, even in the absence of other unexpected economic shocks (McKernan &

Sherraden, 2008). To address such issues, it is important to secure a stable access to the job market with sufficient income.

To secure stable income and promote asset accumulation, it is important to improve one's financial literacy (Kezar & Yang, 2010). For example, financial literacy is a key to budgeting and expense management. By understanding income and expenses, individuals can allocate resources effectively, prioritize essential needs, and avoid unnecessary expenditures. Financial literacy is also important for one's debt management capacities (French & McKillop, 2016). More specifically, financial literacy includes knowledge about managing and reducing debt. People who are aware of the consequences of high-interest debt and understand debt repayment strategies are better positioned to avoid financial pitfalls, contributing to a stable financial situation (Carretta et al., 2017; French & McKillop, 2016). Additionally, financial literacy is important for one's capacity for risk prevention. For example, it includes having appropriate insurance coverage, diversifying investments, and making decisions that align with one's risk tolerance (Carretta et al., 2017; French & McKillop, 2016). Mitigating financial risks is essential for maintaining stable income and asset levels. In summary, improving financial literacy is essential for stable income and asset accumulation as it lays a foundation for individuals to make informed decisions, develop effective financial habits, and navigate the complexities of the financial landscape.

Implications: the need of interventions addressing multiple dimensions of issues in economically vulnerable families

Consistent with Masarik and Conger (2017), my findings support the viewpoint that addressing household economic stress has a cross-generational benefit. Addressing both income and asset shortage seems more beneficial for caregiver psychological well-being and child behavioral development than addressing income shortage alone. For economically vulnerable families, providing an intervention able to secure stable and sufficient income and assets could be a key to child and caregiver well-being. This viewpoint is aligned with Chen et al. (2023), which suggested that the positive changes induced by addressing income shortage on caregiver psychological well-being and child behavioral development are more important for families with higher household assets levels.

This study found that class 3 economic stress is associated with less caregiver psychological distress and child internalizing behavior as well as less reciprocal associations between caregiver psychological distress and child internalizing behavior, compared to class 2 and class 1 economic stress. These findings suggest that simultaneously facing income and asset shortage could be a risk factor resulting in a repeated cycle between caregiver psychological distress and child internalizing behaviors. When caregivers face low income and lack sufficient assets to buffer such an income shortage, they could constantly face the unmet daily needs which in turn develop into psychological distress. For children facing economic stress or disrupted parenting due to economic stress, they may withdraw or suppress their emotions. Such emotional issues can further reinforce caregiver psychological distress (Masarik & Conger, 2017). Therefore, in order

to prevent repeated cycling between child internalizing behavior and caregiver psychological distress, it is important to ensure stable and sufficient income and assets for economically vulnerable families. Given that addressing income and assets could be time-consuming, it is also important to provide interventions improving child and caregiver well-being while they still face economic stress.

To improve child and family well-being for those living in economic stress, interventions should simultaneously target the needs of children and their caregivers (Chen et al., 2023). For example, offering caregivers opportunities for education and job training is key to breaking the cycle of poverty and improving their long-term prospects. For children, offering school learning support and after-school support is a key to improving child development. These implications are in alignment with not only findings in this study but other findings outside of the US, which similarly suggested that economic stress could have cross-generational influences in a family (Know et al, 2003; Mistry et al., 2008; Zhang et al., 2020). It is therefore important to provide family-based interventions to improve both child and family well-being. More efforts are required to address potential barriers interrupting implementation of such family-based interventions. One example is the bureaucratic challenge that prevents coordination of multiple interventions together, which may lower the efficiency of interventions designed to improve child and caregiver well-being in economically vulnerable families. Additionally, due to stigma toward economically vulnerable families, people in need could avoid interventions targeting their needs. To ensure economically vulnerable families can benefit from such a family-based intervention, it is necessary to address these barriers (Chen et al., 2023). One example is the two generations program, which center the whole family to create economic prosperity that passes

from one generation to the next. (Chase-Lansdale & Brooks-Gunn, 2014).

Implications: Economic inequality

Compared to caregivers who are employed or having a college degree, their counterparts are at higher risk of experiencing long-term asset shortage (i.e., class 2 economic stress). Compared to dual parenting families, single parenting families are also at higher risk of experiencing long-term asset shortage. Additionally, these demographic characteristics could also put families at higher risk of simultaneously experiencing long-term income and asset shortage (i.e., class 3 economic stress), rather than just asset shortage alone. Other demographic characteristics, such as being younger, female, or non-White, also put people at higher risk of experiencing long-term income and asset shortage (Rank & Hirschl, 2010). These findings suggest that economic inequality among those with these demographic characteristics could easily be a long-term phenomenon. This is consistent with Chen et al. (2022), which observed that people with these demographic features are more likely to fall into poverty and less likely to escape poverty.

