

Intra-Household Dynamics and Well-Being: Evidence from Kyrgyzstan

Inaugural Dissertation

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1 Introduction

1.1 Motivation

In many households across the world, daily life revolves around decisions made within the family. Who eats what? Who goes to school? Who works? And who cares for whom? These seemingly private choices add up to significant outcomes for individual welfare and societal development. Both scholars and policymakers are coming to understand that intra-household dynamics can play a crucial role in shaping individual outcomes. This is especially evident in societies where extended, multigenerational households are common.

Extended household structures remain one of the common living arrangements in developing countries (Gupta et al., 2021). In many of these contexts, extended living often takes a patrilocal form (Landmann et al., 2018), where young married women reside with their husband’s parents. This practice is known as patrilocal residence. These traditional living arrangements can have profound implications. They influence how parents allocate food and care among their children, how much autonomy a woman has within this household, and how people share the burdens and supports of daily life. Evidence shows that co-resident daughters-in-law typically have less decision-making power (Debnath, 2015), face significant constraints on their mobility (Khalil and Mookerjee, 2019), and report lower levels of well-being than women in nuclear households (Anderson and Eswaran, 2009; Turaeva and Becker, 2022; Khalil et al., 2024). Moreover, women in patrilocal families spend considerably more hours on unpaid domestic and caregiving tasks, often limiting their participation in the labor market or public life (Landmann et al., 2018). Importantly, these constraints do not stem solely from male dominance. Rather, they are embedded in broader institutional and cultural norms that uphold generational hierarchies and assign authority to senior family members. Mothers-in-law, who often hold influential positions within these households, frequently become the primary enforcers of these expectations, mediating younger women’s roles

and autonomy in daily life (Anderson and Eswaran, 2009; Turaeva and Becker, 2022; Khalil et al., 2024).

At the same time, it is important to recognize that extended living arrangements are not uniformly restrictive. Mothers-in-law or other senior female relatives can provide crucial childcare, which can, in turn, improve children’s health and nutritional status. In developing countries, including Kyrgyzstan, firstborn children tend to receive greater nutritional and cognitive investment (Horton, 1988; Jayachandran and Pande, 2017; Bishwakarma and Villa, 2019) due to resource dilution (Blake, 1989). However, the presence of extended family members can help to offset these disparities by redistributing caregiving responsibilities and household labor. As a result, residing in extended households may not only improve children’s well-being but also provide younger women with more flexibility to engage in agricultural labor or informal employment. (Landmann et al., 2018). In rural communities, such support is essential due to the limited availability of formal childcare. Additionally, co-residence facilitates economic pooling and shared resources, improving overall household stability and financial security (Nedoluzhko and Agadjanian, 2015). This duality highlights the multifaceted nature of patrilocal living arrangements, where constraints on autonomy coexist alongside supportive structures that may mitigate some psychological stress experienced by daughters-in-law and improve the well-being of their children. Therefore, understanding these intra-household dynamics is not only academically intriguing but also of urgent policy relevance. Interventions aimed at improving child nutrition, advancing women’s agency, or enhancing mental health must account for the family context in which individuals live and make choices.

1.2 Aim and Contribution

The main aim of this dissertation is to contribute to the growing literature on family dynamics and individual well-being in developing and transition economies. In particular, it focuses on how household structure shapes individual outcomes across generations

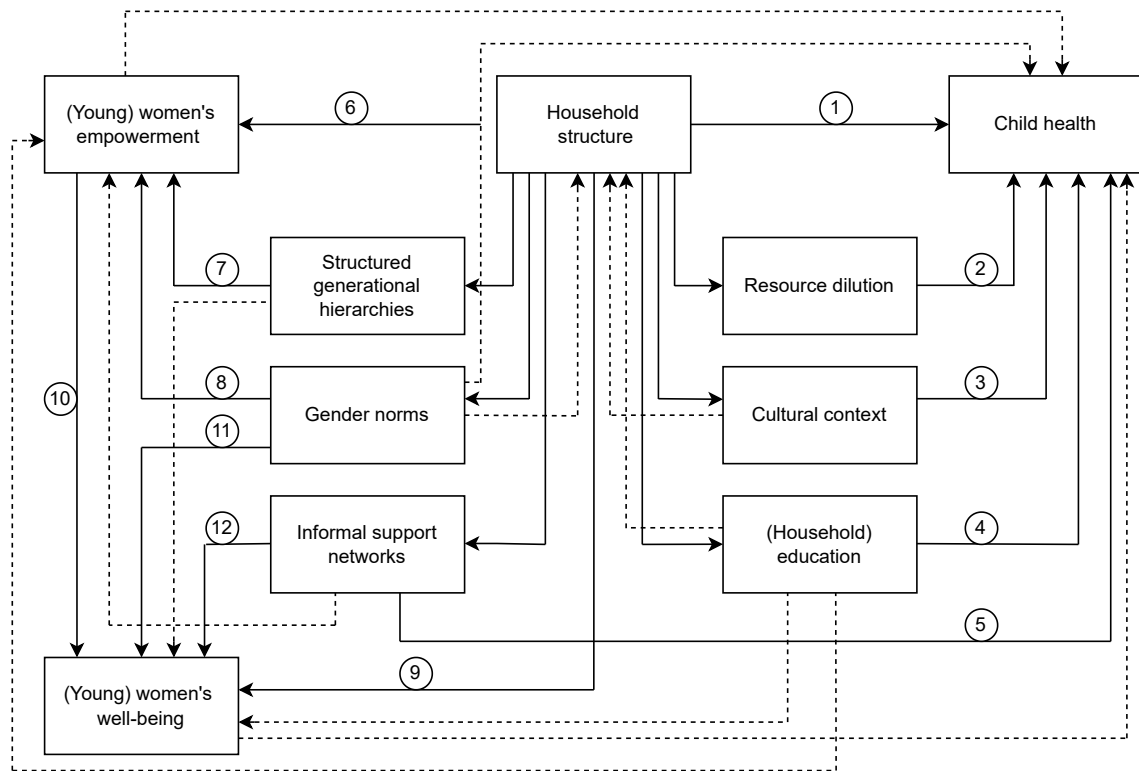
in Kyrgyzstan. By exploring these issues in a Central Asian context, this work contributes to the active field of research at the intersection of health economics, family economics, and development economics. It also offers policymakers evidence on which groups within the household are most vulnerable and how policies can be designed to improve child health and strengthen young women's empowerment and well-being within existing family structures.

The conceptual framework of the thesis is illustrated in Figure 1.1. It helps to situate each chapter within a broader theoretical perspective, showing that child nutrition, women's empowerment, and well-being are not isolated outcomes but part of a unified system of intra-household interactions. The relationships directly examined in this dissertation are represented by solid arrows. The dashed arrows mirror interactions, which are also important for understanding the complex relationship between intra-household dynamics and individual outcomes, but are not directly explored.

The first relationship analyzed in this dissertation is the causal link running from household structure to child health, as denoted by the solid arrow 1 in Figure 1.1. Specifically, we analyze the effects of birth order on child nutritional outcomes. Empirical evidence from developed countries that study birth order effects on various child health outcomes, reveals that later-born children have better health at birth, and the health inequality extends into middle childhood (Björkegren and Svaleryd, 2017; Brenøe and Molitor, 2018; Pruckner et al., 2021). On the contrary, in developing countries, later-born children often lag behind their elder siblings (Jayachandran and Pande, 2017; Horton, 1988; Bishwakarma and Villa, 2019; Rahman, 2016). Several explanations have been proposed, including resource dilution (solid arrow 2), cultural preferences favoring sons (solid arrow 3), and differences in maternal education (solid arrow 4). Chapter 2 contributes to this ongoing debate in the literature by adding new evidence from Kyrgyzstan, an under-researched post-Soviet country in Central Asia. Kyrgyzstan offers a valuable comparative case for studying birth order and child nutrition, as it combines a Soviet legacy of near-universal healthcare and education with persistently high fertility

and widespread multigenerational households (solid arrow 5). The analysis draws on unique data from the Kyrgyz Multiple Indicator Cluster Surveys (MICS) for 2014, 2018, and 2023 and applies mother fixed effects to isolate within-family variation. The MICS data are particularly well suited for this analysis due to their high data quality and standardized collection procedures which ensure comparability across survey rounds.

Figure 1.1: Conceptual framework of the dissertation



Notes: The figure presents the conceptual framework of the dissertation. Dashed arrows illustrate relationships that are not examined directly.

Source: Own illustration.

The second relationship analyzed in this dissertation is the causal link running from household structure to women's empowerment, as denoted by the solid arrow 6 in Figure 1.1. In patriarchal societies, young married women often move into their husband's parental home after marriage, where their autonomy is constrained not only by gender norms (solid arrow 8) but also by structured generational hierarchies (Anderson and Eswaran, 2009) (solid arrow 7). Research from South Asia finds that women in

joint or patrilocal households experience significantly lower decision-making power and mobility due to the influence of in-laws, particularly mothers-in-law (Debnath, 2015; Khalil and Mookerjee, 2019). In Southeast Asia, residence norms have been shown to shape not only women's autonomy but also their exposure to intimate partner violence. Particularly, women residing with extended families report lower rates of domestic violence (Khalil et al., 2024), likely due to the deterrent effect of extended family presence. However, these results contrast with evidence from Tajikistan, where co-residence with in-laws has been associated with a higher likelihood of emotional abuse from husbands (Turaeva and Becker, 2022). Landmann et al. (2018) find that, in Kyrgyzstan, co-residence with in-laws does not significantly affect women's employment, contrasting with previous research (Sasaki, 2002) in less patrilocal settings where co-residence was associated with increased female employment due to parental assistance. This suggests that the protective or harmful effects of patrilocal residence depend strongly on regional kinship norms and intergenerational dynamics. Thus, this chapter examines whether co-residence with in-laws constrains or enhances women's agency within households in Kyrgyzstan, a country that offers a valuable comparative case as it undergoes both economic transition and development. The analyses are based on the Life in Kyrgyzstan (LiK) survey data, which is a nationally representative, multidisciplinary panel dataset covering the period from 2010 to 2019 (Brück et al., 2014). The data is very well suited for the purpose of this study as it collects rich information on household structure, living arrangements, income, employment, and intra-household decision-making.

Although much of the literature conceptualizes patrilocal living primarily as a source of constraint and psychological burden (Debnath, 2015; Khalil and Mookerjee, 2019; Landmann et al., 2018; Turaeva and Becker, 2022), this perspective remains theoretically incomplete. Extended households are complex social environments that can simultaneously impose restrictions and provide protective resources. In some contexts, co-residence may limit women's autonomy while offering stress-mitigating benefits, such as shared childcare, pooled economic assets, or protection from certain social and fi-

nancial risks (Marphatia et al., 2023; Khalil and Mookerjee, 2019; Raymo et al., 2015). However, few studies explicitly unpack these offsetting mechanisms or investigate how the trade-off between autonomy and support shapes women’s psychological well-being. Most existing research examines either empowerment indicators or mental health outcomes in isolation, leaving the channels through which household structures influence psychological stress only partially understood. Thus, Chapter 4 builds on this theoretical framework by addressing two key questions: Do extended household living arrangements affect women’s psychological well-being (solid arrow 9)? And do reductions in autonomy and/or the additional support within such households translate into measurable impacts on women’s psychological well-being (solid arrows 10–12)? The analyses are also based on data from the Life in Kyrgyzstan (LiK) survey.

Methodologically, a unifying feature across all three studies is the use of empirical strategies designed to identify causal effects rather than simple correlations. Chapter 2 employs mother fixed effects to isolate within-family variation in child nutrition, thereby addressing unobserved heterogeneity across households. Importantly, genetic material is randomly allocated at conception, with each child receiving half of their genes from each parent. This genetic allocation does not systematically differ by birth order, allowing observed differences across siblings to be interpreted as causal effects of environmental and household-level factors (Björkegren and Svaleryd, 2017). The chapter 3 and chapter 4 apply a two-stage least squares (2SLS) framework using an instrumental variable strategy that exploits community-level variation in the prevalence of patrilocal residence to address the endogeneity of living arrangements. This approach builds on recent empirical work that leverages local customs and social norms as instruments to identify causal effects in the context of gender and family dynamics (Becker et al., 2017; Bazarkulova and Compton, 2021).

1.3 Outline

Chapter 2: Explaining Birth Order Effects on Child Nutrition: Evidence from Kyrgyzstan

In this chapter (joint work with Dana Bazarkulova), we investigate how intra-household dynamics shape nutritional inequalities among children. We use data from the Multiple Indicator Cluster Surveys (MICS) for 2014, 2018, and 2023, focusing on households with mothers who have at least two children with non-missing anthropometric information. By applying mother fixed effects, the analysis isolates within-family variation, comparing siblings of different birth orders under the same maternal and environmental conditions. This identification strategy captures the pure effect of birth order on nutritional outcomes such as height-for-age and weight-for-age z-scores.

The findings indicate that later-born children experience significant nutritional disadvantages compared to their firstborn siblings, particularly in long-term indicators of growth (height-for-age). These results are consistent with previous evidence from developing countries such as Philippines (Horton, 1988), India (Jayachandran and Pande, 2017; Dhingra and Pingali, 2021), Pakistan (Chaudhry et al., 2021), South Africa (Bishwakarma and Villa, 2019), and Ethiopia (Bras and Mandemakers, 2022). Several explanations have been proposed in the literature, including limited household resources, cultural preferences favoring firstborn sons, and differences in maternal education. However, the relative importance of these drivers likely varies across social and economic contexts. To better understand the Kyrgyz context, we examine not only the established explanations but also how intergenerational caregiving environments (i.e. the presence of co-residing grandmothers) may shape birth order disparities in child nutrition. We find that the presence of co-residing grandmothers mitigates these negative effects faced by later-born children.

The results underscore that family composition and intergenerational co-residence are critical to understanding child development outcomes. The chapter concludes that while resource constraints drive birth order disadvantages, extended households can

serve as compensatory mechanisms, redistributing care and attention across siblings. These insights contribute to broader debates on fertility, household structure, and child health by showing how kinship and caregiving arrangements interact with economic factors to shape child well-being.

Chapter 3: Bound by Tradition: How Patrilocal Residence Shapes Women's Empowerment

This chapter (joint work with Dana Bazarkulova) turns attention to the position of women within extended family systems. Using data from the Life in Kyrgyzstan (LIK) survey, it examines how co-residence with in-laws affects women's empowerment in household decision-making. The analysis focuses on three domains of empowerment: financial, child-related, and social decisions. To address potential endogeneity between co-residence and empowerment, the study employs an instrumental variable approach using the community-level prevalence of patrilocal residence as an instrument. This strategy leverages exogenous variation in local marriage and residence norms to isolate the causal effect of patrilocal living.

The results reveal that women living with their husband's parents exhibit significantly lower levels of decision-making power, consistent with findings from the literature on South Asian countries (Debnath, 2015; Khalil and Mookerjee, 2019). In particular, patrilocal residence reduces women's decision-making power in financial and social matters, whereas its impact on child-related decisions is small and statistically insignificant. The analysis also challenges the assumption that women's decision-making power naturally improves over time. Neither longer marriage duration nor having a son significantly weakens the restrictive effects of patrilocal setup. The mechanism analysis further shows that the decline in empowerment under patrilocal residence is not primarily driven by husbands' gender attitudes or conservatism, but rather by intra-household hierarchies, particularly the dominant role of mothers-in-law.

By documenting the institutional roots of women's disempowerment within ex-

tended households, this chapter contributes to understanding how patrilocal living arrangements translate into enduring power inequalities. The findings have policy relevance in highlighting the need for targeted interventions such as women's networks, local leadership programs, and housing support that can help mitigate the structural disadvantages faced by women living in multigenerational households. More broadly, the chapter situates Kyrgyzstan within the comparative literature on gender and kinship, showing that even in societies with high female education and labor participation, traditional residence patterns continue to shape younger women's everyday agency.

Chapter 4: Living Together, Worrying Less: Emotional Trade-offs of Patrilocal Residence

In this chapter, the analysis is extended to psychological well-being to capture the dual nature of extended living arrangements. Using the same LIK data and an instrumental variable framework as in Chapter 3, it examines how patrilocal co-residence affects women's self-reported levels of worry across different domains: financial concerns, personal safety, and child-related worries. While chapter 3 highlights the restrictive aspects of extended households, this chapter explores their potential protective and emotional dimensions.

Results reveal a nuanced picture. Women in patrilocal households report substantially lower levels of financial, personal security, and child-related worries compared to their neolocal counterparts. Mechanism analysis shows that reduced autonomy does not explain the psychological benefits of co-residence. Instead, the study examines whether various forms of instrumental support from in-laws including economic contributions, childcare assistance, and their gender attitudes serve as channels through which patrilocal residence influences women's psychological outcomes. Even after accounting for these factors, patrilocal residence continues to significantly reduce financial, personal security, and child-related worries, suggesting that such support only partially mediates the observed effects. Interestingly, economic contributions from in-laws are positively

associated with financial worries, likely reflecting that these transfers occur in financially strained households where underlying hardship outweighs any stress-reducing benefit. Likewise, more conservative gender attitudes among in-laws are associated with higher levels of personal security worries, consistent with the idea that restrictive norms exacerbate women's feelings of insecurity. In contrast, childcare assistance shows no significant relationship with concerns about children's futures, indicating that this form of support does not constitute an important mediating pathway.

This chapter contributes to the literature on intra-household dynamics and women's well-being by showing that co-residence entails emotional trade-offs. It constrains women's autonomy while simultaneously reducing their exposure to stress. From a policy perspective, the findings underscore the importance of designing social programs that recognize both the protective and limiting roles of extended households, balancing respect for traditions with efforts to enhance women's psychological well-being.

2 Explaining Birth Order Effects on Child Nutrition: Evidence from Kyrgyzstan

2.1 Introduction

Child malnutrition remains a critical global challenge, particularly in developing countries, where it has severe long-term consequences for health, cognitive development, and economic productivity (Victora et al., 2008; Dewey and Begum, 2011; Walker et al., 2011; Black et al., 2013). Early childhood malnutrition is linked to stunting, impaired immune function, and reduced educational attainment, leading to persistent disadvantages throughout life. These effects are especially severe in low-income settings, where access to nutritious food, healthcare, and sanitation is often limited (Currie and Vogl, 2013). Beyond structural barriers, recent studies underscore the importance of intra-household factors, such as birth order, as key drivers of child health disparities.

The resource dilution hypothesis (Blake, 1989) suggests that as family size increases, later-born children receive fewer parental resources, which can lead to poorer nutritional status. Evidence from the Philippines supports this hypothesis, where Horton (1988) finds that long-term nutritional disparities, measured by height-for-age, are more pronounced for later-born children than short-term measures like weight-for-age. Similarly, a study from South Africa shows that firstborns have better health outcomes than their later-born siblings, as resource constraints in larger families disproportionately affect younger children (Bishwakarma and Villa, 2019). Beyond resource constraints, later-born children also face greater exposure to infections due to household overcrowding, further exacerbating nutritional disadvantages. Hatton and Martin (2010), using historical data from 1930s Britain, demonstrate that both birth order and family size negatively impact child height, primarily through increased exposure to disease and limited per capita food intake.