To protect socioeconomically vulnerable populations from economic stress, modern social welfare systems provide interventions, such as unemployment benefits, food assistance, and healthcare. However, while these policies and interventions are designed to address economic stress resulting from income shortage, less attention is paid to addressing asset shortage, a key for long-term economic stress (Chen et al., 2022). This study suggests that more efforts should be made to reduce not only income inequality but also asset inequality. To address economic inequality while considering demographic characteristics, several strategies are suggested, such

as job training programs and social and financial support for socioeconomically vulnerable families. Also, it is important to implement age-inclusive policies, which are important for age-neutral recruitment and promotion practices to address age discrimination (Truxillo et al., 2015). This strategy is a key to allowing both younger and older adult workers in their career development. To address asset inequality, it is important to provide economically vulnerable populations with asset-accumulation interventions, such as IDA (Grinstein-Weiss et al., 2015).

Implications for Saint Louis, Missouri

In Saint Louis, Missouri, poverty and economic inequality remain prevalent today (Prener, 2021). While there have been several programs aimed at promoting the well-being of children and families within economically vulnerable communities, such as the Child Care Subsidy Program, which assists eligible caregivers with childcare payments to enhance children's access to early learning in Missouri, additional efforts are needed. Firstly, as indicated by this study, economic stress is not solely determined by income but also by assets. Thus, it is crucial to accurately identify families with greater economic need. Secondly, economic stress can impact not only material needs but also child behavioral development and caregiver mental health, which can mutually reinforce over time. Therefore, to enhance the well-being of both children and caregivers in economically vulnerable families in Saint Louis, Missouri, local authorities should coordinate both financial and non-financial support programs, such as Early Intervention programs, for those in the most economically disadvantaged circumstances.

Theoretical implications

Traditionally, the family stress model posits that economic stress influences caregiver
psychological distress, which subsequently affects child behavior (Conger & Conger, 2002;
Conger et al., 2010; Masarik & Conger, 2017). However, by observing that child behavior can
also be associated with subsequent caregiver distress, our understanding of the complex
dynamics within family systems is enriched. More specifically, for families experiencing
economic stress resulting from long-term income shortage and instability, such an economic
stress could have cross-generational influences in a family, namely through caregiver
psychological distress and child problematic behaviors. These findings are aligned with family
stress model (Conger & Conger, 2002; Conger et al., 2010; Masarik & Conger, 2017). However,
for families experiencing economic stress resulting from long-term income and asset shortage
and instability, the mechanisms explaining child problematic heavier may be beyond the family
stress model, given there could be a reciprocal association between caregiver psychological
distress and child internalizing behavior reinforcing each other.

Exploring mechanisms beyond a theoretical framework has implications for policies and
interventions. For example, policies or interventions aimed at supporting economically
vulnerable families can inform decisions regarding resource allocation and service provision
simultaneously for children's needs (e.g., behavioral intervention) and their caregivers (e.g.,
mental health services). In turn, these reformed policies or interventions can lead to more
effective support strategies, instead of offering support for either children or caregivers alone that
could hardly address both child behavioral issues and caregiver mental health issues and

preventing them from reinforcing each other. For academic implications, theoretical framework expansion is an important step for further exploration of other potential mechanisms explaining child and caregiver well-being in an economically vulnerable family. Also, such exploration is able for direct and indirect effect comparison, which expands our understanding of the main mechanisms explaining child and caregiver well-being in an economically vulnerable family and how strong such main mechanisms are than other mechanisms.

Methodological implications

While using the ratio of income and assets to the poverty threshold enables us to measure economic stress in a family, longitudinal latent class analysis provides a more nuanced measure of household economic stress. The pure use of income and asset ratio at one time point cannot show multiple dimensions of economic stress, such as duration and fluctuation. Even though income and asset ratio information using multiple data waves is available, the unobservable heterogeneity of household economic stress cannot be detected in ways that longitudinal latent class analysis does. Such measures of economic stress reflected in income and asset severity, duration, and fluctuation using longitudinal latent class analysis provide a more comprehensive picture of financial issues faced by a family. This is a key to reforming policy and implication to better address dynamic household economic stress and its consequence on child and caregiver.

Limitations

This study is subject to several limitations. It is possible that people could intentionally preserve assets even when they are facing economic stress. A second issue has to do with content validity. Beyond the factors modeled in this study, factors such as genetic information, brain function and development, parent-child and teacher-child interactions in daily life, community risk factors (e.g., drugs addiction and crime prevalence), or social networking could also influence child problematic behaviors. Determinants of child problematic behavior are so complex that it is impossible to embed all potentially worthy factors into a single model. Even if there were a hypothetically complete data set that contains all variables, it would remain impossible to embed every factor from all theories in a single statistical model due to model convergence issues as well as residuals that cannot be reduced to zero. When considering community quality, the scope of the neighborhood is determined by the subjective perception of caregivers. The geographic delineation of what respondents consider a neighborhood is also subjective, in this sense, neighborhoods in PSID is not a defined and specific geographic area, such as a block, a tract or a county. Future studies should replicate our findings using these factors as and when they become available.