Cultural norms further reinforce these birth order disparities, particularly in societies with strong son preference. In India, for example, Jayachandran and Pande (2017)

find that firstborn sons exhibit a height advantage due to their significant cultural role in funeral rites, which influences parental resource allocation. A related mechanism operates through fertility behavior: in societies where sons are strongly preferred, parents often shorten the time between births in hopes of having a boy sooner. This practice of shortened birth intervals, observed across South Asia, increases nutritional risk for later-born children by limiting maternal recovery time and exacerbating household resource constraints (Chaudhry et al., 2021; Das Gupta, 2010; Dhingra and Pingali, 2021). In Ethiopia, however, Bras and Mandemakers (2022) finds that the negative height disadvantage for later-born children disappears when mothers have at least eight years of education, suggesting that maternal education can mitigate some of these birth order effects. Building on existing studies from other developing countries, our research examines whether similar patterns of nutritional disadvantage among later-born children hold in the Kyrgyz context.

Kyrgyzstan offers a particularly valuable comparative case for studying birth order and child nutrition, as the country combines a Soviet legacy of near-universal healthcare and education with persistently high fertility and multigenerational households. The country faces a dual nutritional challenge. While stunting has declined, food insecurity, micronutrient deficiencies, and rising childhood overweight reflect an ongoing nutrition transition under conditions of economic vulnerability and dependence on remittances. In 2023, staple food prices were more than 50 percent higher than pre-COVID levels, while the share of remittances in GDP fell from 32 to 20 percent (World Bank, 2024). As a consequence, more than 70 percent of children under five fail to meet minimum dietary diversity, and nearly half of them, along with adolescent girls, suffer from iron and other micronutrient deficiencies (World Food Programme, 2024). At the same time, the country retains deeply entrenched patrilineal kinship norms, and widespread multigenerational co-residence. In such households, grandmothers provide regular childcare support, which can influence how parental resources and attention are distributed among siblings. These features make Kyrgyzstan not only an under-

researched case but also an ideal setting to provide new comparative evidence on child well-being under a different set of demographic, institutional, and social conditions than those documented in prior studies.

For our analysis, we use nationally representative data from the 2014, 2018, and 2023 waves of the Kyrgyzstan Multiple Indicator Cluster Survey (MICS) and employ a mother fixed-effects specification. The analysis focuses on children under the age of five, a period known to have lasting consequences for growth and development. We use height-for-age (HFA) and weight-for-age (WFA) z-scores as primary outcomes. We also include the weight-for-height (WFH) z-score as an alternative measure of malnutrition, it serves as an indicator of overweight. Overweight may arise even in low-income settings due to imbalanced or low-quality diets, where calorie intake is adequate but nutritional quality is poor. Including WFH allows us to assess the broader spectrum of nutritional risks faced by later-born children. HFA captures long-term nutritional deprivation and serves as a proxy for stunting, while WFA and WFH reflect both acute and chronic undernutrition and are more sensitive to short-term nutritional shocks (WHO, 1995). These z-scores are computed using WHO growth reference standards and are age- and gender-standardised.

Consistent with existing evidence from developing countries, our results reveal a significant negative impact of birth order on child nutrition. Later-born children consistently exhibit lower HFA z-scores, indicating a cumulative disadvantage in long-term growth. While WFA outcomes also decline with birth order, the effects are smaller in magnitude and less consistent. These patterns remain robust across various sample restrictions. To understand the mechanisms underlying these disparities, we conduct heterogeneity analyses focusing on resource constraints, cultural norms, and intra-household education. We find that birth order penalties are more pronounced in lower-income and medium-sized households, consistent with resource dilution theory. Cultural factors such as first-born child's gender and rural residence further exacerbate disparities, particularly between first- and second-born children. We also exploit vari-

ation in household composition to compare birth order disparities between households with and without co-residing grandmothers. This approach provides indirect evidence on whether intergenerational caregiving arrangements moderate birth order inequalities. Notably, short-term indicators like WFA continue to show gaps even in wealthier households, suggesting that such outcomes are more sensitive to current household conditions and caregiving fluctuations, while long-term nutritional deficits, as captured by HFA, are shaped more by sustained structural and caregiving investments.

This study makes three key contributions. First, it provides the first rigorous evidence on birth order and child nutrition from Kyrgyzstan, offering a critical comparative case for evaluating whether mechanisms identified in South Asia, Sub-Saharan Africa, or historical Europe also apply in post-Soviet Central Asia. In doing so, it helps to fill a major regional gap in the literature. Second, the paper goes beyond existing studies by examining how birth order disparities vary with household structure. Specifically, it compares outcomes in households with and without co-residing grandmothers. This approach leverages a distinctive cultural feature of Kyrgyz family life, where grandmothers frequently provide childcare, to shed light on how intergenerational caregiving contexts shape intra-household allocation patterns. Although the data do not allow for direct measurement of caregiving inputs, this heterogeneity analysis provides new insight into how family composition may moderate the strength and persistence of birth order effects. Third, it demonstrates that birth order disparities persist even amid Kyrgyzstan's ongoing nutrition transition. Short-term indicators such as WFA show gaps even in wealthier households, reflecting sensitivity to current shocks, while HFA captures cumulative deficits shaped by sustained structural and caregiving investments. This finding underscores that birth order effects remain relevant not only in contexts of poverty but also under emerging risks linked to food insecurity, remittance dependence, and changing diets, thereby offering timely insights for policy design.

The remainder of the paper is organized as follows. Section 2.2 reviews related literature; Section 2.3 describes the data used in our analysis and presents descriptive

statistics; Section 2.4 discusses methodology; In Section 2.5, we report estimation results together with robustness checks and underlying mechanisms; Section 2.6 concludes.

2.2 Literature review

A number of studies from various research disciplines document a strong relationship between birth order and health, education, and labor market outcomes. A well-established fact in the literature is that firstborns, on average, have higher cognitive and noncognitive skills, attain more schooling, and earn more than their later-born siblings.¹ However, the effects of birth order on child health outcomes are mixed, and the potential mechanisms behind the observed effects are not fully understood.

Empirical evidence from developed countries that study birth order effects on various child health outcomes, reveals that later-born children have better health at birth, and the health inequality extends into middle childhood (Brenøe and Molitor, 2018; Björkegren and Svaleryd, 2017; Pruckner et al., 2021). Mechanisms behind the observed birth order effects include biological and behavioral mechanisms. The biological mechanism is explained by the uterus’s nutrition supply getting better with each pregnancy. The behavioral mechanism related to parental investment differs with birth order. For instance, parents may spend more on children with poor health status or spend less on each additional child due to resource constraints.

On the contrary, in developing countries, later-born children often lag behind their elder siblings. Studies that analyze child nutrition outcomes such as HFA and WFA z-scores, tend to find that later-born children in developing countries experience significantly worse outcomes than their older siblings. This negative birth order gradient has been documented across multiple settings, including South Asia and Sub-Saharan Africa, and is attributed to mechanisms such as intra-household resource dilution, cultural son preferences, and socioeconomic factors (Jayachandran and Pande, 2017; Hor-

¹Potential mechanisms are parental time (Black et al., 2005) and unwanted fertility (Lin et al., 2020). Parents, on average, spend more time with their firstborn child (Price, 2008). Later-born children, often resulting from unplanned pregnancies, can disrupt parental plans for optimal human capital investment (Kantarevic and Mechoulam, 2006; Barclay, 2015; Lehmann et al., 2018)

ton, 1988; Bishwakarma and Villa, 2019; Ramalingaswami et al., 1996; Rahman, 2016). Given our focus on Kyrgyzstan, this study contributes to the literature by providing evidence on how birth order affects child nutrition in a developing country of Central Asia. Below we review in more detail the empirical findings from developing countries.

Examining the birth order and child nutritional status in the Philippines, Horton (1988) discovers that long-term nutritional inequalities (height-for-age) are more pronounced than current nutritional disparities (weight-for-age), with later-born children falling behind their earlier-born siblings. Author argues that the birth order effects are not due to parental discrimination in resource allocation among children of different birth orders. Instead, parents are unable to distribute resources over time in a manner that compensates for the inherent advantages enjoyed by earlier-born children, who benefit from higher per capita resources at birth. Similarly, research from South Africa by Bishwakarma and Villa (2019) shows that firstborns have a health advantage over their later-born siblings. This disadvantage is linked to the cumulative depletion of household resources as family size increases. Authors highlight that families of different sizes exhibit differences in household and maternal characteristics. Hatton and Martin (2010) using a sample of predominantly poor British families in the 1930s, present evidence for both negative birth order effects and negative family size effects on children's heights. Authors suggest that the number of children in a family impacts children's health status through two main channels: directly by reducing food intake and indirectly by increasing crowding, which affects hygiene levels and the incidence of disease.

Indian children are, on average, shorter than children in sub-Saharan Africa (SSA), despite India's higher average income. This puzzle has been named the "Asian Enigma" (Ramalingaswami et al., 1996) and has received considerable attention (eg., Coffey et al., 2013). Recently, Jayachandran and Pande (2017) have proposed birth order effects within India as an explanation. Authors find that India's height disadvantage becomes evident with second-born children and worsens with higher birth order. In

addition, investments in later-born children found to diminish more rapidly in India than in Africa. Gender bias, in particular favoritism towards the eldest son, is argued to be the main mechanism behind a birth order gradient. This is because, according to Hindu culture, the funeral rituals are performed by the eldest son. In support of their arguments, authors conducted a within-India analysis and showed that son preference is less pronounced in non-Hindu culture. Additionally, when examining only girls samples, authors found that Indian girls without older brothers are more disadvantaged compared to those with older brothers. Conversely, Spears et al. (2019), reconsidering the analysis conducted by Jayachandran and Pande (2017), show that the birth order differences disappear once data is stratified by siblings size. The argument is based on the structure of DHS data that provides health measures for younger children (under age of five), and higher parity children are usually from big families, emphasizing the importance of considering siblings size to avoid confounding birth order effects.

Chaudhry et al. (2021) argues that gender norms are also strong in Pakistan. Authors document a strongly negative birth order gradient in the nutritional status of children and highlight short birth intervals being a major mediating factor. Interestingly, when parents plan subsequent pregnancies sooner after having daughters in an effort to conceive a son, the reduced spacing between births is found to negatively impact boys more than girls. Similarly, Dhingra and Pingali (2021) analyze the negative birth order effect on stunting among Indian children, attributing it to short intervals between births. Their findings reveal that firstborn children are taller than those of higher birth order, with the height-for-age gap for third or higher-order children being twice that of second-born children. This trend is evident when the spacing between later-born children and their elder siblings is less than 3 years. Notably, the height advantage of firstborns vanishes when later-born children are born at least 3 years after their elder siblings. Therefore, authors concludes that the length of birth spacing, rather than birth order alone, accounts for differences in children's height.

Ethiopian boys exhibit better nutritional status compared to girls, and earlier-born

children had better nutritional outcomes than their later-born siblings, as measured by height-for-age and weight-for-age (Bras and Mandemakers, 2022). The disadvantage in height for higher-order children was found to disappear for those whose mothers had at least eight years of education (equivalent to completing primary school or some secondary education), highlighting the positive impact of maternal education in reducing nutritional inequalities among siblings.

A Regional Gap and the Case of Kyrgyzstan

The global findings provide important insights into the implications of birth order effects, but they also show strong regional variation. This underscores the need for context-specific analysis, particularly in under-researched regions such as Central Asia, where demographic pressures, cultural norms, and intergenerational family structures may shape child nutrition outcomes in distinct ways.

This study contributes to the literature by providing new evidence from Kyrgyzstan, a lower-middle-income country in Central Asia with limited prior empirical research on intra-household dynamics and child nutrition. While existing studies primarily focus on mechanisms such as resource dilution, gender norms, and fertility behavior, less attention has been given to intergenerational caregiving structures. In Kyrgyzstan, traditional family systems often involve co-residence with grandparents, and extended family living arrangements remain prevalent. Nearly three out of four newly married women move into their husband's parental household (Landmann et al., 2018; Grogan, 2007). In such settings, grandparents frequently take on a prominent caregiving role in early childhood. This context-specific feature of extended households introduces an additional dimension for understanding birth order effects and offers new insight into how intergenerational caregiving arrangements shape intra-household variation in child nutrition.

In recent decades, Kyrgyzstan has made notable progress in improving key child health outcomes, driven in part by national initiatives such as the National Health Strategy and the Health Sector Reform. Between 2000 and 2023, child mortality de-

clined from 49.2 to 10.6 deaths per 1,000 live births, and the prevalence of malnutrition among children under five fell from 28% to 10.3% (World Bank, 2024). However, these gains are increasingly under pressure from recent economic disruptions. The country remains heavily reliant on remittances from Russia, the share of which in GDP fell from 32% to 20% between 2020 and 2023 (World Bank, 2024). At the same time, staple food prices rose by more than 50% compared to pre-COVID levels, exacerbating food insecurity. Together, these demographic and economic trends provide essential context for examining birth order effects in a setting characterized by both nutritional improvements and persistent household vulnerability.²

2.3 Data

We base our analysis on data from the Multiple Indicator Cluster Survey (MICS), a globally standardised household survey initiative developed by UNICEF. MICS provides reliable, internationally comparable data on key indicators of child health, nutrition, education, maternal well-being, and household conditions. Designed to inform evidence-based policy and track progress toward the Sustainable Development Goals (SDGs), the survey uses a consistent methodology across countries and years. Specifically, MICS employs a two-stage stratified sampling design to ensure nationally representative estimates. MICS is a cross-section survey and was first conducted in Kyrgyzstan in 1995, with follow-up rounds in 2005–06, 2014, 2018, and 2023. This study draws on data from the 2014, 2018, and 2023 waves, which include complete fertility histories. This information is essential for accurately determining birth order, which is central to our analysis.

We focus on two primary measures of child nutritional status: height-for-age (HFA) and weight-for-age (WFA) z-scores. These measures capture different dimensions of undernutrition. HFA reflects chronic malnutrition, indicating long-term nutritional deprivation and serving as a proxy for stunting. In contrast, WFA reflects both acute

²Detailed statistics on Kyrgyzstan’s socioeconomic and health indicators are presented in Appendix Table 2.A.1, along with Figures 2.A.1–2.A.2.

and chronic malnutrition, but is more sensitive to short-term nutritional shocks such as illness or dietary changes (WHO, 1995). Z-scores are computed using WHO growth reference standards through the Stata package `zscore06`. These scores are age- and gender-standardized, with a value of 0 representing the median for a healthy reference population. In addition to continuous z-scores, we also report categorical indicators based on WHO thresholds: children are classified as stunted ($HFA < -2$) and underweight ($WFA < -2$).³

As an alternative measure of nutritional status, we analyze the weight-for-height (WFH) z-score to capture overweight conditions in children. According to WHO standards, children are classified as overweight if their WFH z-score exceeds +2 standard deviations. While overweight may seem contradictory in contexts of poverty and undernutrition, it can emerge from imbalanced or low-quality diets, where energy intake is sufficient or excessive, but nutritional quality is poor. Early-life undernutrition can predispose children to fat accumulation later in life due to metabolic adaptations. In environments where food insecurity leads to inadequate nutrient intake, the body may respond by storing fat more efficiently when food becomes available—a phenomenon linked to the “thrifty phenotype” hypothesis (Hales and Barker, 1992). As a result, children who experience early nutritional deprivation may exhibit overweight, particularly if postnatal diets are high in calories but low in micronutrients. Including overweight as an outcome thus offers a broader view of the nutritional risks faced by later-born children in resource-constrained households.

To control for potential confounding factors that may influence child nutritional outcomes, we include a set of child-specific and maternal controls. These include child age in months and its squared term, child gender, mother’s age at the time of birth and its squared term. These controls are particularly important given the dynamic nature of child growth and the critical importance of early childhood nutrition. While some children may experience “catch-up” growth, with HFA z-scores improving over time

³These thresholds identify children who are significantly below the reference median in height or weight for their age.

(Desmond and Casale, 2017), evidence from developing countries suggests the opposite pattern may hold—nutritional status often deteriorates with age due to cumulative deprivation (Horton, 1988).

Maternal age at birth also plays a vital role. Younger mothers are often less educated and may engage in riskier health behaviors, whereas older mothers typically have greater financial stability, more parenting experience, and better health knowledge, potentially benefiting later-born children (Hatton and Martin, 2010). Gender is another key determinant, especially in settings where son preference influences household resource allocation (Jayachandran and Pande, 2017; Chaudhry et al., 2021). Additionally, birth year fixed effects are included to account for cohort-specific improvements in living conditions and health services, as children born in more recent years may benefit from broader economic growth and improved infrastructure (Bishwakarma and Villa, 2019). Finally, sibling age differences implicitly account for birth spacing, a crucial factor in child nutrition outcomes.

To ensure comparability and focus on the most nutritionally vulnerable period, we restrict the sample to children under five years of age (0–59 months) born to mothers aged 15 to 49 with at least two biological children. Given the cross-sectional nature of the survey, we observe each child and their mother once in the data sample. Early childhood is a crucial stage for physical and cognitive development, and adequate nutrition during this period is emphasised by the WHO as a core component of global child health monitoring (WHO, 2014). To improve data quality, we exclude children with anthropometric measurements outside the WHO-recommended range of -6 to $+6$ standard deviations. We also drop observations with missing information on height, weight, or maternal identity. After applying these restrictions, the final sample includes 2,476 mothers and 5,167 children, comprising 2,631 boys and 2,536 girls.

Data quality in anthropometric measurements

Since our research is focused on analyzing anthropometric measures such as height and weight, the data collection method and quality play an important role. The use of the

MICS dataset is advantageous for our study due to the high-quality anthropometric data collection. Two field team members, the measurer and the assistant (interviewer, field editor or field supervisor) are trained to measure height and weight using appropriate tools, such as stadiometers for height and the Seca 874 U Scale for weight. The measurer and the assistant place the child on the appropriate measuring tool and make sure that the position of the child allows for the high-quality collection of the height and weight measures. Children under two who cannot or are not willing to stand on the scale are weighted in the mother's/caretaker's arms, and the child's weight is recorded as total weight minus the weight of the mother/caretaker. The child's length is recorded for children under two (or under 85 cm) in the horizontal position, and the child's height in children older than two is recorded in the vertical position. Uniformed instructions to the measurer and the assistants and the use of the same measurement tools ensures the standardization of anthropometric measurements recorded by the MICS.⁴

Descriptive statistics

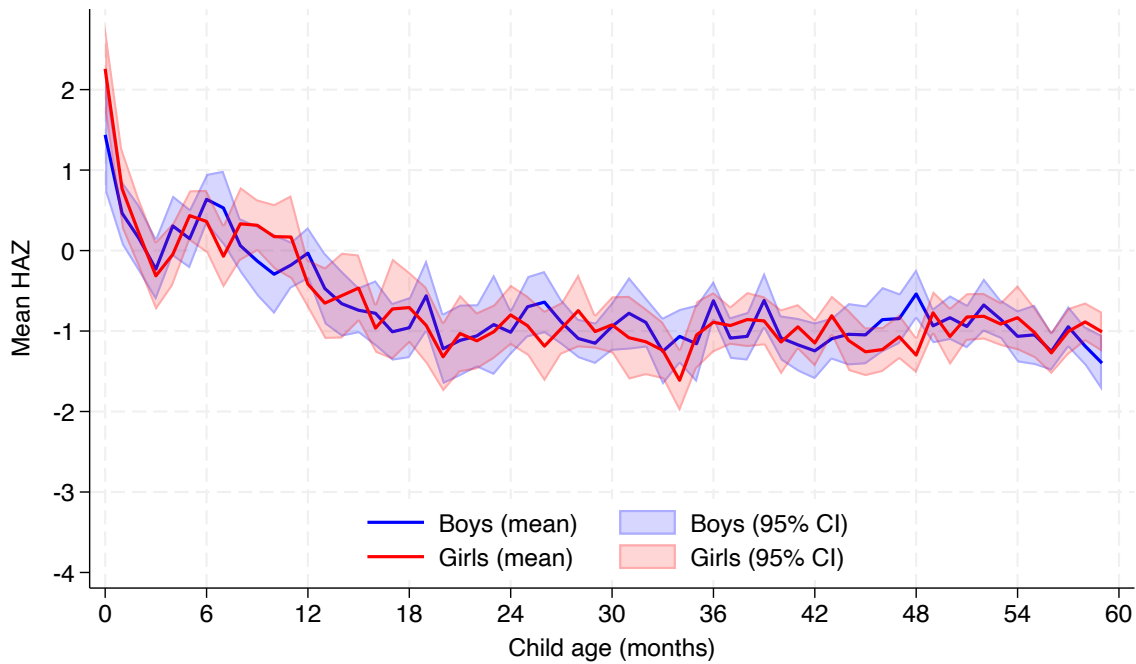
Table 2.1 presents summary statistics of key child, maternal and household level characteristics by birth order.⁵ The distribution of children across birth orders is unbalanced, primarily due to missing values or children aging out of the sample once they reach age of 5. HFA and WFA z-scores mostly remain below zero across birth orders, indicating that children in the sample face growth and weight challenges relative to the reference population, regardless of birth order.⁶ The proportion of children classified as stunted or underweight is relatively low but non-negligible, with stunting rates ranging from 13.1% to 14.2% and underweight rates generally below 2%. The gender distribution is relatively balanced across all birth orders, although a slightly higher proportion of girls is observed among third- and fourth-or-higher-born children. These descriptive patterns provide an overview of the sample but do not account for household- or mother-level confounders that are addressed in the multivariate analysis.