The timeline of experiencing poverty (i.e., when a child experiences poverty) also matters for child development. For example, Johnson et al. (2016), Luby et al. (2013), and Troller-Renfree et al. (2022) showed that living in a low-income environment in one's early years has a strong impact on brain development. However, for the following reasons, this study does not include the timeline of poverty exposure in the proposed model. First, in the PSID Main Study, the income

and asset poverty information are recorded biannually, instead of annually. Therefore, it is difficult to obtain an accurate timeline regarding childhood poverty. Second, while survival analysis approaches (e.g., discrete-time model) could allow for risk assessment using discrete time event data, they cannot investigate heterogeneity in the economic stress dynamics simultaneously measured by income and asset poverty severity, duration, and fluctuation in a way that longitudinal latent class analysis does. The best this study can do, given the current data and the analytic approaches employed, is to include child age and other demographic features as controls. While having more detailed information in poverty severity (e.g., income ratio > 3) might help us to better understand economic well-being, the sample size impedes such availability. Fortunately, even so, this study shows heterogeneity in income/asset poverty severity, duration, and fluctuation and how it associates with child and caregiver well-being. Science is incremental, and I hope that this study lays a foundation for exploring different mechanisms that explain the association between long-term household economic stress and child problematic behaviors.

Conclusion

We need to think about economic stress, caregiver stress and child behavioral problems as intertwined and as influencing each other over time. Recognizing the cyclical nature of caregiver distress and child behavioral issues, interventions should adopt a longitudinal approach, providing ongoing support and monitoring at-risk families beyond immediate crisis periods.

Early identification and intervention can help break cycles of distress and prevent long-term negative outcomes for caregivers and children. Interventions addressing child internalizing and externalizing behaviors should consider the nuanced pathways through which economic stress impacts these outcomes. Tailored intervention strategies should target both direct and indirect pathways, addressing caregiver psychological distress and previous child behavioral issues to effectively mitigate current and future behavioral problems. Multifaceted interventions that simultaneously offer parenting and economic support could be effective to promote positive outcomes of children (Wimer et al., 2021). In addition to family-based interventions, it is also important to recognize that community quality can serve as a protective factor against the negative effects of economic stress. Community-based support programs and social services should be strengthened to provide families with resources, social connections, and coping mechanisms to buffer economic hardships and promote resilience (Green & Haines, 2015).

Resource allocation decisions should take into account the differential impact of economic stress on caregiver and child well-being. Priority should be given to programs and policies that target households experiencing the most severe economic strain, aiming to alleviate immediate distress

and prevent long-term negative consequences for families and communities. When evaluating one's immediate and long-term needs, it is important to consider economic stress severity, duration, and fluctuation based on income and assets, rather than either alone. Interventions should focus on providing adequate financial support and resources to alleviate financial burdens resulting from income and asset shortage, as well as mitigating associated psychological distress and child behavioral problems. As financial strained families could experience not only materials needs but family dysfunctions, more efforts should be made to extend positive changes brought about by a financial support from material needs satisfaction to family function improvement for children and their caregivers in financially strained environments.

Future research should explore additional factors contributing to economic stress and its implications for family well-being, such as social support networks and coping strategies. While there are existing evidence showing the benefits of policy outcomes, such as saving account for low-income families (Grinstein-Weiss et al., 2015), how it addresses long-term economic stress featured by poverty severity, duration, and fluctuation is still not fully explored. Longitudinal studies examining the long-term effects of economic stress on intergenerational outcomes are also required to inform more effective prevention and intervention efforts.

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Figure 1. The proposed model.
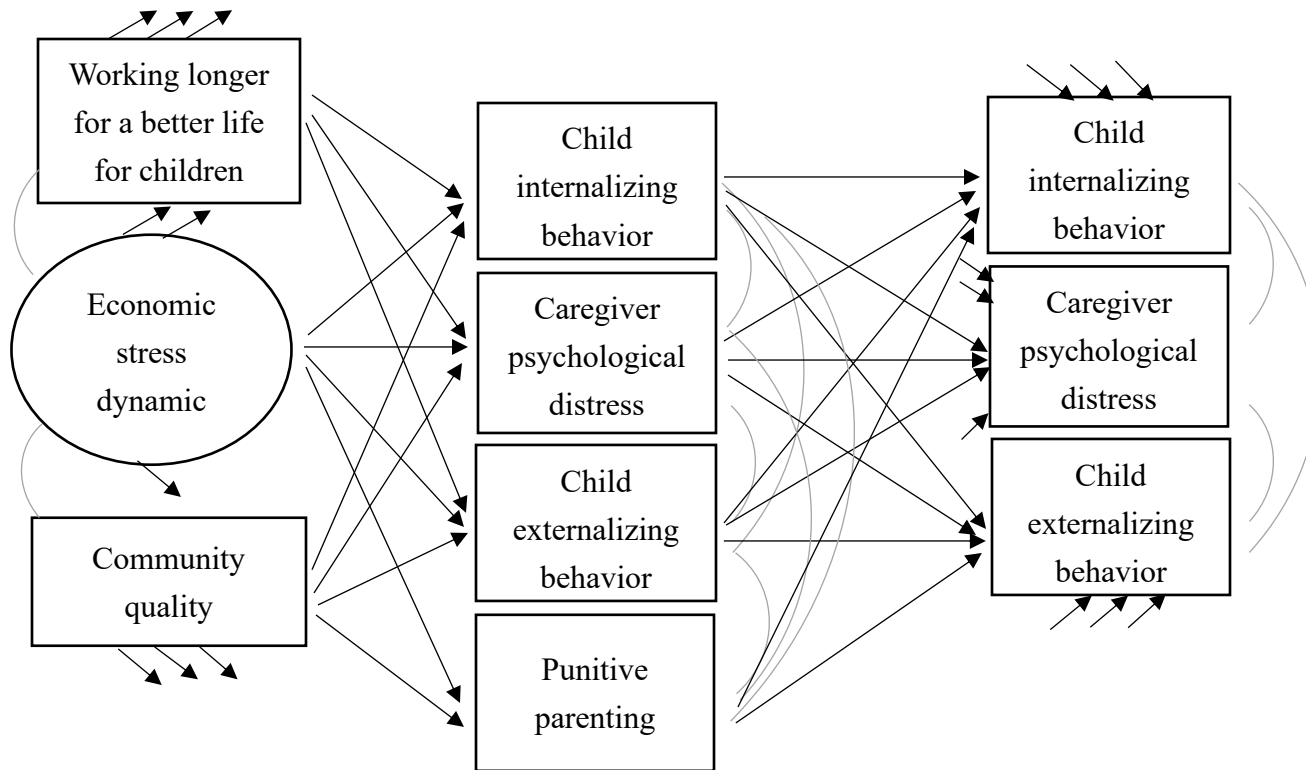
Note:
[1]circle represents latent variable while rectangle represents observable variables.
[2]for a clear picture, paths linking community quality, economic stress dynamic, and working longer status to the outcomes shown at far-right do not be shown.
[3]parenting information is provided in the 2019 CDS, but not in the 2020 CDS.

Table 1. Descriptive Results (N=615)

Demographic characteristics	Mean (SD) / %
Caregiver	
Age	36.7 (7.6)
Gender (female)	76.6%
White	60%
Employed	74.4%
College or above	34.2%
Psychological distress (2019)	4.0 (3.4)
Psychological distress (2020)	4.2 (4.1)
Children	
Age	11.4 (3.3)
Gender	48.3%
Internalizing behaviors (2019)	3.2 (3.0)
Externalizing behaviors (2019)	3.8 (3.5)
Internalizing behaviors (2020)	3.2 (2.9)
Externalizing behaviors (2020)	3.7 (3.4)
Family	
Dual-parenting	66.0%
2015 income ratio	3.3 (3.3)
2015 asset ratio	0.5 (1.9)
2017 income ratio	3.5 (3.7)
2017 asset ratio	0.6 (1.6)
2019 income ratio	3.8 (3.9)
2019 asset ratio	0.7 (2.3)

Table 2. Longitudinal Latent Class Analysis

Classes	LogL	Entropy	AIC	BIC	Adj. BIC	VLMR (*p*)	ALMR (*p*)	Smallest Class (%)
2	-5458.201	0.904	11030.403	11282.435	11101.471	< 0.001	< 0.001	39.0
3	**-5006.864**	**0.999**	**10185.728**	**10565.988**	**10292.954**	**< 0.001**	**< 0.001**	**23.4**
4	-4769.560	0.998	9769.120	10277.606	9912.503	> 0.05	> 0.05	18.5
5	-4664.916	0.993	9617.831	10254.545	9797.373	> 0.05	> 0.05	11.7
6	-4599.484	0.983	9544.969	10309.909	9760.668	> 0.05	> 0.05	3.0

Note. AIC = Akaike information criterion; BIC = Bayesian information criteria; LogL = loglikelihood; VLMR = Vuong-Lo-Mendell-Rubin test. ALMR = adjusted Vuong-Lo-Mendell-Rubin test. Higher values of entropy and lower values of AIC and BIC indicate better model fit. Significant LMR-LRT and BLRT p-values indicate that k number of classes has a better fit than k-1 number of classes. Bold indicates the selected model

Table 3-1. Probability Scale of Income Poverty Severity, Duration, and Fluctuation by Class