⁴See MICS (2014) for the MICS Manual on Anthropometry.

⁵Appendix Table 2.A.2 presents summary statistics separately for each survey wave.

⁶See Figures 2.1–2.3, which plot height-for-age, weight-for-age, and weight-for height z-scores by child age and gender.

Figure 2.1: Height-for-Age Z-Scores by Age and Gender



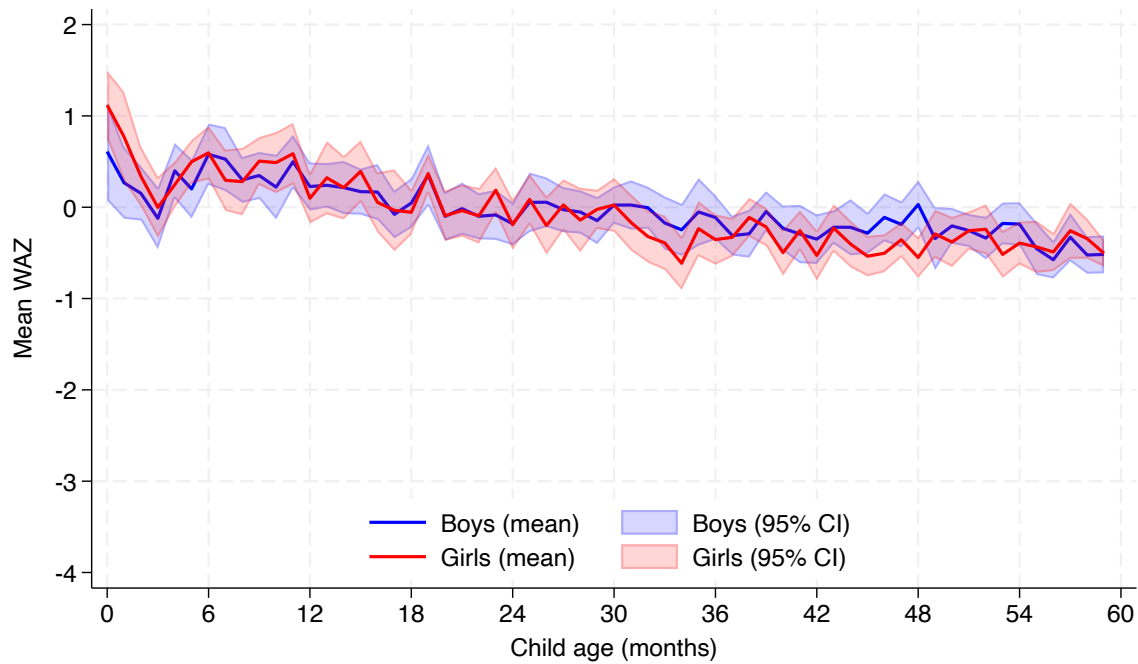
Notes: Figure 2.1 plots mean height-for-age z-scores by child age in months, separately for boys and girls. Shaded bands represent 95% confidence intervals.

Source: Authors' own illustration based on MICS survey rounds 2014, 2018 and 2023.

The average maternal age at first birth is around 22 years, and mothers are, on average, 26 years old at the time of childbirth. A higher percentage of mothers (47.2%) have attained higher education compared to household heads (37.5%).⁷ Mothers in the sample have an average of three children, and the majority of households (65.9%) are located in rural areas, where traditional family structures are more prevalent. Only 19.6% of households are female-headed, reflecting the dominance of male-headed households in the country. The average household size is approximately 6.6 members. The combined household wealth score remains relatively stable across rounds, with negative values reflecting the standardized nature of the index (mean zero at the national level).

⁷Household heads are not always the husbands. Since extended family arrangements are common in Kyrgyzstan, household heads are mostly senior members of the family.

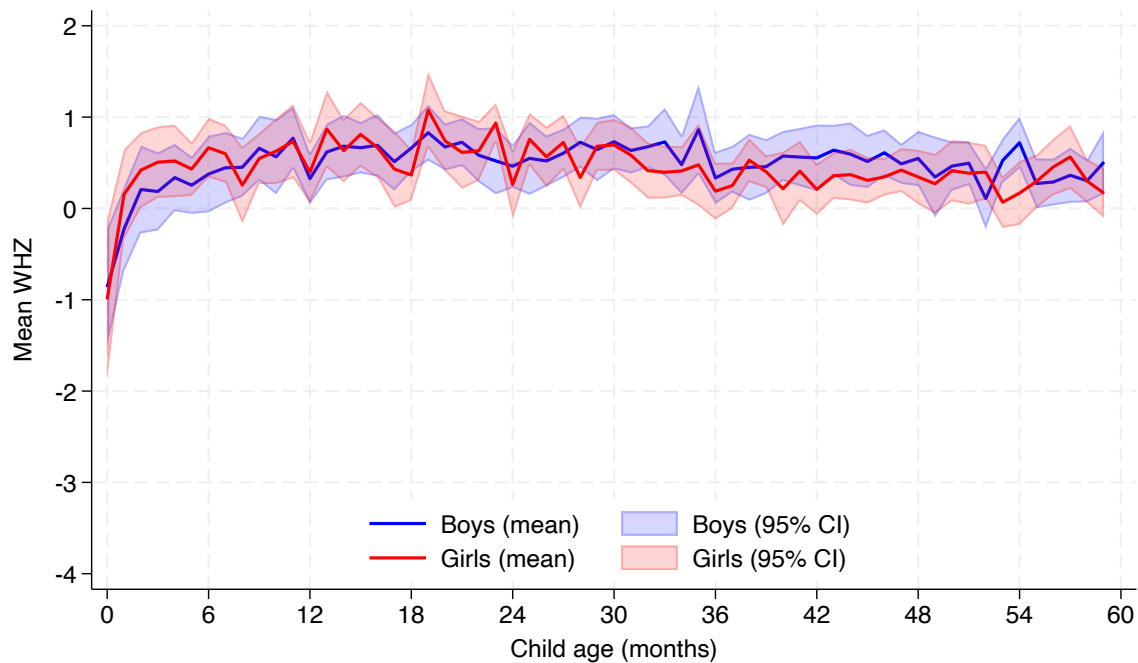
Figure 2.2: Weight-for-Age Z-Scores by Age and Gender



Notes: Figure 2.3 plots mean weight-for-age z-scores by child age in months, separately for boys and girls. Shaded bands represent 95% confidence intervals.

Source: Authors' own illustration based on MICS survey rounds 2014, 2018 and 2023.

Figure 2.3: Weight-for-Height Z-Scores by Age and Gender



Notes: Figure 2.3 plots mean weight-for-height z-scores by child age in months, separately for boys and girls. Shaded bands represent 95% confidence intervals.

Source: Authors' own illustration based on MICS survey rounds 2014, 2018 and 2023.

Table 2.1: Descriptive statistics by birth order

	All		1st child		2nd child		3rd child		4th(+) child	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Child characteristics										
Child age (in months)	29.154	17.389	40.512	10.957	26.616	17.587	26.581	17.889	23.949	16.905
Child is girl	0.491	0.500	0.481	0.500	0.482	0.500	0.502	0.500	0.503	0.500
Child height	85.273	13.991	94.501	7.943	83.160	14.267	83.212	14.443	81.094	13.836
HFA z-score	-0.697	1.335	-0.886	1.103	-0.675	1.308	-0.614	1.406	-0.621	1.496
Stunted (HFA<-2)	0.134	0.341	0.134	0.341	0.131	0.337	0.132	0.339	0.142	0.350
Child weight	12.320	3.604	14.539	2.382	11.811	3.660	11.840	3.672	11.302	3.561
WFA z-score	-0.054	0.992	-0.204	0.866	-0.033	1.016	0.010	1.025	0.005	1.030
Underweight (WFA<-2)	0.024	0.153	0.025	0.156	0.026	0.158	0.024	0.152	0.020	0.142
WFH z-score	0.478	1.126	0.437	0.986	0.481	1.155	0.502	1.193	0.490	1.149
Overweight (WFH>2)	0.069	0.253	0.046	0.209	0.080	0.272	0.074	0.262	0.069	0.253
Maternal and household characteristics										
Maternal age at first birth	22.136	3.026	22.392	3.158	22.334	3.151	22.127	2.942	21.573	2.683
Maternal age at birth	26.345	4.953	22.392	3.158	24.622	3.447	27.574	3.692	31.874	4.177
Number of children	3.134	1.244	2.116	0.326	2.441	0.554	3.438	0.550	4.958	0.994
Maternal education: low	0.105	0.306	0.117	0.322	0.116	0.320	0.103	0.304	0.077	0.266
Maternal education: secnd.	0.423	0.494	0.375	0.484	0.380	0.485	0.419	0.494	0.545	0.498
Maternal education: high	0.472	0.499	0.508	0.500	0.505	0.500	0.478	0.500	0.378	0.485
HH head education: low	0.117	0.322	0.112	0.315	0.114	0.318	0.114	0.318	0.132	0.338
HH head education: secnd.	0.507	0.500	0.500	0.500	0.496	0.500	0.509	0.500	0.531	0.499
HH head education: high	0.375	0.484	0.388	0.488	0.390	0.488	0.377	0.485	0.337	0.473
Rural residence	0.659	0.474	0.641	0.480	0.634	0.482	0.658	0.475	0.717	0.451
Household head is female	0.196	0.397	0.199	0.399	0.199	0.399	0.196	0.397	0.190	0.392
Household size	6.602	1.950	6.181	2.060	6.303	2.006	6.713	1.802	7.389	1.614
Combined wealth score	-0.284	0.819	-0.229	0.840	-0.230	0.835	-0.274	0.812	-0.433	0.761
No. of children	5,167		1,162		1,747		1,135		1,123	

Notes: The table presents mean values and standard deviations for the full sample and by birth order.

Source: Own calculations based on MICS, survey rounds 2014, 2018 and 2023.

2.4 Econometric model

To estimate the effect of birth order on child nutritional outcomes, we implement a mother fixed-effects approach:

$$NS_{im} = \beta_0 + \beta_1 2ndChild_{im} + \beta_2 3rdChild_{im} + \beta_3 4th(+)Child_{im} + \gamma C_{im} + \lambda_m + \epsilon_{im} \quad (2.1)$$

where NS represents the nutritional status of child i of mother m . NS take the values of HFA, WFA or WFH z-scores, and the set of dummy variables indicating stunting, severe stunting, underweight and severe underweight in children.

The coefficients β_1 , β_2 , and β_3 capture the birth order effects, measuring differences in child nutritional outcomes relative to firstborn children, who serve as the reference category. When the dependent variable is a z-score measure (HFA, WFA or WFH), these coefficients reflect how birth order influences continuous variations in a child's nutritional status, while accounting for differences in age and gender. A difference in z-scores represents relative differences in nutrition rather than absolute differences in height or weight. For example, a higher z-score for a later-born child does not imply they are physically taller than their firstborn sibling. Rather, it indicates that, relative to other children of the same age and gender, later-born children exhibit better nutritional status. Conversely, a lower z-score suggests that later-born children experience poorer nutrition for their age and gender compared to firstborn children.

When the dependent variable is a binary indicator for stunting, underweight or overweight, the coefficients represent the change in probability of a child being classified within these categories due to birth order differences. In these cases, a negative coefficient suggests that later-born children are less likely to be stunted, underweight or overweight compared to firstborns, while a positive coefficient implies a higher likelihood of malnutrition among later-born siblings.

The control vector C_{im} includes characteristics such as age (in months) and its squared term, gender, maternal age at birth, and its squared term, to account for

potential confounding factors. It also includes birth year fixed effects to control for cohort-specific heterogeneity, as children born in more recent years in many developing countries tend to be taller—a pattern attributed to economic growth and expanded access to healthcare and nutrition services. Sibling age differences implicitly capture birth spacing, which is a key factor influencing child nutrition outcomes.

The model includes mother fixed effects λ_m , which absorb all time-invariant maternal characteristics that remain constant across siblings, such as genetic factors, baseline socioeconomic status, and cultural practices. This approach ensures that birth order effects are identified independently of unobserved household heterogeneity by making comparisons within families, between siblings. By eliminating unobserved household-level confounders, the mother fixed-effects strategy provides a clean identification of birth order effects. To ensure robust inference, we cluster standard errors at the mother level.

Maternal and household characteristics are not included in the main regression (except maternal age at birth) because these factors remain constant for a given mother and are therefore absorbed by the mother fixed effects. However, when exploring potential mechanisms, we introduce relevant maternal and household characteristics to better understand the channels through which birth order affects child nutrition.

2.5 Results

This section presents the empirical results on the relationship between birth order and child nutrition outcomes. We begin by estimating the effects of birth order on child nutrition outcomes, comparing second-, third-, and fourth-or-higher-born children to firstborns. We then conduct robustness checks to verify the consistency of the results across different sample restrictions. Finally, we explore potential mechanisms driving the observed birth order effects through a series of heterogeneity analyses, focusing on resource constraints, cultural norms, and household education.

2.5.1 Main results

Table 2.2 reports the estimated effects of birth order on child nutrition outcomes, including HFA, WFA and WFH z-scores, as well as their corresponding categorical measures: stunting, underweight and overweight. The coefficients represent differences in nutritional outcomes for second-born, third-born, and fourth-or-higher-born children relative to firstborns.

Columns 1–2 present the results for height-related outcomes (HFA and stunting). The results indicate that later-born children have significantly lower HFA z-scores compared to firstborns. Specifically, second-born children have an HFA score that is 0.265 standard deviations lower, third-born children experience a 0.330 standard deviation decline, and fourth-or-higher-born children show the greatest disadvantage with a 0.389 standard deviation reduction in HFA. These findings suggest that birth order is negatively associated with long-term growth indicators. Although the coefficients for stunting are not statistically significant, the probability of being stunted increases steadily with birth order, pointing to a cumulative growth deficit among later-born children.

Table 2.2: Main results: The birth order effects on child nutrition

	HFA	Stunted	WFA	Underweight	WFH	Overweight
2nd child	-0.265*** (0.077)	0.033 (0.022)	-0.129** (0.056)	-0.007 (0.011)	0.261 (0.359)	0.038** (0.017)
3rd child	-0.330** (0.143)	0.038 (0.042)	-0.152 (0.104)	-0.020 (0.020)	0.694 (0.638)	0.063** (0.032)
4th(+) child	-0.389* (0.206)	0.042 (0.061)	-0.179 (0.148)	-0.050* (0.027)	0.684 (0.802)	0.073 (0.045)
No. of mothers	2,476	2,476	2,476	2,476	2,476	2,476
No. of children	5,167	5,167	5,167	5,167	5,167	5,167

Notes: The table shows the results from the mother fixed effects estimation. Controls include child age in months and its squared term, child gender, child birth year, mother's age at the time of birth and its squared term. Standard errors are clustered at the mother level and presented in parentheses. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Source: Own calculations based on MICS, survey rounds 2014, 2018 and 2023.

Columns 3-4 report the effects on weight-related outcomes (WFA and underweight).

The results indicate that birth order also negatively affects WFA, though the effects are somewhat weaker than those on height. Second-born children have a 0.129 standard deviation lower WFA z-score relative to firstborns, and third-born children exhibit a slightly larger decline of 0.152 standard deviations, though this is not statistically significant. The WFA gap widens further for fourth-or-higher-born children (-0.179 SD), the estimate is not statistically significant. While birth order does not significantly influence the likelihood of being underweight for second- and third-born children, fourth-or-higher-born children exhibit a 5 percentage point higher probability of being underweight, suggesting that weight deficiencies become more pronounced in larger families.

To further capture acute malnutrition and excess weight, we include WFH z-scores and the likelihood of being overweight. While WFH coefficients are positive across birth orders, they are not statistically significant. However, the probability of being overweight increases significantly with birth order: second-born children are 3.8 percentage points more likely to be overweight, and third-born children 6.3 percentage points more likely, relative to firstborns. These findings suggest that later-born children may be at greater risk of unbalanced diets or poor feeding practices.

Our findings are consistent with previous evidence from developing countries. Studies from the Philippines (Horton, 1988), India (Jayachandran and Pande, 2017; Dhingra and Pingali, 2021), Pakistan (Chaudhry et al., 2021), South Africa (Bishwakarma and Villa, 2019), and Ethiopia (Bras and Mandemakers, 2022) all find that later-born children are more likely to experience poorer nutritional outcomes compared to their older siblings. Several explanations have been proposed in the literature, including limited household resources, cultural preferences favoring firstborn sons, and differences in maternal education. However, the relative importance of these drivers likely varies across social and economic contexts. To better understand the Kyrgyz context, we examine not only these established explanations but also how intergenerational caregiving environments (i.e. the presence of co-residing grandmothers) may shape birth order disparities

in child nutrition. If the birth order effect is driven by intra-household allocation patterns or cultural factors, then there is clear scope for targeted policy interventions to mitigate these disparities and promote more equitable child development outcomes.

2.5.2 Mechanisms

To better understand the channels through which birth order affects child nutrition, this section presents a series of heterogeneity analyses. First, we examine whether birth order effects vary by family size and household wealth to test the resource dilution hypothesis. Second, we assess the role of cultural norms by exploring heterogeneity by firstborn child's gender, rural versus urban residence, and the presence of a co-residing grandmother. Third, we evaluate whether maternal or household head's education mitigates the negative effects of birth order on child nutrition outcomes.

Birth order effects due to resource dilution

Resource dilution theory suggests that as family size increases, the resources available per child decline, leading to poorer nutritional outcomes for later-born children. This effect is further amplified in lower-income households, where overall resources are already constrained, limiting parents' ability to compensate for the disadvantages faced by later-born children. Empirical evidence from the Philippines (Horton, 1988), South Africa (Bishwakarma and Villa, 2019), and historical Britain (Hatton and Martin, 2010) supports this theory, demonstrating that larger families are associated with reduced per capita resources, lower food intake, and greater exposure to infections due to crowding.