	Class 1	Class 2	Class 3
Income poverty severity			
2015			
Income ratio ≥ 2	10.4%	**69.3%**	**91.0%**
1 ≥ income ratio < 2	22.9%	30.7%	7.8%
0.5 ≥ income ratio < 1	**37.5%**	0%	0.6%
Income ratio < 0.5	29.2%	0%	0.6%
2017			
Income ratio ≥ 2	9.8%	**71.7%**	**94.9%**
1 ≥ income ratio < 2	25.0%	28.3%	5.1%
0.5 ≥ income ratio < 1	**43.0%**	0%	0%
Income ratio < 0.5	22.2%	0%	0%
2019			
Income ratio ≥ 2	14.6%	**77.1%**	**92.7%**
1 ≥ income ratio < 2	32.6%	22.9%	5.6%
0.5 ≥ income ratio < 1	**32.8%**	0.0%	0.6%
Income ratio < 0.5	20.0%	0.0%	1.1%
Income poverty duration			
0 data wave	0%	**100%**	**97.2%**
1 data wave	26.3%	0%	2.8%
2 data waves	**44.5%**	0%	0%
3 data waves	29.2%	0%	0%
# of income fluctuation			
0	10.4%	**60.1%**	**61.8%**
1	44.4%	31.1%	29.8%
2	**45.2%**	8.9%	8.4%

Table 3-2. Probability Scale of Assets Poverty Severity, Duration, and Fluctuation by Class

	Class 1	Class 2	Class 3
Asset poverty severity			
2015			
Asset ratio ≥ 2	0.7%	2.4%	**53.4%**
1 ≥ asset ratio < 2	1.4%	4.4%	25.3%
0.5 ≥ asset ratio < 1	2.8%	15.0%	9.0%
Asset ratio < 0.5	**95.1%**	**78.2%**	12.3%
2017			
Asset ratio ≥ 2	1.4%	3.8%	**64.0%**
1 ≥ asset ratio < 2	0%	7.8%	27.5%
0.5 ≥ asset ratio < 1	5.6%	22.2%	4.5%
Asset ratio < 0.5	**93.0%**	**66.2%**	3.9%
2019			
Asset ratio ≥ 2	2.8%	8.2%	**62.9%**
1 ≥ asset ratio < 2	4.8%	8.5%	30.9%
0.5 ≥ asset ratio < 1	6.9%	20.5%	5.1%
Asset ratio < 0.5	**86.1%**	**62.8%**	1.1%
Asset poverty duration			
0 data wave	0%	0%	**64.1%**
1 data wave	0.7%	0%	35.9%
2 data waves	9.0%	35.2%	0%
3 data waves	**90.2%**	**64.8%**	0%
# of asset fluctuation			
0	36.8%	9.6%	18.5%
1	20.8%	28.3%	33.2%
2	**42.4%**	**62.1%**	**48.3%**

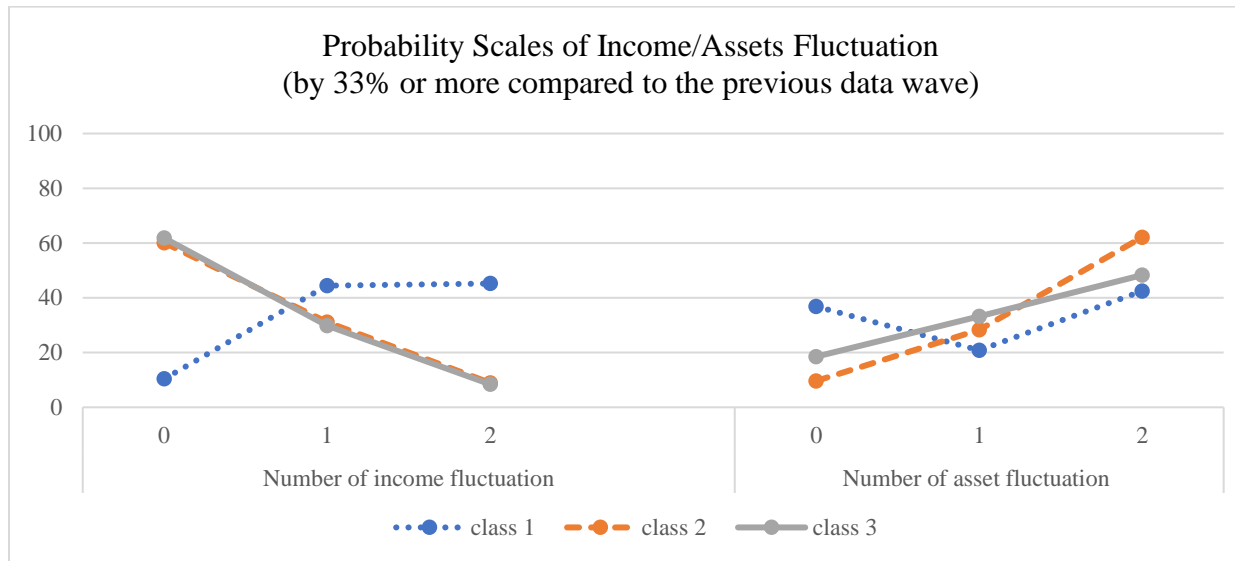Figure 2. Probability Scales of Poverty Severity
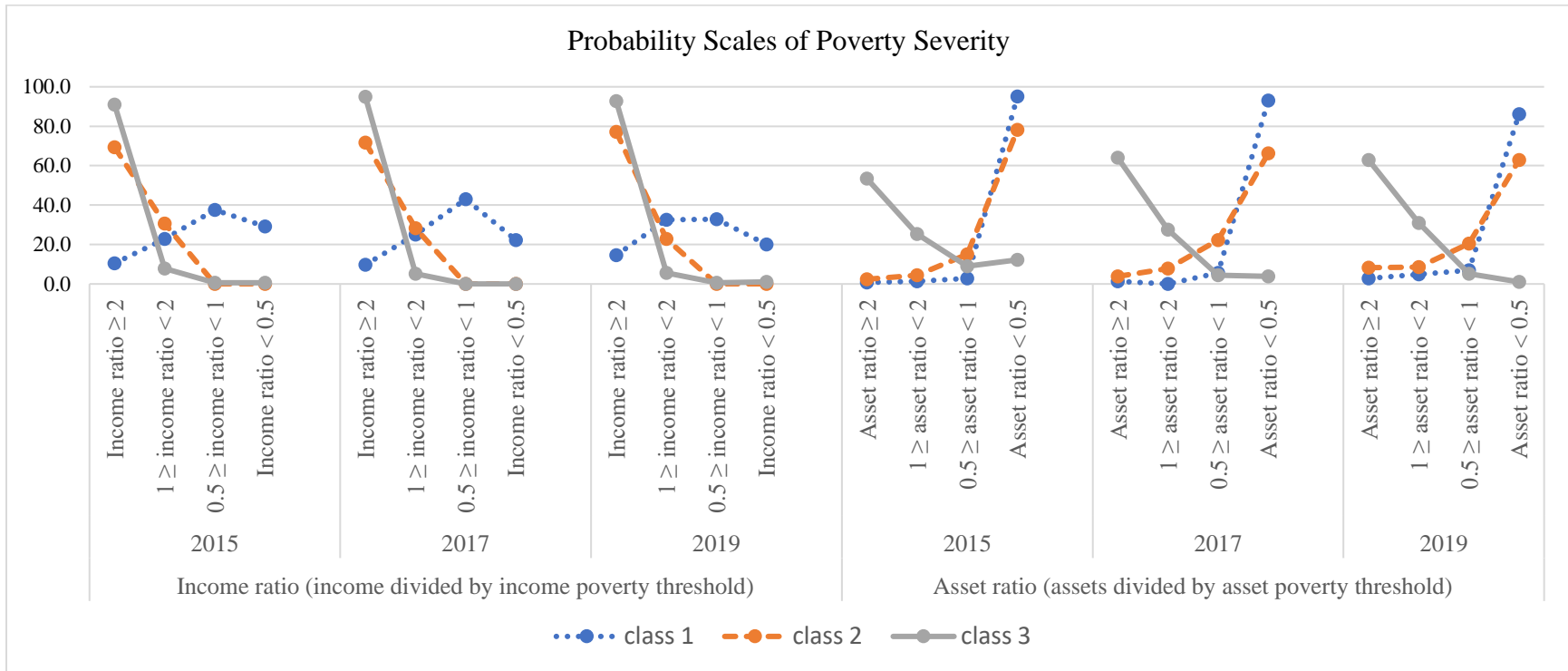
Y-axis represents probability of each item shown in X-axis.

Figure 3. Probability Scales of the Number of Data Waves in Poverty
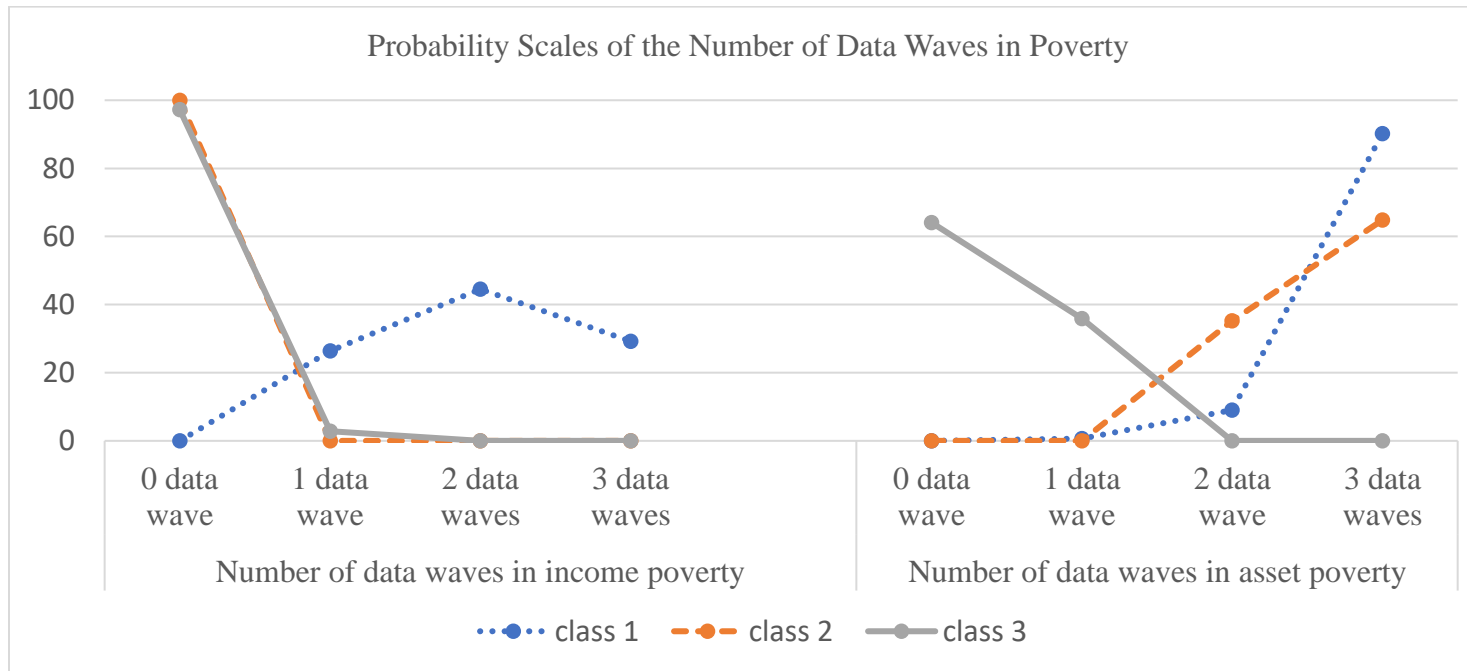
Y-axis represents probability of each item shown in X-axis.