Our analysis provides further empirical support for the resource dilution hypothesis by examining birth order effects across families of different sizes. As shown in columns 1–3 of Panel A in Table 2.3, the second-born child in two-child families experiences a statistically significant disadvantage in height-for-age (HFA), with a z-score 0.311 standard deviations lower than the firstborn. In contrast, in three-child and four-or-more-child families, the HFA gap narrows slightly (coefficients range from -0.166 to

−0.291) and becomes statistically insignificant, suggesting that the strongest disparities emerge when only two children compete for resources, and parents have not yet adapted to managing larger family sizes. In bigger families, adjustments in caregiving or economies of scale may buffer the disadvantages for later-born children.

Table 2.3: Birth order effects due to resource dilution

Panel A: Heterogeneity by family size									
	HFA			WFA			WFH		
	2-child	3-child	4+ child	2-child	3-child	4+ child	2-child	3-child	4+ child
2nd child	-0.311** (0.140)	-0.166 (0.146)	-0.267 (0.401)	-0.145 (0.107)	-0.274** (0.111)	-0.179 (0.262)	0.003 (0.135)	-0.246* (0.145)	-0.160 (0.508)
3rd child		-0.180 (0.264)	-0.291 (0.390)		-0.455** (0.197)	-0.077 (0.275)		-0.521** (0.255)	-0.048 (0.507)
4th(+) child			-0.283 (0.426)			-0.043 (0.307)			-0.009 (0.530)
No. of mothers	1,029	673	774	1,029	673	774	1,029	673	774
No. of children	2,058	1,467	1,642	2,058	1,467	1,642	2,058	1,467	1,642
Panel B: Heterogeneity by household wealth									
	HFA		WFA		WFH				
	Q1	Q2		Q1	Q2		Q1	Q2	
2nd child	-0.411*** (0.123)	-0.134 (0.129)		-0.153* (0.087)	-0.204** (0.101)		0.101 (0.108)	-0.202 (0.135)	
3rd child	-0.537** (0.234)	-0.148 (0.244)		-0.146 (0.158)	-0.245 (0.201)		0.233 (0.199)	-0.310 (0.264)	
4th(+) child	-0.730** (0.343)	0.028 (0.365)		-0.172 (0.229)	-0.297 (0.283)		0.390 (0.287)	-0.568 (0.369)	
No. of mothers	1,135	871		1,135	871		1,135	871	
No. of children	2,363	1,804		2,363	1,804		2,363	1,804	

Notes: The table shows the results from the mother fixed effects estimation. Panel A reports results by family size: two-child, three-child, and four-or-more-child households. Panel B reports results by household wealth, divided into terciles: poorer (Q1) and wealthier (Q2). Controls include child age in months and its squared term, child gender, child birth year, mother's age at the time of birth and its squared term. Standard errors are clustered at the mother level and presented in parentheses. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Source: Own calculations based on MICS, survey rounds 2014, 2018 and 2023.

A somewhat different pattern emerges for WFA. The strongest negative effect is observed in three-child families, where the second-born child has a WFA score 0.274 standard deviations lower than the firstborn, and the third-born faces an even greater disadvantage of 0.455 standard deviations. In contrast, WFA differences across birth order are smaller and statistically insignificant in two-child and four-or-more-child families. A similar trend as in WFA is observed for WFH z-scores. In three-child families, the third-born child experiences a significant disadvantage, with a WFH z-score 0.521 standard deviations lower than the firstborn. The second-born child in these families also shows a moderately negative coefficient of -0.246. Again, birth order differences in two-child and four-or-more-child families are small and statistically insignificant. Taken together, the WFA and WFH results indicate that short-term nutritional stress is most pronounced in medium-sized households, likely due to temporary strain on resources and caregiving capacity during a period of family expansion. Once families grow beyond three children, they may have already adapted their resource allocation strategies, mitigating later-born children from further disadvantage.

However, wealthier households may help mitigate resource constraints, potentially reducing the negative impact of birth order on child nutrition, although existing literature does not consistently identify household wealth as a key mechanism behind the nutritional disadvantages faced by later-born children (Horton, 1988; Jayachandran and Pande, 2017; Bishwakarma and Villa, 2019). If wealth plays a mitigating role, we would expect the nutritional disadvantages faced by later-born children to be smaller or statistically insignificant in wealthier households, compared to those in poorer households.

Panel B of Table 2.3 presents the estimated birth order effects on child nutrition outcomes, disaggregated by household wealth: poorer (Q1) and wealthier (Q2) households. Columns 1 and 2 show the effects on HFA z-scores. In poorer households, later-born children face increasingly worse height outcomes compared to firstborns. Specifically, second-born children exhibit a significant disadvantage of 0.411 standard deviations, followed by third-borns with a 0.537 SD disadvantage, and fourth-or-higher-born chil-

dren with a 0.730 SD deficit, all statistically significant at 5%. In contrast, the effects in wealthier households are smaller and statistically insignificant, suggesting that higher household wealth may mitigate against long-term nutritional disadvantages associated with higher birth order.

Columns 3 and 4 present the results for WFA. Interestingly, the strongest birth order disadvantage emerges in wealthier households, where second-born children have WFA scores 0.204 standard deviations lower than their firstborn siblings. However, estimates for third- and fourth-born children are smaller and statistically insignificant across both wealth groups. This pattern suggests that while short-term nutritional gaps may emerge even in better-off households, they are not consistently observed across later birth orders, possibly due to adaptive resource allocation by parents.

Columns 5 and 6 show the results for WFH z-scores. Unlike HFA and WFA, the birth order gradients for WFH are weak and statistically insignificant across wealth levels. Some negative point estimates are observed in wealthier households, but they lack precision and do not follow a consistent pattern. These results suggest that resource dilution effects are more pronounced in long-term nutritional outcomes like HFA, particularly in low-income households. This highlights the greater sensitivity of height-related measures to sustained resource constraints, while weight-based outcomes appear more responsive to temporary household dynamics.

Birth order effects due to cultural factors

Firstborn son is often viewed as the future head of the household, with responsibilities in family rituals, caregiving for elderly parents, and inheritance (Das Gupta, 2010; Jayachandran and Pande, 2017; Chaudhry et al., 2021). In Kyrgyzstan, these traditional norms around elder sons' duties and privileges remain salient, particularly in rural and more conservative regions. Economically, firstborn sons are also likely to reach adulthood earlier, allowing them to contribute to the household income sooner or take on productive roles such as herding, farming, or wage labor. This earlier transition to

economic independence may incentivize parents to invest more in their firstborn sons, anticipating future returns that benefit the entire family. To assess whether this pattern holds in our sample, we estimate the model separately for households where the firstborn is a girl and those where the firstborn is a boy. The results, presented in Panel A of Table 2.4, provide insights into how gender-based parental preferences may shape birth order disparities in child nutrition. Columns 1 and 2 show the effects on HFA for households where the firstborn is a boy and a girl, respectively, while columns 3 and 4 present the corresponding results for WFA, and columns 5 and 6 present the results for WFH .

The results indicate that birth order disadvantages in HFA are steeper when the firstborn child is a boy. The second-born child in families where the firstborn is male has an HFA z-score 0.359 standard deviations lower than the elder sibling, while the disadvantage for third- and fourth-or-later-born children increases to 0.432 and 0.483 standard deviations, respectively. In contrast, when the firstborn child is a girl, the negative birth order effects are smaller in magnitude and statistically insignificant across all birth ranks, with HFA coefficients ranging from -0.120 to -0.224. This suggests that birth order disparities in height-for-age are more pronounced in families with firstborn sons, potentially reflecting differences in parental investment strategies that favor earlier-born male children due to their anticipated economic contributions.⁸ For WFA, a similar pattern emerges, though the effects are weaker. When the firstborn child is a boy, the second-born child has a 0.205 standard deviation lower WFA z-score, while third- and fourth-or-later-born children also show negative but statistically insignificant coefficients. In contrast, in families where the firstborn is a girl, the birth order effects on WFA are small and statistically insignificant across all birth ranks. Birth order effects on WFH z-scores are small and statistically insignificant across all groups, showing no clear pattern by firstborn gender. The absence of a clear pattern for short-term nutrition outcomes implies that these disparities are more deeply rooted in long-term

⁸A supplementary analysis comparing mothers with only boys to those with only girls shows no statistically significant difference in birth order effects (see Table 2.A.3)

Table 2.4: Birth order effects due to cultural factors

Panel A: Heterogeneity by gender of firstborn child						
	HFA		WFA		WFH	
	FB is boy	FB is girl	FB is boy	FB is girl	FB is boy	FB is girl
2nd child	-0.359*** (0.111)	-0.120 (0.117)	-0.205** (0.084)	-0.093 (0.083)	-0.030 (0.106)	-0.057 (0.106)
3rd child	-0.432** (0.203)	-0.173 (0.211)	-0.182 (0.156)	-0.172 (0.147)	0.088 (0.190)	-0.170 (0.191)
4th(+) child	-0.483* (0.289)	-0.224 (0.301)	-0.252 (0.222)	-0.174 (0.208)	-0.003 (0.268)	-0.114 (0.265)
No. of mothers	1,208	1,268	1,208	1,268	1,208	1,268
No. of children	2,515	2,652	2,515	2,652	2,515	2,652
Panel B: Heterogeneity by residence type						
	HFA		WFA		WFH	
	Urban	Rural	Urban	Rural	Urban	Rural
2nd child	-0.284** (0.133)	-0.244** (0.096)	-0.129 (0.094)	-0.138** (0.070)	0.019 (0.125)	-0.021 (0.090)
3rd child	-0.247 (0.253)	-0.361** (0.176)	-0.233 (0.177)	-0.133 (0.129)	-0.166 (0.227)	0.066 (0.165)
4th(+) child	-0.403 (0.361)	-0.362 (0.253)	-0.309 (0.263)	-0.136 (0.181)	-0.119 (0.322)	0.045 (0.227)
No. of mothers	847	1,629	847	1,629	847	1,629
No. of Children	1,762	3,405	1,762	3,405	1,762	3,405
Panel C: Heterogeneity by presence of grandmother						
	HFA		WFA		WFH	
	Not present	Present	Not present	Present	Not present	Present
2nd child	-0.349*** (0.121)	-0.187* (0.101)	-0.163* (0.084)	-0.086 (0.076)	0.024 (0.110)	0.005 (0.098)
3rd child	-0.578*** (0.206)	-0.102 (0.200)	-0.284* (0.149)	-0.019 (0.143)	0.027 (0.188)	0.023 (0.190)
4th(+) child	-0.583** (0.284)	-0.198 (0.307)	-0.286 (0.207)	-0.058 (0.208)	0.024 (0.258)	0.048 (0.271)
No. of mothers	1,132	1,344	1,132	1,344	1,132	1,344
No. of children	2,348	2,819	2,348	2,819	2,348	2,819

Notes: The table shows the results from the mother fixed effects estimation. Panel A reports estimates by the gender of the firstborn child (boy vs. girl), Panel B by place of residence (urban vs. rural), and Panel C by the presence of a co-residing grandmother. Controls include child age in months and its squared term, child gender, child birth year, mother's age at the time of birth and its squared term. Standard errors are clustered at the mother level and presented in parentheses. Significance levels: *p < 0.1, **p < 0.05, ***p < 0.01.

Source: Own calculations based on MICS, survey rounds 2014, 2018 and 2023.

parental investment behaviors rather than immediate dietary or illness-related shocks.

To further explore how cultural factors shape birth order effects, we examine whether these patterns differ between rural and urban households. In Kyrgyzstan, traditional norms around family structure, gender roles, and the value of children, especially sons, tend to be more deeply rooted in rural areas, where extended family living arrangements and customary practices remain prevalent (Lehmann et al., 2018; Kazenin, 2023). Urban households, by contrast, are generally more exposed to modern lifestyles, education, and employment opportunities, which may weaken traditional norms and lead to more equal investment in children regardless of birth order. If cultural norms indeed play a role in driving birth order disparities, we would expect stronger negative effects in rural areas compared to urban ones. To test this, we estimate the model separately for rural and urban households. The Panel B of Table 2.4 presents the results. Columns 1 and 2 report the effects on HFA for rural and urban samples, respectively, while columns 3 and 4 show the corresponding WFA results.

The results reveal that the negative impact of birth order on HFA is considerably stronger in rural areas. In rural households, second-born children have HFA scores that are 0.244 standard deviations lower than first-borns, and the disadvantage grows for third-born children, -0.361 standard deviations. In contrast, in urban households, the disadvantage is concentrated between the first-born and second-born children, with second-borns having HFA scores that are 0.284 standard deviations lower. However, for third- and later-born children, the coefficients are not statistically significant. These findings are consistent with the interpretation that cultural norms and traditional expectations, which are more prevalent in rural areas, play a significant role in reinforcing unequal investments across children by birth order. A similar, though less pronounced, pattern is observed for WFA: rural second-born children exhibit a significant disadvantage of 0.138 standard deviations, while urban birth order effects are weaker and statistically insignificant across all birth ranks. Birth order effects on WFH z-scores are small and statistically insignificant in both rural and urban households, further

suggesting that cultural influences primarily manifest in chronic growth deficits rather than short-term weight changes.

An important component of our analysis investigates how household structure shapes birth order differences in child nutrition. In Kyrgyzstan, deeply rooted patrilineal kinship norms and widespread multigenerational co-residence mean that grandmothers often provide regular childcare support. This caregiving role can affect how parental resources and attention are distributed among siblings, potentially moderating birth order disparities. While we cannot directly observe caregiving behaviors, the heterogeneity analysis provides suggestive evidence on how intergenerational caregiving may shape intra-household resource allocation. To explore this mechanism, we estimate the model separately for households with and without a co-residing grandmother. The Panel C of Table 2.4 presents the results, with columns 1 and 2 reporting HFA outcomes, columns 3 and 4 showing WFA results, and columns 5 and 6 presenting WFH outcomes. Columns 1, 3, and 5 correspond to households without a co-residing grandmother, while columns 2, 4, and 6 reflect households with a co-residing grandmother.

We find that the presence of a grandmother partially mitigates the nutritional disadvantages associated with higher birth order. While second-born children still exhibit a marginally significant height deficit even when a grandmother is present, the magnitude of this disadvantage is considerably smaller than in households without one. Even with additional caregiving, resource reallocation or dilution of attention between the first and second child may persist. Notably, for third and later-born children, the negative effects disappear when a grandmother is present. We observe similar, though less pronounced, patterns for WFA, while no consistent birth order effects emerge for WFH. These results suggest that grandmothers' involvement may help equalize short-term nutritional outcomes across siblings, as reflected in the absence of consistent disparities in WFA and WFH. However, persistent height deficits among second-born children indicate that long-term advantages for firstborns remain difficult to fully offset.

Birth order effects due to intra-household education level

Beyond cultural norms and family structure, maternal education plays a key role in shaping child nutrition outcomes and potentially moderating birth order effects. In Kyrgyzstan, female literacy and school attendance have remained relatively high by regional standards, particularly in urban areas. However, there is still substantial variation in educational attainment, particularly across rural and urban areas, age cohorts, and household types. More educated mothers are often better equipped to make informed decisions about feeding, hygiene, and healthcare utilization. They may also be more aware of the importance of equitable treatment among siblings and more capable of resisting social norms that prioritize firstborn or male children. These capabilities can reduce the extent to which resource dilution or cultural preferences disadvantage later-born children. Prior research supports this hypothesis. Bras and Mandemakers (2022), for example, find that in Ethiopia, the height disadvantage of later-born children disappears when mothers have at least eight years of education.

To examine whether similar patterns hold in Kyrgyzstan, we divide the sample into three groups based on maternal education: low (primary or incomplete secondary), middle (secondary), and high (post-secondary or university). We also stratify the sample by the education level of the household head to assess whether broader household educational attainment produces similar patterns. This dual approach allows for a more nuanced understanding of how intra-household education may shape birth order disparities in child nutrition.

Panel A of Table 2.5 shows that birth order effects on height-for-age are more pronounced among mothers with low education. In this group, second-born children have HFA z-scores that are 0.586 standard deviations lower than those of firstborns. This disadvantage increases with birth order, reaching 0.814 SD for third-born and 1.335 SD for fourth-or-later-born children, although the latter estimates are less precisely estimated. A similar, though smaller, pattern is observed in WFA outcomes. In contrast, among highly educated mothers, the birth order coefficients are smaller and statistically

insignificant across all ranks and outcomes, suggesting that maternal education may mitigate against the nutritional disadvantages typically faced by later-born children. For WFH, no consistent or significant birth order patterns are observed, regardless of maternal education level.

Panel B presents results stratified by the education level of the household head. Similar to the maternal education analysis, the strongest HFA disadvantages are found among children in households where the head has low education. Second-, third-, and fourth-or-higher-born children in these households have HFA scores that are 0.625, 0.879, and 1.074 standard deviations lower than their firstborn siblings, respectively. However, in contrast to Panel A, significant HFA disadvantages persist even in middle-educated households (e.g., -0.403 SD for third-born children). Notably, birth order penalties in HFA largely disappear in high-education households, although estimates for later-borns are imprecise. The WFA results are somewhat mixed. Among low-education households, later-born children consistently show negative WFA scores, particularly third-born children (-0.534 SD), although statistical significance weakens beyond second-borns. In middle- and high-education households, birth order coefficients for WFA are generally small and statistically insignificant. For WFH, no systematic birth order patterns emerge across education levels, consistent with the findings in Panel A.

Taken together, these results suggest that maternal education plays a more direct and consistent protective role in mitigating birth order disadvantages in long-term nutritional outcomes. In contrast, while household head's education is also associated with better nutrition, its effects are less uniform and do not follow a clear gradient. This may reflect the more proximate role mothers play in child care, health-seeking behavior, and nutritional decisions, whereas the household head's education may be more indicative of broader socioeconomic conditions that do not necessarily translate into daily caregiving practices.

Table 2.5: Birth order effects due to household education

Panel A: Heterogeneity by maternal education									
	HFA			WFA			WFH		
	Low	Middle	High	Low	Middle	High	Low	Middle	High
2nd child	-0.586** (0.243)	-0.281** (0.134)	-0.244** (0.107)	-0.316* (0.183)	-0.200** (0.089)	-0.096 (0.080)	0.027 (0.200)	-0.097 (0.112)	0.044 (0.110)
3rd child	-0.814* (0.420)	-0.364 (0.240)	-0.328 (0.206)	-0.425 (0.338)	-0.262 (0.161)	-0.154 (0.152)	0.041 (0.361)	-0.146 (0.202)	0.036 (0.210)
4th(+) child	-1.335** (0.590)	-0.412 (0.332)	-0.374 (0.308)	-0.524 (0.493)	-0.318 (0.226)	-0.190 (0.220)	0.313 (0.530)	-0.179 (0.273)	0.011 (0.300)
No. of mothers	257	1,043	1,176	257	1,043	1,176	257	1,043	1,176
Observations	541	2,186	2,440	541	2,186	2,440	541	2,186	2,440
Panel B: Heterogeneity by household head's education									
	HFA			WFA			WFH		
	Low	Middle	High	Low	Middle	High	Low	Middle	High
2nd child	-0.625*** (0.203)	-0.224** (0.107)	-0.238* (0.132)	-0.366*** (0.134)	-0.108 (0.080)	-0.096 (0.096)	-0.007 (0.209)	0.023 (0.100)	-0.002 (0.122)
3rd child	-0.879*** (0.337)	-0.403** (0.201)	-0.089 (0.249)	-0.534** (0.233)	-0.182 (0.146)	-0.019 (0.183)	-0.039 (0.333)	0.082 (0.188)	-0.071 (0.222)
4th(+) child	-1.074** (0.444)	-0.564* (0.292)	0.097 (0.362)	-0.208 (0.332)	-0.431** (0.208)	0.180 (0.261)	0.562 (0.471)	-0.106 (0.267)	-0.001 (0.305)
No. of mothers	292	1,246	938	292	1,246	938	292	1,246	938
Observations	606	2,621	1,940	606	2,621	1,940	606	2,621	1,940

Notes: The table shows the results from the mother fixed effects estimation. Panel A divides the sample into three groups based on maternal education: low (primary or incomplete secondary), middle (completed secondary), and high (post-secondary or university). Panel B stratifies the sample by the education level of the household head using the same categorization. Controls include child age in months and its squared term, child gender, child birth year, mother's age at the time of birth and its squared term. Standard errors are clustered at the mother level and presented in parentheses. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Source: Own calculations based on MICS, survey rounds 2014, 2018 and 2023.