Figure 4. Probability Scales of Income/Asset Fluctuation (by 33% or more compared to the previous data wave)

Y-axis represents probability of each item shown in X-axis.

Table 4. Multinomial Logistic Model Results (reference class is the class 1)

	[a]Log odds ratio of class 2	[b]Log odds ratio of class 3
Caregiver age	0.02	0.07*
Caregiver gender (female)	-0.35	-0.80***
Caregiver race (White)	0.10	0.72*
Caregiver employment	1.08***	1.07***
Caregiver education (college)	0.87*	2.36***
Dual parenting	1.47***	2.21***
Child age	-0.04	-0.05
Child gender (female)	-0.06	0.04

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; model index: Pseudo R2: 0.201, Chi-square:224.49 ($p < 0.001$)
[a] log odds ratio is the log value showing probability at class2 divided by probability at class 1.
[b] log odds ratio is the log value showing probability at class3 divided by probability at class 1.

Table 5. Structural Equation Modeling: Direct Effects

Path	Coefficient
Class 2 → caregiver psychological distress (2019)	-1.70**
Class 2 → child internalizing behaviors (2019)	-0.85*
Class 2 → child externalizing behaviors (2019)	-1.02*
Class 2 → punitive parenting (2019)	-0.16
(Compared to Class 1)	
Class 3 → caregiver psychological distress (2019)	-2.15***
Class 3 → child internalizing behaviors (2019)	-1.64***
Class 3 → child externalizing behaviors (2019)	-2.17***
Class 3 → punitive parenting (2019)	-0.70
(Compared to Class 1)	
Extending work hours → caregiver psychological distress (2019)	0.49
Extending work hours → child internalizing behaviors (2019)	0.33
Extending work hours → child externalizing behaviors (2019)	-0.09
Community quality → caregiver psychological distress (2019)	-0.31*
Community quality → child internalizing behaviors (2019)	-0.38*
Community quality → child externalizing behaviors (2019)	0.15
Community quality → punitive parenting (2019)	-0.03

$*p < 0.05; **p < 0.01; ***p < 0.001$

Table 5. Structural Equation Modeling: Direct Effects (Continued)

Path	Coefficient
Caregiver psychological distress (2019) → caregiver psychological distress (2020)	0.65***
Caregiver psychological distress (2019) → child internalizing behaviors (2020)	0.15***
Caregiver psychological distress (2019) → child externalizing behaviors (2020)	0.10*
Child internalizing behaviors (2019) → caregiver psychological distress (2020)	0.18**
Child internalizing behaviors (2019) → child internalizing behaviors (2020)	0.60***
Child internalizing behaviors (2019) → child externalizing behaviors (2020)	0.04
Child externalizing behaviors (2019) → caregiver psychological distress (2020)	0.05
Child externalizing behaviors (2019) → child internalizing behaviors (2020)	0.03
Child externalizing behaviors (2019) → child externalizing behaviors (2020)	0.65***
Punitive parenting (2019) → child internalizing behaviors (2020)	0.02
Punitive parenting (2019) → child externalizing behaviors (2020)	0.09**

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

Table 6-1. Structural Equation Modeling: Indirect Effects (Child internalizing behavior as the outcome)