2.5.3 Robustness checks

We conduct three robustness checks to ensure that our main findings are not driven by specific subpopulations that may distort the general relationship between birth order and child nutrition.

First, we exclude 175 observations corresponding to multiple births (i.e. twins). While our empirical strategy assigns a birth order to each child based on their birth sequence within the household, this approach may be problematic in the case of multiple births, since twins are born at the same time and do not have a meaningful birth order in the conventional sense. Assigning arbitrary birth order values to twins could introduce measurement error, particularly if the order is driven by data entry or minor birth timing differences that are not substantively relevant. Moreover, twins often face distinct biological risks, such as low birth weight and preterm delivery, and impose unique economic demands on the household. These factors may independently affect child nutrition outcomes and confound the observed birth order effects. Excluding multiple births therefore helps to isolate the effect of true sequential birth order among singleton children. The results, presented in Panel A of Table 2.6, closely align with our main estimates, confirming the robustness of the birth order gradient.

Second, we exclude children residing in the two largest cities—Bishkek and Osh, the most populous and economically developed cities in Kyrgyzstan. These cities have substantially better access to healthcare, education, infrastructure, and employment opportunities compared to smaller cities or rural areas. These advantages may lead to systematically different child nutrition patterns and parental investment behaviors. By excluding Bishkek and Osh, we test whether our results are robust to the presence of large urban outliers, ensuring that our findings are not disproportionately driven by households in these exceptional settings. As shown in Panel B of Table 2.6, the results remain robust and closely aligned with our main findings. Notably, in Table 2.6 the birth order gradient holds consistently across all continuous nutritional measures (HFA, WFA, and WFH), while effects on binary indicators such as stunting and overweight are weaker or statistically insignificant. This suggests that continuous z-score measures are more informative for capturing subtle intra-household nutritional disparities. Accordingly, in the next section, we focus on continuous outcomes in our mechanism analysis.

Table 2.6: Robustness check: The birth order effects with sample restrictions

Panel A: Excluding twins						
	HFA	Stunted	WFA	Underweight	WFH	Overweight
2nd child	-0.275*** (0.083)	0.045* (0.023)	-0.136** (0.060)	-0.001 (0.011)	0.301 (0.386)	0.029 (0.018)
3rd child	-0.356** (0.158)	0.068 (0.043)	-0.169 (0.113)	-0.008 (0.019)	0.804 (0.715)	0.045 (0.035)
4th(+) child	-0.419* (0.232)	0.084 (0.064)	-0.207 (0.163)	-0.034 (0.027)	0.824 (0.917)	0.047 (0.049)
No. of mothers	2,391	2,391	2,391	2,391	2,391	2,391
No. of children	4,959	4,959	4,959	4,959	4,959	4,959
Panel B: Excluding Bishkek and Osh cities						
	HFA	Stunted	WFA	Underweight	WFH	Overweight
2nd child	-0.296*** (0.085)	0.041 (0.025)	-0.165*** (0.062)	0.002 (0.011)	-0.025 (0.326)	0.029 (0.019)
3rd child	-0.396** (0.157)	0.049 (0.046)	-0.173 (0.115)	-0.011 (0.021)	0.445 (0.648)	0.058 (0.035)
4th(+) child	-0.437* (0.227)	0.054 (0.067)	-0.181 (0.163)	-0.037 (0.029)	0.392 (0.824)	0.066 (0.049)
No. of mothers	2,072	2,072	2,072	2,072	2,072	2,072
No. of children	4,331	4,331	4,331	4,331	4,331	4,331

Notes: The table shows the results from the mother fixed effects estimation. Panel A excludes twins, while Panel B excludes children living in the two largest cities, Bishkek and Osh. Controls include child age in months and its squared term, child gender, child birth year, mother's age at the time of birth and its squared term. Standard errors are clustered at the mother level and presented in parentheses. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Source: Own calculations based on MICS, survey rounds 2014, 2018 and 2023.

As a final robustness check, we examine whether our findings are sensitive to the specific subsample of children included in the analysis. In our main specification (Table 2.2), we estimate discrete birth order effects relative to firstborn children across the full sample of mothers, many of whom have children of different birth ranks. However, some mothers in our sample have only lower-parity children and may not have a firstborn included due to missing data or sample construction (for example, exceeding age of 5). This means that the comparison group in the main regression is not uniformly present across all families.

Table 2.7: Robustness check: Birth order effects by child rank combinations

Panel A: Sample of mothers with 1st/2nd born children						
	HFA	Stunted	WFA	Underweight	WFH	Overweight
2nd child	-0.329** (0.140)	0.045 (0.041)	-0.148 (0.107)	-0.016 (0.018)	-0.510 (0.865)	0.009 (0.032)
No. of mothers	1,033	1,033	1,033	1,033	1,033	1,033
No. of children	2,066	2,066	2,066	2,066	2,066	2,066
Panel B: Sample of mothers with 1st/2nd/3rd born children						
	HFA	Stunted	WFA	Underweight	WFH	Overweight
2nd child	-0.640** (0.296)	0.109 (0.095)	-0.518** (0.242)	-0.039 (0.069)	-0.593 (0.641)	-0.020 (0.056)
3rd child	-0.819 (0.496)	0.049 (0.163)	-1.106*** (0.409)	-0.142 (0.125)	-1.957 (1.348)	-0.107 (0.095)
No. of mothers	127	127	127	127	127	127
No. of children	375	375	375	375	375	375
Panel C: Sample of mothers with 2nd/3rd born children						
	HFA	Stunted	WFA	Underweight	WFH	Overweight
3rd child	-0.002 (0.192)	-0.077 (0.064)	-0.117 (0.138)	0.009 (0.025)	0.083 (0.840)	-0.002 (0.042)
No. of mothers	546	546	546	546	546	546
No. of children	1,092	1,092	1,092	1,092	1,092	1,092
Panel D: Sample of mothers with 2nd/3rd/4th born children						
	HFA	Stunted	WFA	Underweight	WFH	Overweight
3rd child	-0.037 (0.683)	0.146 (0.190)	0.189 (0.353)	-0.004 (0.014)	0.264 (0.450)	0.169 (0.169)
4th(+) child	-0.266 (1.002)	0.144 (0.255)	0.374 (0.611)	-0.013 (0.025)	0.767 (0.619)	0.315 (0.270)
No. of mothers	45	45	45	45	45	45
No. of children	134	134	134	134	134	134
Panel E: Sample of mothers with 3rd/4th born children						
	HFA	Stunted	WFA	Underweight	WFH	Overweight
4th(+) child	-0.017 (0.179)	-0.008 (0.060)	-0.054 (0.145)	0.003 (0.020)	-0.099 (0.149)	-0.020 (0.042)
No. of mothers	416	416	416	416	416	416
No. of children	860	860	860	860	860	860

Notes: The table shows the results from the mother fixed effects estimation. Controls include child age in months and its squared term, child gender, child birth year, mother's age at the time of birth and its squared term. Standard errors are clustered at the mother level and presented in parentheses. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Source: Own calculations based on MICS, survey rounds 2014, 2018 and 2023.

To address this, we re-estimate the birth order effects in Table 2.7 using more narrowly defined parity subsamples, based on the available children for each mother. Specifically, we conduct separate regressions for mothers with: (A) only first- and second-born children, (B) first- to third-born children, (C) second- and third-born children, (D) second- to fourth-born children, and (E) third- and fourth-born children. This approach ensures that comparisons are made only within the relevant sample of children available to a given mother, avoiding bias from unbalanced sibling structures.

Results from Panel A confirm a significant nutritional disadvantage for second-born children relative to firstborns, particularly in HFA, consistent with our main findings. In Panel B, this pattern strengthens and extends to third-borns, especially in WFA outcomes. By contrast, Panels C through E, where firstborns are not included, show smaller and statistically insignificant differences in nutrition outcomes between later-born children. These findings suggest that birth order disadvantages in child nutrition are most pronounced between first- and second-born children. While third- and fourth-born children also show nutritional penalties in our main results, robustness checks indicate that these effects are less precisely estimated in subsamples excluding firstborns.

2.6 Conclusion

The aim of the current paper was to examine the relationship between birth order and child nutrition in Kyrgyzstan. Using data from three waves of MICS data and employing a mother fixed effects approach, we find that later-born children consistently exhibit poorer nutritional outcomes than their firstborn siblings. Across all analyses, we find that birth order effects are more robust and consistent for height-for-age than for other nutritional indicators. Height-for-age captures cumulative nutritional outcomes and is therefore more sensitive to sustained differences in intra-household resource allocation and caregiving practices. In contrast, weight-based measures such as weight-for-age and weight-for-height reflect shorter-term nutritional shocks and show less systematic varia-

tion across birth order. This pattern reinforces the interpretation that the disadvantages faced by later-born children are rooted in long-term constraints, rather than temporary fluctuations in food intake or illness. While the presence of a co-residing grandmother and higher maternal education do mitigate some of the nutritional disadvantages faced by later-born children, they appear insufficient to fully eliminate disparities between first- and second-born children.

Our findings have important policy implications. First, interventions aimed at improving child nutrition should account for intra-household dynamics, particularly the disadvantage faced by later-born children in low-income and medium-sized families. Targeted nutrition programs, such as conditional cash transfers or food supplementation, could prioritize households with multiple young children to counteract resource dilution. Second, policy efforts should combine community-level engagement with strategies that reduce families' reliance on older children as economic contributors. Behavior change campaigns that encourage equitable investment in all children can be complemented by targeted support, including conditional cash transfers, school feeding programs, or childcare subsidies. These measures not only alleviate financial pressure on households but also incentivize more balanced parental investment across siblings. Finally, strengthening maternal education remains a critical tool for mitigating birth order disadvantages. Policies that support girls' secondary and higher education, as well as maternal health and parenting knowledge, can enhance women's capacity to allocate resources more equitably and improve child outcomes across the birth order spectrum.

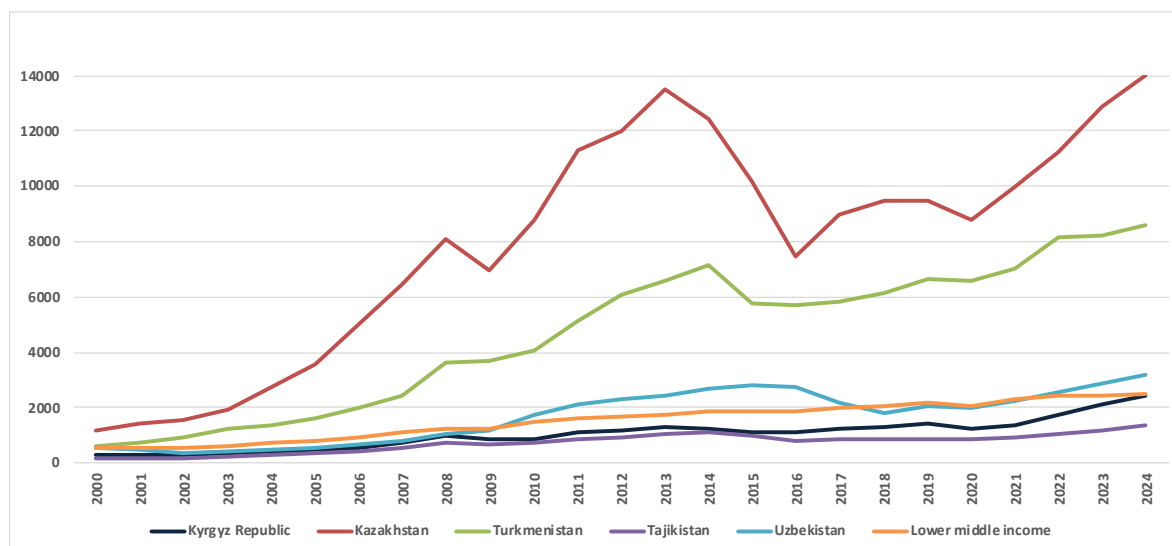
This paper is not without limitations. Our dataset lacks detailed information on maternal behaviors during pregnancy (e.g., smoking, prenatal doctor visits) as well as the family's socioeconomic status at the time of the child's birth. However, in Kyrgyzstan, free healthcare is available to pregnant women and children, which likely minimizes disparities in pre- and post-natal care. In addition, the practices of smoking and drinking alcohol among women are generally low in Kyrgyzstan, further reducing the likelihood

that smoking and alcohol consumption play a significant role in birth outcomes. Another limitation is the cross-sectional nature of the data, which limits our ability to observe the same child over time or capture dynamic household changes. Nevertheless, the use of multiple survey rounds allows us to test the robustness of our findings across different time periods and socio-economic contexts. Lastly, while our fixed effects approach controls for all time-invariant maternal and household characteristics, we cannot rule out the influence of time-varying shocks, such as income fluctuations or health crises, that may differentially affect children by birth order. However, such shocks are unlikely to systematically bias our estimates unless they are strongly correlated with both birth order and child nutrition, which is less plausible within families over a short time frame. Despite these limitations, our study provides robust evidence on birth order disparities in child nutrition and offers valuable insights into intra-household dynamics in a lower-middle-income context.

Future research could build on these findings by incorporating longitudinal or panel data that tracks individual children over time to better understand the long-term implications of birth order for child development and health. Richer datasets that include information on maternal health behaviors during pregnancy, and household economic conditions at the time of each child's birth would also help disentangle the complex pathways linking birth order to child nutrition. In addition, qualitative studies exploring parental decision-making, resource allocation, and cultural beliefs around child-rearing could complement quantitative findings and offer deeper insights into intra-household dynamics. Finally, further comparative work across Central Asian countries could assess whether similar birth order patterns hold in neighboring contexts, helping to identify region-specific drivers and inform more targeted policy responses.

Appendix

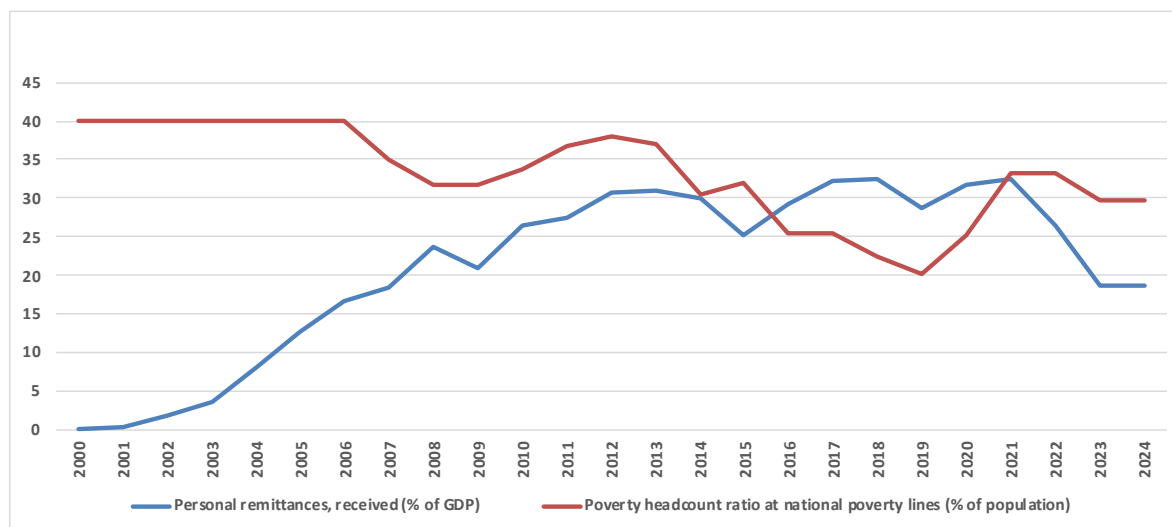
Figure 2.A.1: GDP per capita (current US\$)



Notes: Figure 2.A.1 shows trends in GDP per capita (in current US dollars) for selected countries over the period 2000–2024. Lower-middle-income group averages in the figure are based on the World Bank’s classification of countries by income level.

Source: Authors’ own illustration based on World Development Indicators, 2025

Figure 2.A.2: Personal remittances received and Poverty rate in Kyrgyzstan



Notes: Figure 2.A.2 shows trends in personal remittances received (% of GDP) and national poverty headcount rate (% of population) in Kyrgyzstan over the period 2000–2024.

Source: Authors’ own illustration based on World Development Indicators, 2025

Table 2.A.1: Socioeconomic and health indicators of Kyrgyzstan

Indicator	2000	2005	2010	2014	2018	2024
GDP growth (annual %)	5.4	-0.2	-0.5	4.0	3.8	9.0
GDP per capita (current US\$)	279.6	476.5	876.9	1264.5	1283.5	2419.3
Poverty headcount ratio (% of population)	39.9	39.9	33.7	30.6	22.4	29.8
Current health expenditure (% of GDP)	4.4	7.4	7.0	7.4	5.0	4.9
Out-of-pocket expenditure (% of current health exp.)	51.7	42.6	43.1	56.3	46.6	38.4
Population, total (millions)	4.9	5.2	5.5	5.9	6.4	7.2
Life expectancy at birth (years, total)	68.6	68.0	69.3	70.4	71.4	72.2
Mortality rate, under-5 (per 1,000 live births)	50.8	39.3	29.6	23.5	19.1	17
Mortality rate, neonatal (per 1,000 live births)	20.9	19.3	16.6	14.0	11.9	10.8
Mortality rate, infant (per 1,000 live births)	44.0	34.1	25.7	20.4	16.7	14.9
Maternal mortality ratio (per 100,000 live births)	72.0	74.0	71.0	62.0	49.0	42.0
Prevalence of stunting (% of children under 5)	28.3	23.0	17.6	14.4	12.0	11.0
Prevalence of overweight (% of children under 5)	9.1	9.6	8.2	7.0	6.6	9.9
Prevalence of underweight (% of children under 5)	8.1	2.7	4.7	2.8	1.8	2.9
Prevalence of undernourishment (% of population)	14.6	8.1	7.4	5.8	4.7	6.1
Prevalence of anemia (% of women aged 15–49)	36.9	35.8	34.3	33.5	33.0	32.9
Prevalence of anemia (% of pregnant women)	37.4	37.7	37.7	38.4	39.8	42.5
Prevalence of anemia (% of children aged 6–59 months)	42.8	37.8	34.7	33.6	33.3	33.4

Source: World Development Indicators, 2025

Table 2.A.2: Summary statistics by survey year

	2014		2018		2023	
	Mean	SD	Mean	SD	Mean	SD
Child characteristics						
Child age (months)	28.731	17.334	28.876	17.437	30.079	17.391
Child is girl	0.500	0.500	0.487	0.500	0.481	0.500
Child height (cm)	84.621	13.898	85.309	14.201	86.173	13.842
HFA z-score	-0.797	1.248	-0.610	1.298	-0.653	1.481
Stunted (HFA<-2)	0.143	0.350	0.111	0.314	0.149	0.356
Child weight (kg)	12.132	3.548	12.333	3.679	12.576	3.586
WFA z-score	-0.113	1.008	-0.009	0.946	-0.020	1.017
Underweight (WFA<-2)	0.029	0.167	0.015	0.123	0.027	0.162
WFH z-score	0.464	1.110	0.470	1.057	0.505	1.221
Overweight (WFH>2)	0.067	0.249	0.060	0.238	0.081	0.273
Maternal and household characteristics						
Maternal age at first birth	22.053	3.060	22.174	3.023	22.208	2.984
Maternal age at birth	25.904	4.978	26.074	4.764	27.283	5.014
Number of children	2.951	1.145	3.104	1.230	3.431	1.337
Maternal education: low	0.110	0.312	0.104	0.305	0.097	0.296
Maternal education: secondary	0.474	0.499	0.395	0.489	0.378	0.485
Maternal education: high	0.416	0.493	0.501	0.500	0.525	0.500
Household head education: low	0.163	0.370	0.090	0.287	0.083	0.276
Household head education: secondary	0.506	0.500	0.491	0.500	0.527	0.499
Household head education: high	0.331	0.471	0.419	0.494	0.390	0.488
Rural residence	0.677	0.468	0.617	0.486	0.677	0.468
Household head is female	0.201	0.401	0.172	0.378	0.216	0.412
Household size	6.457	1.967	6.584	1.839	6.845	2.066
Combined wealth score	-0.267	0.789	-0.309	0.788	-0.275	0.900
No. of mothers	1,003		783		690	
No. of children	2,088		1,633		1,446	

Notes: The table presents mean values and standard deviations by survey rounds.

Source: Own calculations based on MICS, survey rounds 2014, 2018 and 2023.

Table 2.A.3: Birth order effects by gender composition

	HFA		WFA		WFH	
	Only boys	Only gilrs	Only boys	Only gilrs	Only boys	Only gilrs
2nd child	-0.283 (0.235)	-0.107 (0.246)	-0.199 (0.172)	-0.166 (0.169)	-0.054 (0.214)	-0.138 (0.185)
3rd child	-0.029 (0.455)	0.230 (0.537)	-0.126 (0.348)	-0.217 (0.348)	-0.153 (0.425)	-0.521 (0.419)
4th(+) child	0.387 (0.744)	0.849 (0.888)	-0.517 (0.549)	0.023 (0.532)	-1.064 (0.671)	-0.644 (0.642)
No. of mothers	346	307	346	307	346	307
No. of children	708	634	708	634	708	634

Notes: The table shows the results from the mother fixed effects estimation. Columns are divided based on the gender composition of children in the household: households with only boys and households with only girls. Controls include child age in months and its squared term, child gender, child birth year, mother's age at the time of birth and its squared term. Standard errors are clustered at the mother level and presented in parentheses. Significance levels: *p < 0.1, **p < 0.05, ***p < 0.01.

Source: Own calculations based on MICS, survey rounds 2014, 2018 and 2023.

3 Bound by Tradition: How Patrilocal Residence Shapes Women’s Empowerment

3.1 Introduction

Women’s empowerment refers to the process of increasing women’s autonomy, decision-making power, access to resources, and ability to control their own lives. Empowering women yields far-reaching benefits, as it enables them to access education (Stromquist, 2015), healthcare (Htun et al., 2021), and economic opportunities (Guo et al., 2024), which significantly improve their well-being. Beyond these direct benefits, empowered women are also more likely to adopt healthier practices, including improved breastfeeding (Abdurazzakova et al., 2024), better child nutrition (Coffey et al., 2015), and higher immunization rates (Lu et al., 2021). These positive choices contribute to improved long-term health outcomes for children, reinforcing the intergenerational benefits of women’s empowerment (Noghanibehambari and Noghani, 2023). However, empowerment is not uniformly experienced by all women. It varies significantly with socio-cultural context, family structure, and notably, the position a woman occupies within her household hierarchy.

In many patriarchal societies, including those in Central and South Asia, young married women are expected to move into their husband’s natal home, where their autonomy is typically constrained (Debnath, 2015; Khalil and Mookerjee, 2019). The constraints within these households, however, are not solely a direct consequence of male dominance. They rather arise from broader institutional arrangements that reinforce generational hierarchies. Mothers-in-law, occupying authoritative positions established by these norms, become the primary agents enforcing restrictions on younger women’s autonomy (Anderson and Eswaran, 2009; Khalil and Mookerjee, 2019). These dynamics are particularly pronounced in societies with strong intergenerational obligations, where hierarchical family structures are deeply embedded in social norms. Such arrangements are widespread across many parts of the world, including South and Central

Asia. Bühler-Niederberger and Schwittek (2022) describe how Kyrgyz society socializes younger generations into strong obligations of intergenerational solidarity, where deference to elders is expected and individual agency is constrained. As a result, within extended households, daughters-in-law are placed at the bottom of the familial hierarchy and face significant constraints on their ability to make independent decisions. Yet, this constrained empowerment is often temporary. As women age and gain seniority within the family, they frequently transition from subordinate daughters-in-law to influential mothers-in-law. This transition perpetuates the traditional power hierarchies across generations, creating a cyclical dimension to empowerment. Recognizing this heterogeneity is essential for advancing the women's empowerment agenda, as young married women in extended patrilocal households represent a particularly constrained subgroup whose autonomy is shaped by multi-generational household arrangements.

A substantial body of literature has focused on the implications of patrilocal living arrangements, particularly in relation to human capital development and the transfer of wealth across generations (Edlund and Rahman, 2005; Grogan, 2007; Coffey et al., 2015). More recent work has turned to the implications of patrilocal residence for women's autonomy and well-being. Research from South Asia finds that women in joint or patrilocal households experience significantly lower decision-making power and mobility due to the influence of in-laws, particularly mothers-in-law (Debnath, 2015; Khalil and Mookerjee, 2019). However, some studies also highlight potential benefits of extended-family living, such as improved maternal health and access to resources (Allendorf, 2013). In Southeast Asia, residence norms have been shown to influence not only autonomy but also intimate partner violence and labor participation, with matrilineal and neolocal arrangements generally associated with greater female empowerment (Khalil et al., 2024). Similarly, research from sub-Saharan Africa suggests that matrilineal kinship systems support women's political participation by fostering more egalitarian gender norms (Robinson and Gottlieb, 2021).

At the same time, evidence from Central Asia remains limited. A recent study from

Tajikistan shows that patrilocal co-residence is associated with significantly higher emotional abuse, especially in the presence of mothers-in-law (Turaeva and Becker, 2022). Landmann et al. (2018) find that, in Kyrgyzstan, co-residence with in-laws does not significantly affect women's employment but increases their caregiving responsibilities. These mixed results suggest that the implications of patrilocality for women's agency vary significantly across contexts, depending on regional kinship norms, household hierarchies, and intergenerational dynamics. The aim of the current paper is to provide new evidence from Kyrgyzstan on how patrilocal residence shapes young married women's decision-making power¹ within the household. The country provides a compelling context, as it retains strong patrilocal traditions, with nearly three out of four newly married women moving into their husband's parental household (Landmann et al., 2018; Grogan, 2007).

We use data from the Life in Kyrgyzstan (LiK) Study, pooling five survey waves to provide a comprehensive analysis of women's decision-making autonomy. This nationally representative dataset allows us to assess women's involvement in three key domains of household decision-making: financial, child-related, and social decisions. Ordinary Least Squares (OLS) results indicate significant negative associations between patrilocal living arrangements and women's empowerment in all three decision-making outcomes. While informative, these OLS estimates are descriptive in nature and may be biased due to unobserved factors that influence both household structure and women's autonomy. To address this, we employ a two-stage least squares (2SLS) approach, instrumenting patrilocal residence with the prevalence of patrilocal arrangements within the woman's primary sampling unit. The 2SLS results reveal that women in patrilocal households experience significantly lower decision-making power in financial and social domains compared to women in neolocal households, while the effect on child-related decisions is small and statistically insignificant. On average, patrilocal residence reduces women's involvement in financial decisions by 35.5 percentage points and in social decisions by

¹Throughout the paper, we use women's decision-making power interchangeably with women's autonomy or women's empowerment.

36.2 percentage points. This provides strong evidence of the lower social standing of young married women in patrilocal settings.

Further, we explore the intra-household hierarchical mechanisms underlying the negative impacts of patrilocal residence. Our findings underscore the persistent and structural nature of empowerment constraints within patrilocal arrangements and highlight how household hierarchies, particularly the dominance of mothers-in-law, shape younger women's autonomy. Moreover, our heterogeneity analysis shows that these negative effects persist regardless of marriage duration or whether the woman has given birth to a son, suggesting that the constraints imposed by patrilocality are structural rather than circumstantial. By explicitly acknowledging and empirically addressing the cyclical and hierarchical dimensions of empowerment, our study provides critical insights into how traditional household structures perpetuate gender inequalities across generations and informs policy interventions aiming to break this persistent cycle.

This paper contributes to the literature in several ways. First, this study provides new evidence on how patrilocal residence directly restricts women's decision-making power, expanding the existing literature by offering insights from a developing country in Central Asia, where patrilocal residence, and gender norms remain deeply embedded. Second, it highlights that household hierarchy, particularly the dominance of mothers-in-law, plays a crucial role in limiting younger women's autonomy, reinforcing generational control beyond male authority. Third, it challenges the assumption that women's decision-making power improves over time, showing that neither longer marriage duration nor having a son significantly weakens the restrictive effects of patrilocal setup. Instead, what appears to shift this dynamic is a woman's transition into the role of mother-in-law herself, highlighting that empowerment within patrilocal households is not necessarily cumulative, but rather embedded in generational institutions that reproduce hierarchical authority. Finally, it offers policy-relevant insights by demonstrating that economic dependence on extended families reinforces household arrangements that constrain young women's autonomy, suggesting that pension systems and housing sup-

port for newly married couples, and community-based sessions that help families adopt more balanced and democratic approaches to household decision-making could mitigate the restrictive effects of patrilocal residence.

The remainder of the paper is organized as follows. Section 3.2 provides background information on patriarchal structures, gender norms, and household arrangements in Kyrgyzstan. Section 3.3 reviews the existing literature on how patrilocal residence influences women's empowerment and shapes their autonomy within the household. Section 3.4 describes the data and empirical strategy. Section 3.5 presents the main findings, including robustness checks, heterogeneity analysis, and the identification of potential mechanisms. Finally, Section 3.6 concludes the paper by outlining key policy recommendations.

3.2 Sociocultural and Economic Context: Gender, Kinship, and Patrilocality in Kyrgyzstan

Kyrgyzstan is a lower-middle-income country in Central Asia with a 2023 GDP per capita of approximately USD 1,974 and a population of about 7.1 million (World Bank, 2024). The country gained independence from the Soviet Union in 1991. Although agriculture has remained a dominant sector since Soviet times, the post-independence economy has become increasingly reliant on remittances from labor migrants, with a substantial portion of the population engaged in informal employment.

Despite modernization and urbanization trends, traditional cultural norms remain deeply embedded in Kyrgyz society, particularly concerning family structures and gender roles. While the country has achieved near gender parity in education, women in Kyrgyzstan continue to face persistent inequalities in economic and social life. Female labor force participation is significantly lower than that of men (38% vs. 62%, respectively)², with many women engaged in low-paid, informal labor or unpaid domestic work. Women in Kyrgyzstan are often expected to prioritize family responsibilities over

²Retrieved from the National Statistical Committee of the Kyrgyz Republic on 02 July 2025

professional aspirations, particularly after marriage. Landmann et al. (2018) reports that the labor force attachment of women also depends on her patrilocality residence. Only 39% of married women participate in the labor force when co-residing with in-laws, compared to 56% of married women in nuclear families. Gender disparities extend beyond economic participation, as women's mobility and autonomy are often restricted by patriarchal norms.

In rural areas, where traditional customs are more pronounced, practices such as bride kidnapping, despite being illegal, continue to undermine women's agency in marriage decisions (Nedoluzhko and Agadjanian, 2015). Patrilocal residence remains a dominant post-marital residence pattern in Kyrgyzstan. Landmann et al. (2018) and Grogan (2007) report 46-48% of married women co-reside with their in-laws. This practice is rooted in cultural traditions that emphasize family unity and male lineage, with daughters-in-law assuming a subordinate position within the household (Zhussipbek and Nagayeva, 2021; Ismailbekova, 2014; Turaeva and Becker, 2022).

Patrilocal household structures in Kyrgyzstan are characterized by complex inter-gender and intergenerational hierarchies that systematically place men in positions of authority over women. Within the female hierarchy, the family matriarch assumes decision-making authority across all domains of household governance, followed by unmarried daughters who retain natal family privileges, and subsequently daughters-in-law, with wives of elder sons maintaining hierarchical superiority over wives of younger sons. Traditional kinship arrangements typically designate the youngest son as the designated caregiver for elderly parents, requiring his permanent residence in the natal household with his spouse, while elder sons retain the option of establishing independent households. This arrangement is reinforced by contemporary labor migration patterns, wherein elder sons frequently engage in international labor migration while leaving their wives and children to provide eldercare in the natal household, while younger sons remain domestically anchored to fulfill eldercare obligations (Thieme, 2008).

Zhussipbek and Nagayeva (2021) conceptualizes daughters-in-law subordination in

Central Asia through five dimensions of oppression: economic exploitation manifested through unpaid domestic labor and reproductive responsibilities; social marginalization through systematically inferior status within patriarchal family structures dominated not only by husbands but also mothers-in-law and extended family members; structural powerlessness characterized by the absence of agency, fundamental rights, and economic autonomy; cultural imperialism requiring psychological and physical submission to in-law authority; and exposure to psychological and physical violence as mechanisms of control and subordination.

Daughters-in-law may experience gradual increases in household authority and decision making autonomy over time, contingent upon multiple factors. These include their demonstrated competence in household management and domestic responsibilities, pre-marital socioeconomic status and educational attainment, labor force participation patterns, fertility outcomes, particularly the total number and gender composition of children. Daughters-in-law eventually transition into positions of authority by becoming mothers-in-law themselves, continuing the established power dynamics.

While Kyrgyzstan has unique historical and regional influences, its gender norms and family structures are reflective of many developing countries, particularly in South and Central Asia, the Middle East, and parts of Africa. Studying the effects of patrilocal residence on women's empowerment in Kyrgyzstan provides broader insights into how traditional family systems shape women's autonomy and influence within households in societies undergoing economic and social transformation.

3.3 Literature Review

Existing research on joint household arrangement has mainly focused on its impact on human capital outcomes (Edlund and Rahman, 2005; Grogan, 2007; Coffey et al., 2015) and intergenerational wealth transfers within such households (Kochar, 2000). However, fewer studies have explored its effects on women's autonomy. Specifically, researchers have examined how extended household arrangements influence women's

decision-making power within the household, financial independence, and social mobility. Below we provide a detailed review of the existing literature on this topic.

Debnath (2015) examines the impact of household structure on female autonomy in rural India, focusing on the differences between joint and nuclear households. The analysis centers specifically on daughters-in-law, who are considered second-generation women within the household. Using India Human Development Survey panel data (1993–2005) and an instrumental variable approach, where the death of the patriarch serves as an exogenous instrument for household structure, the study finds that women in nuclear households enjoy significantly higher autonomy and labor force participation compared to those in joint households. The results show that living in a joint household reduces women's decision-making power over purchases, childbearing, and healthcare by 12–25 percentage points and significantly restricts their freedom of movement. The negative effects of joint households are particularly strong for lower-caste women, who experience 18–26 percentage point reductions in decision-making power. However, richer joint households provide greater autonomy within the household but impose stricter mobility restrictions. Regionally, the negative effects of joint households are stronger in northern India but insignificant in the southern states, highlighting how kinship structures mediate gender norms differently across India. This study challenges the traditional view that bargaining power is solely a negotiation between husband and wife, demonstrating that extended family members, particularly in-laws, play a crucial role in shaping women's autonomy.

Similar findings emerge in broader South Asian contexts. Khalil and Mookerjee (2019) examine the impact of patrilocal residence on women's autonomy and social status in South Asia using Demographic Health Survey data from India, Pakistan, Bangladesh, and Nepal. The study finds that women in patrilocal households have significantly lower decision-making power and restricted mobility compared to those in nuclear households, with 9%–18% lower involvement in economic decisions and 16%–31% lower likelihood of visiting their natal family. The presence of a mother-in-law fur-

ther exacerbates these restrictions, and through a quasi-experimental approach using mother-in-law mortality as an exogenous factor, the authors show that women gain autonomy in her absence. Contrary to expectations, husbands' beliefs about women's autonomy do not significantly differ across household types, suggesting that it is the extended family, not the husband, that imposes constraints on women's decision-making. Interestingly, the study also finds that women in patrilocal households experience lower domestic violence due to the deterrent effect of the extended family, highlighting a trade-off between autonomy and protection from abuse. Over time, however, women's autonomy increases with marriage duration, supporting an intergenerational power shift where daughters-in-law eventually become senior figures within the household.

A recent study from Central Asia provides evidence on how extended living arrangements impact women's emotional well-being through household power dynamics. Turaeva and Becker (2022) examine the link between domestic violence and living with in-laws among married women in Tajikistan, using the 2012 Tajikistan Demographic and Health Survey. Employing propensity score matching and logistic regression, they find that women living with in-laws, especially in three-generational households, are significantly more likely to experience emotional abuse from their husbands compared to those in nuclear families. The presence of a mother-in-law is strongly associated with higher levels of emotional violence. This finding aligns with anthropological theories of "classical patriarchy," which suggest that women may come to internalize patriarchal norms and, over time, reproduce them as they acquire greater authority within the household. The study concludes that intergenerational hierarchies, rather than solely male dominance, sustain the oppressive environment in patrilocal households. Notably, these results diverge from findings in South Asia, where co-residence with in-laws has been found to reduce the risk of domestic violence due to the deterrent presence of the extended family (Khalil and Mookerjee, 2019). This suggests that the protective or harmful effects of patrilocal residence depend strongly on regional kinship norms and intergenerational dynamics.

Research from Southeast Asia explores how variations in post-marital residence norms influence women's autonomy beyond patrilocal residence. Khalil et al. (2024) examine how post-marital residence norms affect women's autonomy and domestic violence outcomes in four Southeast Asian countries: Indonesia, the Philippines, Cambodia, and Myanmar. Using DHS data, they classify households based on co-residence patterns and compare women's decision-making power, mobility, and intimate partner violence experiences across different living arrangements. Their findings show that women in patrilocal households have significantly lower autonomy compared to those in neolocal setups, while women in matrilocal households enjoy greater decision-making power, particularly in health, financial, and mobility-related decisions. However, the study also finds that both patrilocal and matrilocal women experience lower rates of domestic violence compared to those in neolocal households, likely due to the deterrence effect of extended family presence. To address selection bias, the authors conduct robustness checks, showing that differences in autonomy are not solely driven by household-level conservatism or pre-existing gender attitudes. Moreover, they document a life-cycle effect where young brides in patrilocal households experience the greatest restrictions early in marriage, but gradually gain more autonomy as they age and their position within the household strengthens.