Path	Coefficient
Class 2 → Caregiver psychological distress (2019) → Child internalizing behaviors (2020)	-0.30**
Class 2 → Child internalizing behaviors (2019) → Child internalizing behaviors (2020)	-0.52*
Class 2 → Child externalizing behaviors (2019) → Child internalizing behaviors (2020)	-0.03
Class 2 → Punitive parenting (2019) → Child internalizing behaviors (2020)	-0.00
(Compared to Class 1)	
Class 3 → Caregiver psychological distress (2019) → Child internalizing behaviors (2020)	-0.33**
Class 3 → Child internalizing behaviors (2019) → Child internalizing behaviors (2020)	-0.99***
Class 3 → Child externalizing behaviors (2019) → Child internalizing behaviors (2020)	-0.06
Class 3 → Punitive parenting (2019) → Child internalizing behaviors (2020)	-0.02
(Compared to Class 1)	
Extending work hours → Caregiver psychological distress (2019) → Child internalizing behaviors (2020)	0.07
Extending work hours → Child internalizing behaviors (2019) → Child internalizing behaviors (2020)	0.20
Extending work hours → Child externalizing behaviors (2019) → Child internalizing behaviors (2020)	-0.00
Community quality → Caregiver psychological distress (2019) → Child internalizing behaviors (2020)	-0.05
Community quality → Child internalizing behaviors (2019) → Child internalizing behaviors (2020)	-0.23**
Community quality → Child externalizing behaviors (2019) → Child internalizing behaviors (2020)	-0.00
Community quality → Punitive parenting (2019) → Child internalizing behaviors (2020)	-0.00

R-square of 2020 child internalizing behavior: 49.5%
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

Table 6-2. Structural Equation Modeling: Indirect Effects (Child externalizing behavior as the outcome)

Path	Coefficient
Class 2 → Caregiver psychological distress (2019) → Child externalizing behaviors (2020)	-0.16*
Class 2 → Child internalizing behaviors (2019) → Child externalizing behaviors (2020)	-0.04
Class 2 → Child externalizing behaviors (2019) → Child externalizing behaviors (2020)	-0.66*
Class 2 → Punitive parenting (2019) → Child externalizing behaviors (2020)	-0.01
(Compared to Class 1)	
Class 3 → Caregiver psychological distress (2019) → Child externalizing behaviors (2020)	-0.21*
Class 3 → Child internalizing behaviors (2019) → Child externalizing behaviors (2020)	-0.07
Class 3 → Child externalizing behaviors (2019) → Child externalizing behaviors (2020)	-1.40***
Class 3 → Punitive parenting (2019) → Child externalizing behaviors (2020)	-0.06
(Compared to Class 1)	
Extending work hours → Caregiver psychological distress (2019) → Child externalizing behaviors (2020)	0.05
Extending work hours → Child internalizing behaviors (2019) → Child externalizing behaviors (2020)	0.01
Extending work hours → Child externalizing behaviors (2019) → Child externalizing behaviors (2020)	-0.04
Community quality → Caregiver psychological distress (2019) → Child externalizing behaviors (2020)	-0.03
Community quality → Child internalizing behaviors (2019) → Child externalizing behaviors (2020)	-0.02
Community quality → Child externalizing behaviors (2019) → Child externalizing behaviors (2020)	-0.09
Community quality → Punitive parenting (2019) → Child externalizing behaviors (2020)	-0.00

R-square of 2020 child externalizing behavior: 58.2%
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

Table 6-3. Structural Equation Modeling: Indirect Effects (Caregiver psychological distress as the outcome)

Path	Coefficient
Class 2 → Caregiver psychological distress (2019) → Caregiver psychological distress (2020)	-1.11***
Class 2 → Child internalizing behaviors (2019) → Caregiver psychological distress (2020)	-0.16
Class 2 → Child externalizing behaviors (2019) → Caregiver psychological distress (2020)	-0.06
Class 2 → Punitive parenting (2019) → Caregiver psychological distress (2020)	-0.00
(Compared to Class 1)	
Class 3 → Caregiver psychological distress (2019) → Caregiver psychological distress (2020)	-1.40***
Class 3 → Child internalizing behaviors (2019) → Caregiver psychological distress (2020)	-0.30*
Class 3 → Child externalizing behaviors (2019) → Caregiver psychological distress (2020)	-0.12
Class 3 → Punitive parenting (2019) → Caregiver psychological distress (2020)	-0.01
(Compared to Class 1)	
Extending work hours → Caregiver psychological distress (2019) → Caregiver psychological distress (2020)	0.32
Extending work hours → Child internalizing behaviors (2019) → Caregiver psychological distress (2020)	0.06
Extending work hours → Child externalizing behaviors (2019) → Caregiver psychological distress (2020)	-0.00
Community quality → Caregiver psychological distress (2019) → Caregiver psychological distress (2020)	-0.20*
Community quality → Child internalizing behaviors (2019) → Caregiver psychological distress (2020)	-0.07*
Community quality → Child externalizing behaviors (2019) → Caregiver psychological distress (2020)	-0.01
Community quality → Punitive parenting (2019) → Caregiver psychological distress (2020)	0.00

R-square of 2020 caregiver psychological distress: 42.4%
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$