Another study that explores the potential benefits of matrilineal kinship structures compared to patrilineal is conducted by Robinson and Gottlieb (2021). They examine how matrilineal kinship systems influence women's political participation in sub-Saharan Africa, focusing on their role in closing the gender gap in civic and political engagement. Using Afrobarometer survey data from 26 African countries and ethnographic data from Murdock's Ethnographic Atlas, the study provides the first large-scale empirical test of whether women in matrilineal societies participate more in politics compared to those in patrilineal societies. The findings reveal that the gender gap in political and civic engagement is significantly smaller in matrilineal ethnic groups, suggesting that matrilineal inheritance and residence norms help sustain progressive

gender norms across generations. To further explore the mechanisms, the authors conduct quantitative and qualitative analyses in Malawi, a country with mixed kinship practices. They find that matrilineal land inheritance and matrilineal residence increase women's decision-making power and leadership in local governance, particularly in village head selection and land allocation. The study rejects alternative explanations that matrilineality improves women's participation solely through greater access to economic resources or higher education and instead highlights its role in shaping community-wide expectations about gender roles.

Research also examines how family structure affects women's well-being beyond autonomy and decision-making, particularly in terms of health and labor force participation. Allendorf (2013) examines the impact of family structure on young married women's health in India, challenging the assumption that shifting from patrilocal extended families to nuclear households benefits women's well-being. Using data from the Indian National Family Health Survey from 1992 to 2006, the study explores whether young women living in nuclear families have better health outcomes than those in extended households. The findings indicate that while nuclear families are becoming more common, the majority of young married women still reside in patrilocal extended households. Contrary to the common belief that nuclear families improve women's health, the study finds that four out of five significant health differences favor extended-family living. Women in patrilocal extended families are more likely to receive antenatal care, delivery assistance, and better nutrition (higher dairy consumption) and are less likely to experience domestic violence. The only nuclear-family advantage is a higher likelihood of consuming meat. The study attributes these extended-family benefits to greater economic resources, pooled labor, and social support from in-laws, which may offset the constraints faced by daughters-in-law in patrilocal households. These findings challenge the assumption that modernization and urbanization automatically improve women's well-being, highlighting the complex trade-offs between family structure, economic support, and women's autonomy.

Landmann et al. (2018) analyze the impact of patrilocal residence on female labor supply in Kyrgyzstan. Using data from the LIK Survey, the study employs instrumental variable estimation, leveraging the tradition that youngest sons remain with their parents to address the endogeneity of co-residence.³ The findings show that living with in-laws does not significantly affect women's labor force participation or working hours, contrasting with previous research (Sasaki, 2002) in less patrilocal settings where co-residence was associated with increased female employment due to parental assistance. The study further explores potential mechanisms and finds that co-residing women spend significantly more time on elder care but do not receive parental support for housework or childcare, which may explain the absence of a positive effect on labor supply. These results highlight how strong patrilocal norms shape women's economic roles differently from other cultural contexts.

The current paper contributes to the existing literature by providing new evidence on the role of household hierarchy in shaping women's decision-making power in patrilocal families, extending the analysis beyond the well-studied contexts of South and Southeast Asia to offer insights from Central Asia, where patrilocality is widely practiced. This regional focus is particularly relevant given evidence from prior studies suggesting that the impact of patrilocal kinship and intergenerational dynamics on women's autonomy and well-being varies across settings, depending strongly on local kinship norms and household power structures.

3.4 Empirical Strategy

This section outlines the empirical strategy used to estimate the impact of patrilocal residence and women's decision-making power. We begin by describing the data and key variables, followed by our estimation approach.

³We are unable to use this IV, as our dataset does not include information on whether a woman is married to the youngest son. The authors obtained this information through a supplementary survey. However, marrying to the youngest son is not always the reason why women reside with in-laws. Indeed, authors acknowledge that "marriage to the youngest son" is not the sole determinant of patrilocal residence, confirming that only about 50% of women in patrilocal households are actually married to the youngest son.

3.4.1 Data and Descriptive Statistics

We use data from the Life in Kyrgyzstan (LIK) survey, which is an open-access, longitudinal survey that has been conducted over multiple waves in the years 2010-2013, 2016, and 2019. The survey provides nationally and regionally representative data, encompassing a wide range of topics, including household demographics, well-being, health, migration, agriculture, and economic shocks, among others (Brück et al., 2014). For our analysis, we use 5 waves 2011-2019, as the required data on participation in decision-making are available starting from 2011.

Although the dataset includes repeated cross-sections, we adopt a pooled cross-sectional approach. The main rationale for this choice is that patrilocal residence is relatively stable and does not frequently change within individuals. Thus, a panel approach relying on within-individual variation would be less informative. Moreover, our analytical interest lies not in transitions across residence types, but in comparing decision-making power between women currently living in patrilocal versus neolocal households.

Our analysis relies on distinguishing whether a woman co-resides with in-laws. The household roster records all members along with their relationship to the household head. A woman is considered to be living in a patrilocal household if any member of her husband's natal family, such as his parents, siblings, or extended relatives, is listed as a household resident.⁴ Our analysis focuses on all married women under the age of 35, to capture the empowerment of younger married women (i.e. daughters-in-law).

The outcome variables we use to measure women's decision-making power are grouped into three main categories: financial decisions, child-related decisions, and social decisions. Women are asked who makes certain decisions within their household, and the outcome variables are coded as 1 if they have a say in a decision and 0 if not. A full set

⁴“Patrilocal residence” as used in this paper, differs from the broader concept of “patrilocality” commonly used in anthropology. The anthropological concept of patrilocality refers to post-marital residence *with* or *near* the husband's extended family. In line with the economics literature, we use the term “patrilocal residence” to refer specifically to co-residence with the husband's natal family. This definition reflects the most observable and restrictive form of patrilocality.

of the variables used to construct these decision-making categories is provided in Table 3.A.1.

We include several covariates at the individual, household, and regional levels that may confound the impact of patrilocal residence on women's empowerment. At the individual level, education is a key determinant of decision-making power, as well as an important factor in whether couples reside with extended family. Age is also critical, as younger women tend to have lower autonomy, particularly in patrilocal households where senior family members hold authority. To account for these factors, we control for both the respondent's and her spouse's squared age and education, and include their interaction term. Moreover, Kyrgyzstan is a multiethnic society with ethnicity-specific gender norms and marital customs (Landmann et al., 2018). For instance, the practice of bride kidnapping (*ala-kachuu*) is almost exclusively observed among Kyrgyz. However, the absence of such practices among other groups, such as Uzbeks, does not necessarily imply more egalitarian gender norms. Other ethnic groups may maintain strict patriarchal structures, too.⁵ To account for this variation, we include controls for the respondent's ethnicity, distinguishing between Kyrgyz, Uzbek, and all other ethnicity groups.⁶

At the household level, we include a dummy for rural residence, as urban women often benefit from better access to education, employment, and progressive social norms, whereas rural women may face stronger constraints rooted in traditional practices. In addition, to capture geographic variation and time trends, we include oblast (region) and survey year dummy variables.

Descriptive Statistics

Table 3.1 presents summary statistics for the full sample and separately for women residing in neolocal and patrilocal households.⁷ The majority of women in the sample

⁵We test this by excluding Kyrgyz women from the sample. The results are presented in Table 3.A.4.

⁶Other ethnicity mainly comprises Russians, Uigurs, Tajiks, and Kazakhs, but also includes a number of smaller ethnic groups.

⁷Cases of matrilocal residence, where a woman resides with her own parents after marriage, are

Table 3.1: Summary statistics

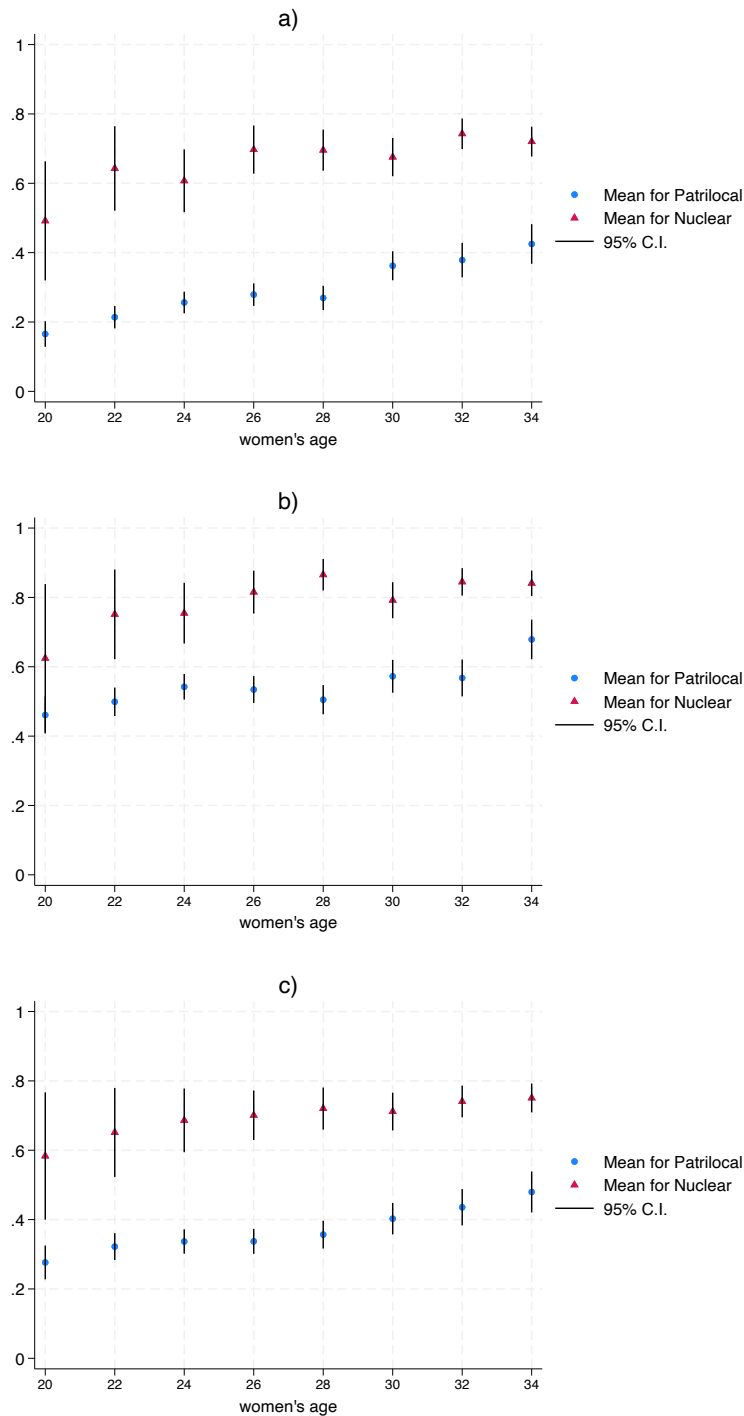
Variables	Full Sample		Neolocal residence		Patrilocal residence	
	Mean	SD	Mean	SD	Mean	SD
Outcome variables						
Financial decisions	0.394	0.439	0.668	0.414	0.267	0.390
Child-related decisions	0.635	0.470	0.824	0.367	0.547	0.487
Social decisions	0.460	0.457	0.710	0.405	0.344	0.433
Instrumental variable						
Prop. of patrilocal hh in psu	0.685	0.208	0.568	0.248	0.739	0.161
Explanatory variables						
Woman's age	26.846	4.296	29.218	3.848	25.755	4.044
Woman's education: in years	11.856	2.414	12.141	2.555	11.723	2.334
Woman's ethnicity:						
Kyrgyz	0.664	0.472	0.689	0.463	0.653	0.476
Uzbek	0.173	0.378	0.102	0.303	0.205	0.404
Other	0.163	0.369	0.209	0.407	0.142	0.349
Husband's age	30.988	5.488	33.726	5.415	29.729	5.046
Husband's education: in years	11.562	2.368	11.697	2.490	11.498	2.306
Rural residence	0.708	0.455	0.618	0.486	0.750	0.433
Bride kidnapping (psu)	0.075	0.077	0.072	0.080	0.077	0.076
Gender attitudes (psu)	0.647	0.110	0.629	0.111	0.656	0.108
Observations	4,508		1,420		3,088	

Notes: Table shows means and standard deviations by household type. Financial, child-related, and social decisions are constructed as averages of relevant binary indicators (see Table 3.A.1).

Source: Authors' own calculations based on Life in Kyrgyzstan (LiK) survey rounds 2011-2013, 2016 and 2019.

(68.5%) live in patrilocal households. Women in neolocal families report significantly greater autonomy in financial, child-related, and social decisions. On average, 66.8% of women in neolocal households participate in financial decisions, compared to just 26.7% in patrilocal households. Similarly, 82.4% of women in neolocal families have a
 extremely rare in Kyrgyzstan and negligible in our sample. Therefore, such cases are grouped with neolocal households.

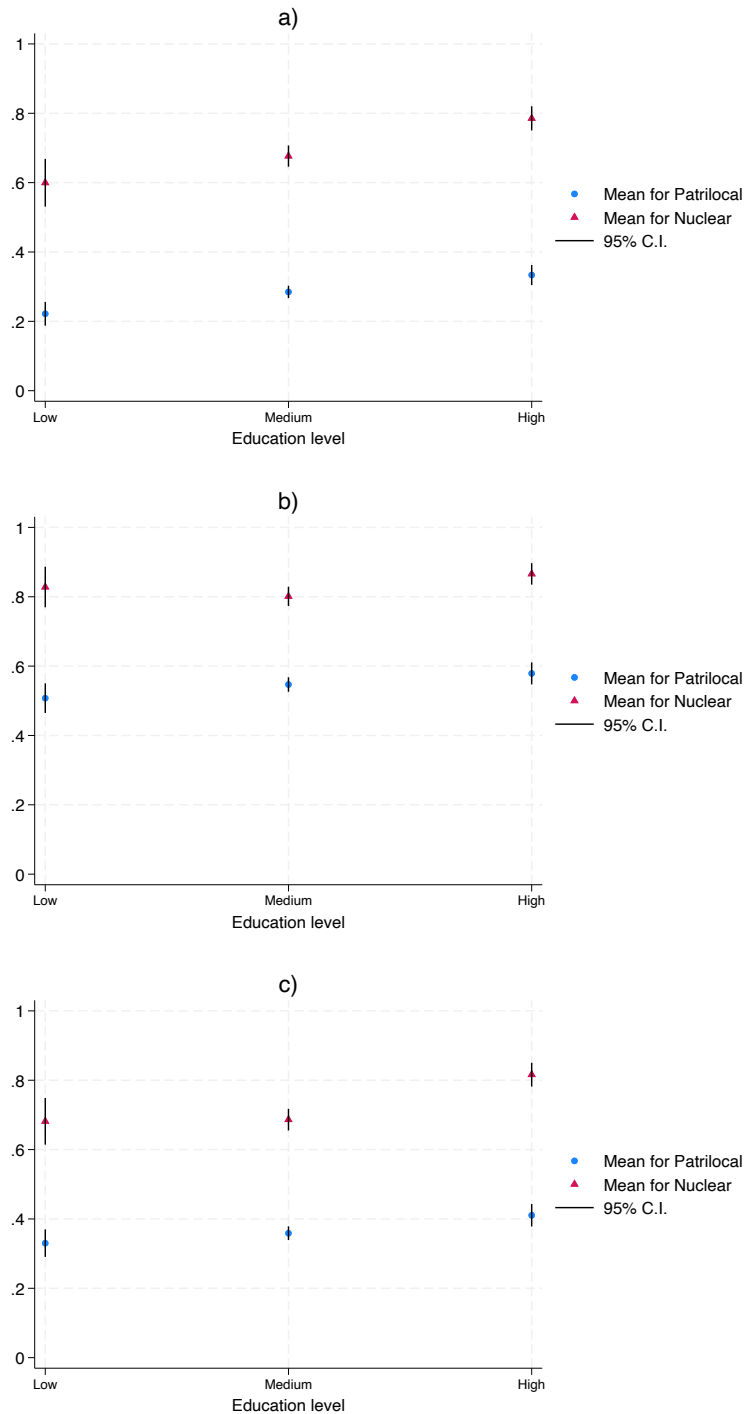
Figure 3.1: Women's decision-making power by age



Notes: Figure 3.1 plots the mean outcomes of women who report having a say in decision-making by age groups. Each panel corresponds to a different decision domain: a) Financial decisions, b) Child-related decisions, and (c) Social decisions.

Source: Authors' own illustration based on Life in Kyrgyzstan (LiK) survey rounds 2011-2013, 2016 and 2019.

Figure 3.2: Women's decision-making power by education level



Notes: Figure 3.2 plots the mean outcomes of women who report having a say in decision-making by education level. Each panel corresponds to a different decision domain: a) Financial decisions, b) Child-related decisions, and (c) Social decisions.

Source: Authors' own illustration based on Life in Kyrgyzstan (LiK) survey rounds 2011-2013, 2016 and 2019.

say in child-related decisions, whereas only 54.7% of their patrilocal counterparts do. A similar pattern emerges for social decisions, with 71.0% of neolocal-residing women involved in decision-making, compared to 34.4% of women in patrilocal households.

There is no significant difference in the average years of education between women in patrilocal and neolocal households. However, women in neolocal households are, on average, about four years older than those in patrilocal households. A similar age gap is observed for husbands, along with comparable educational attainment between the two household types. Figure 3.1 illustrates women's decision-making power by age, confirming that across all age groups, women in patrilocal households consistently have less autonomy in household decision-making. Alternatively, Figure 3.2 plots decision-making outcomes by the education level: low, medium and high, separately for patrilocal and neolocal households. The figure reveals that even at higher education levels, women in patrilocal households have significantly less decision-making power across financial, child-related, and social domains.

3.4.2 Ordinary Least Squares

We employ the following OLS estimation to analyze the differences in outcomes between women living in patrilocal vs. neolocal households:

$$Y_i = \beta_0 + \beta_1 \text{Patrilocal Residence}_i + \beta_2 B_{p(i)} + \beta_3 G_{p(i)} + \beta_4 X_i' + \delta_o + \gamma_s + \epsilon_i \quad (3.1)$$

We estimate this specification separately for the three outcome categories: financial decisions, child-related decisions, and social decisions. Y_i is an outcome variable for woman i . $\text{Patrilocal Residence}_i$ denotes whether the woman i resides with her husband's natal family or not. The coefficient of interest is β_1 , which captures the difference in decision-making power of a married woman living in a patrilocal household compared to one residing in a neolocal household. δ_o captures oblast-level fixed effects, controlling for time-invariant regional characteristics. λ_s captures survey-year fixed effects, accounting for period-specific shocks or trends affecting all women. The vector X_i in-

cludes individual level controls, which are mentioned above. $B_{p(i)}$ is the prevalence of bride kidnapping in PSU $p(i)$, capturing local norms related to marriage formation. $G_{p(i)}$ is the average level of gender attitudes in PSU $p(i)$, capturing prevailing views about women's roles in society.

Selection Concerns

A key concern in assessing the causal impact of patrilocal residence on women's decision-making power is selection bias, the possibility that women who enter patrilocal households differ systematically from those who enter neolocal households. If women with fewer socioeconomic advantages, such as lower education levels or disadvantaged family backgrounds, are more likely to enter patrilocal households, then differences in decision-making power may reflect pre-existing disparities rather than the structural constraints of the patrilocal setup.

To assess whether selection bias drives the observed differences in decision-making power, we compare pre-marital characteristics of women in patrilocal and neolocal households. Table 3.A.2 presents standardized differences for key pre-marital variables, including parental education, parental employment, number of siblings, age at marriage, and women's education level before marriage.⁸ These variables were chosen because they capture important socioeconomic background factors that could influence both a woman's likelihood of entering a patrilocal household and her future decision-making power. Results show that no statistically significant differences exist between patrilocal and neolocal women in any of the pre-marital characteristics examined. These findings suggest that women who enter patrilocal households do not systematically differ from those in neolocal households in terms of their family background and early-life socioeconomic conditions.

However, the possibility of unobserved selection cannot be entirely ruled out. Even though the observable pre-marital characteristics are balanced across patrilocal and

⁸We use secondary education, as it is particularly important, as some women may marry immediately after completing secondary school, making higher education an outcome rather than a pre-determined characteristic.

neolocal households, women may still differ in unmeasured traits. For instance, if more agreeable and traditionally minded women are selected into patrilocal households, OLS would overestimate the negative impact of co-residence on women's decision-making power.

3.4.3 Instrument and Identifying Assumptions

To address concerns regarding the potential endogeneity of patrilocal residence, we use as an instrument the proportion of patrilocal households in the respondent's primary sampling unit (PSU), excluding her own household to avoid mechanical correlation. This strategy follows recent empirical work examining the influence of local customs on family structure and gender outcomes in patriarchal contexts (Becker et al., 2017; Bazarkulova and Compton, 2021).

The identifying assumption is that the local prevalence influences a couple's residential decision by reflecting localized expectations surrounding post-marital co-residence. High prevalence increases the likelihood that a woman ends up in a patrilocal household regardless of her own or her husband's individual preferences (relevance). This pattern is supported by the descriptive statistics in Table 3.1, and is further confirmed by the first-stage results presented in the next section.

We assume that the local prevalence of patrilocal living arrangements affects a woman's decision-making power only through its impact on post-marital living arrangements (exclusion restriction). We argue this assumption is plausible for several reasons. First, the instrument is defined at the community level and reflects local expectations rather than individual or household characteristics. Second, it is unlikely to directly affect a woman's role in decision-making unless it changes the structure of the household, specifically the presence of senior family members who may constrain her agency. Third, the instrument does not reflect actual empowerment outcomes or preferences, but rather the degree to which local traditions reinforce patrilocality.

Nonetheless, one potential concern is that areas with more patrilocal households also

tend to hold more conservative views about gender roles, which could directly affect women’s agency. To address this concern, we control for two key PSU-level covariates. The first is the average gender attitudes of individuals within PSU, capturing prevailing beliefs about women’s societal roles.⁹ The second is the prevalence of bride kidnapping within PSU, a proxy for forced marriage practices and persistent patriarchal norms. These controls help to isolate variation in co-residence that is driven by community-specific patrilocal norms rather than more general gender conservatism.

Importantly, our instrument is continuous, while the endogenous treatment (co-residence with in-laws) is binary. Recent methodological advances show that in such settings, the two-stage least squares (2SLS) estimates can still be interpreted causally. As shown by Alvarez and Toneto (2024), under standard assumptions (exclusion and relevance), the 2SLS coefficient identifies a weighted average of local average treatment effects among subpopulations whose treatment status responds to marginal changes in the instrument. These so-called “marginal compliance” groups are defined with respect to deviations in the instrument from its conditional mean. The weights are positive and sum to one, with greater weight placed on more extreme values of the instrument, that is, values further from the local mean. This interpretation reinforces the credibility and policy relevance of the estimated effects, as it captures the impact of co-residence on women whose living arrangements are most responsive to community norms. It also avoids the need to discretize the instrument or adopt the stronger assumptions required for marginal treatment effect models.

While no instrument is without limitations, we argue that the PSU-level prevalence of patrilocality offers a theoretically grounded and empirically credible way to study the causal effect of extended-family living arrangements on women’s decision-making power. It allows us to isolate variation in co-residence that is plausibly exogenous, shedding light on how household structure shapes women’s agency in deeply patriarchal settings.

⁹A list of the variables used to construct gender attitudes is provided in Table 3.A.3.

3.4.4 Two-Stage Least Squares Estimation

To strengthen the causal interpretation of our findings, we implement a two-stage least squares (2SLS) estimation strategy:

$$\text{Patrilocal Residence}_i = \alpha_0 + \alpha_1 IV_{p(i)} + \alpha_2 B_{p(i)} + \alpha_3 G_{p(i)} + \alpha_4 X'_i + \rho_o + \lambda_s + \nu_i \quad (3.2)$$

$$Y_i = \beta_0 + \beta_1 \widehat{\text{Patrilocal Residence}}_i + \beta_2 B_{p(i)} + \beta_3 G_{p(i)} + \beta_4 X'_i + \delta_o + \gamma_s + \epsilon_i \quad (3.3)$$

Equation (3.2) is the first-stage regression model to estimate the effect of the prevalence of patrilocal residence in a woman's community ($IV_{p(i)}$) on her likelihood of living in a patrilocal household ($\text{Patrilocal Residence}_i$). We confirmed the validity of the potential instrument regressor using the Bound et al. (1995) test. The first-stage regression results are reported in the Panel B of Tables 3.2-3.4.

Equation (3.3) presents the second-stage regression, which estimates the causal effect of patrilocal residence on women's decision-making power, using the predicted values of patrilocal residence from the first stage. This approach allows us to isolate exogenous variation in residential arrangements and address potential bias arising from unobserved confounders.

As in Equation (3.1), we estimate this specification separately for the three outcome categories where Y_i is the decision-making outcome of a woman i , vector X_i is a set of individual level controls. $B_{p(i)}$ is the prevalence of bride kidnapping in PSU $p(i)$, capturing local norms related to marriage formation. $G_{p(i)}$ is the average level of gender attitudes in PSU $p(i)$, capturing prevailing views about women's roles in society. ρ_o and δ_o are oblast fixed effects, while λ_s and γ_s are survey-year fixed effects. Standard errors are clustered at the PSU level.

3.5 Results

This section presents regression estimates of the effect of patrilocal residence on women's decision-making power. Section 3.5.1 reports the main results from the OLS and 2SLS

regressions. Section 3.5.2 examines potential mechanisms underlying the observed effects. Section 3.5.3 explores heterogeneity across subgroups. Finally, section 3.5.4 reports results from robustness checks.

3.5.1 Main results

Tables 3.2–3.4 report the estimated effects of patrilocal residence on women's decision-making power across financial, child-related, and social domains. In each table, Panel A presents the OLS estimates, followed by the 2SLS results in Panel B. Column (1) includes only community-level controls and year fixed effects. Column (2) adds women's individual characteristics: age, education, their interaction term, and ethnicity. Column (3) further includes husband's characteristics: age, education, and their interaction term. The preferred specification in column (4) additionally controls for regional (oblast) and rural fixed effects. Unless otherwise noted, all reported coefficients in the discussion below refer to the fully adjusted specification in column (4).

The OLS estimates indicate a strong and statistically significant association between patrilocal residence and lower decision-making power among young women across all three domains. The results are qualitatively robust to the inclusion of additional covariates. Patrilocal residence is associated with a 28.0 percentage point reduction in financial decision-making power, a 14.2 percentage point reduction in child-related decision-making, and a 25.1 percentage point reduction in social decision-making. These results suggest that young married women in patrilocal households consistently experience reduced decision-making power. However, relying solely on OLS estimates may be problematic, as women's decision-making power could be influenced by unobserved characteristics that are also related to the likelihood of co-residing with in-laws. As mentioned earlier, women who are more agreeable and traditionally minded may be both more likely to accept patrilocal living arrangements and less likely to assert themselves in household decision-making, thus leading to upward bias in OLS estimates. Therefore, 2SLS regressions are estimated to address the potential endogeneity of co-

residence with in-laws and to obtain more credible estimates of its causal impact on women's decision-making power.

Table 3.2: Effect of patrilocal residence on women's decision-making power on financial matters

	(1)	(2)	(3)	(4)
Panel A: OLS estimation results				
Patrilocal residence	-0.373*** (0.023)	-0.301*** (0.022)	-0.299*** (0.022)	-0.280*** (0.021)
Observations	4,154	4,154	4,154	4,154
Panel B: 2SLS estimation results				
First stage				
Prop. of patrilocal hh in psu	0.845*** (0.023)	0.724*** (0.033)	0.721*** (0.034)	0.645*** (0.039)
F-statistic	1372.75	476.976	440.511	270.093
Observations	4,154	4,154	4,154	4,154
Second stage				
Patrilocal residence	-0.590*** (0.073)	-0.467*** (0.090)	-0.469*** (0.090)	-0.355*** (0.098)
Observations	4,154	4,154	4,154	4,154
Interview year fixed effects	yes	yes	yes	yes
Community-level gender attitudes	yes	yes	yes	yes
Community-level bride kidnapping rate	yes	yes	yes	yes
Women characteristics	no	yes	yes	yes
Husband characteristics	no	no	yes	yes
Region (oblast) and rural fixed effects	no	no	no	yes

Notes: Table reports estimates from Ordinary Least Squares and Two-Stage Least Squares models. All specifications include interview year fixed effects, community-level gender attitudes, and community-level prevalence of bride kidnapping. Column (2) additionally controls for women's characteristics: age, education, their interaction term, and ethnicity. Column (3) further includes husband's characteristics: age, education, and their interaction term. The preferred specification in column (4) additionally controls for regional (oblast) and rural residence fixed effects. Standard errors (in parentheses) are clustered at the primary sampling unit level. Significance levels are indicated as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Authors' own calculations based on Life in Kyrgyzstan (LiK) survey rounds 2011-2013, 2016 and 2019.

Table 3.3: Effect of patrilocal residence on women's decision-making power on child-related matters

	(1)	(2)	(3)	(4)
Panel A: OLS estimation results				
Patrilocal residence	-0.214*** (0.020)	-0.160*** (0.020)	-0.159*** (0.020)	-0.142*** (0.022)
Observations	3,906	3,906	3,906	3,906
Panel B: 2SLS estimation results				
First stage				
Prop. of patrilocal hh in psu	0.845*** (0.026)	0.717*** (0.036)	0.717*** (0.037)	0.648*** (0.042)
F-statistic	1066.71	399.375	377.734	235.393
Observations	3,906	3,906	3,906	3,906
Second stage				
Patrilocal residence	-0.272*** (0.050)	-0.153** (0.063)	-0.150** (0.062)	0.065 (0.090)
Observations	3,906	3,906	3,906	3,906
Interview year fixed effects	yes	yes	yes	yes
Community-level gender attitudes	yes	yes	yes	yes
Community-level bride kidnapping rate	yes	yes	yes	yes
Women characteristics	no	yes	yes	yes
Husband characteristics	no	no	yes	yes
Region (oblast) and rural fixed effects	no	no	no	yes

Notes: Table reports estimates from Ordinary Least Squares and Two-Stage Least Squares models. All specifications include interview year fixed effects, community-level gender attitudes, and community-level prevalence of bride kidnapping. Column (2) additionally controls for women's characteristics: age, education, their interaction term, and ethnicity. Column (3) further includes husband's characteristics: age, education, and their interaction term. The preferred specification in column (4) additionally controls for regional (oblast) and rural residence fixed effects. Standard errors (in parentheses) are clustered at the primary sampling unit level. Significance levels are indicated as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Authors' own calculations based on Life in Kyrgyzstan (LiK) survey rounds 2011-2013, 2016 and 2019.

Table 3.4: Effect of patrilocal residence on women's decision-making power on social matters

	(1)	(2)	(3)	(4)
Panel A: OLS estimation results				
Patrilocal residence	-0.312*** (0.025)	-0.255*** (0.024)	-0.254*** (0.023)	-0.251*** (0.023)
Observations	4,074	4,074	4,074	4,074
Panel B: 2SLS estimation results				
First stage				
Prop. of patrilocal hh in psu	0.833*** (0.024)	0.710*** (0.034)	0.706*** (0.035)	0.636*** (0.040)
F-statistic	1191.77	431.887	405.023	247.336
Observations	4,074	4,074	4,074	4,074
Second stage				
Patrilocal residence	-0.439*** (0.072)	-0.339*** (0.084)	-0.337*** (0.084)	-0.362*** (0.121)
Observations	4,074	4,074	4,074	4,074
Interview year fixed effects	yes	yes	yes	yes
Community-level gender attitudes	yes	yes	yes	yes
Community-level bride kidnapping rate	yes	yes	yes	yes
Women characteristics	no	yes	yes	yes
Husband characteristics	no	no	yes	yes
Region (oblast) and rural fixed effects	no	no	no	yes

Notes: Table reports estimates from Ordinary Least Squares and Two-Stage Least Squares models. All specifications include interview year fixed effects, community-level gender attitudes, and community-level prevalence of bride kidnapping. Column (2) additionally controls for women's characteristics: age, education, their interaction term, and ethnicity. Column (3) further includes husband's characteristics: age, education, and their interaction term. The preferred specification in column (4) additionally controls for regional (oblast) and rural residence fixed effects. Standard errors (in parentheses) are clustered at the primary sampling unit level. Significance levels are indicated as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Authors' own calculations based on Life in Kyrgyzstan (LiK) survey rounds 2011-2013, 2016 and 2019.

The top parts of Panel B of Tables 3.2–3.4 report the first-stage results that assess the strength of our instrument. Across all specifications and outcomes, the instrument strongly predicts individual-level patrilocal residence. We find that a 10 percentage

point increase in the share of patrilocal households within a PSU is associated with a 6.4–6.5 percentage point increase in the probability that a woman resides in a patrilocal arrangement, and these estimates are statistically significant at the 1% level. The F-statistics, ranging from 235 to 270, comfortably exceed conventional thresholds for weak instruments, confirming the relevance and strength of the instrument. These results validate the first-stage relationship and support the use of community-level patrilocal residence as a strong instrument in our 2SLS framework.

The bottom parts of Panel B of Tables 3.2–3.4 present the second-stage estimates of the causal effect of patrilocal residence on women's decision-making power. The results indicate strong and statistically significant negative effects of patrilocal residence on young women's autonomy in both financial and social domains. Specifically, patrilocal residence reduces women's financial decision-making power by 35.5 percentage points and social decision-making power by 36.2 percentage points. These effects are larger than the corresponding OLS estimates, suggesting that the OLS results underestimate the true effect of patrilocal setup on young women's decision-making power. This is opposite to the direction of bias mentioned above. We interpret this as consistent with the local average treatment effect (LATE) captured by our IV. Specifically, the instrument identifies the effect of co-residence for women whose likelihood of living with in-laws is shaped by the local prevalence of patrilocal residence. These women may have had weaker initial preferences for co-residence but complied due to local residential practices. As a result, the 2SLS estimates the effect of patrilocal residence on a sub-population of compliers, while the OLS estimates the effect across the entire population (Imbens and Angrist, 1994). In this sense, the larger negative effect found in the 2SLS estimation highlights how the causal effect of co-residence may be stronger for those women whose household arrangements are shaped by local constraints.

In contrast, the 2SLS estimates for child-related decision-making are small and statistically insignificant, 6.5 percentage points, indicating no robust effect in this domain. This could be due to the possibility that mothers retain some degree of autonomy in

child-related matters regardless of household structure, or that decision-making around children is more often shared or considered less sensitive to hierarchical household dynamics.

3.5.2 Mechanisms

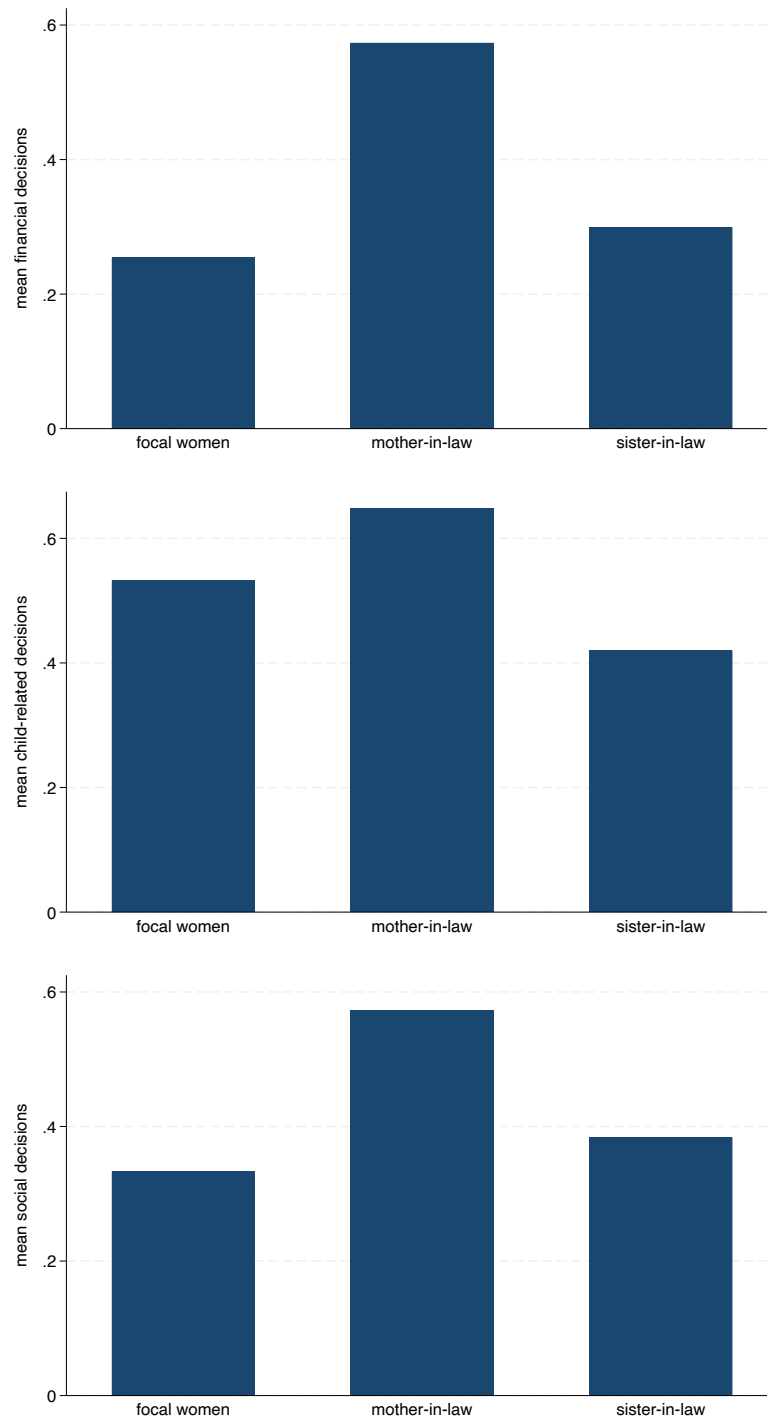
To explore the mechanisms underlying the negative impact of patrilocal residence on young women's decision-making power, we consider whether intra-household hierarchy plays a central role. A key advantage of the LiK data is that it surveys all adult members of the household, not just those aged 15–49 as in other surveys. This allows us to compare outcomes across women of different roles within the same household. Specifically, we compare the decision-making authority of focal women (i.e., young married women) to that of co-residing mothers-in-law (i.e., husband's mother) and adult, unmarried sisters-in-law (i.e., husband's sister).¹⁰ If mothers-in-law hold significantly more decision-making power than the focal women, this would indicate that power imbalances within the household hierarchy, rather than individual characteristics or selection bias, are key drivers of the observed restrictions on young married women's autonomy. Likewise, examining the role of sisters-in-law, further allows us to assess whether hierarchical status explains the constraints on young married women's autonomy.¹¹

Figure 3.3 provides an initial illustration of these patterns by depicting the mean decision-making power across different household roles. As shown, mothers-in-law have the highest levels of decision-making authority, followed by sisters-in-law, while focal women exhibit the lowest levels of autonomy across financial, child-related, and social decisions. This visual evidence suggests a clear generational hierarchy, with older women maintaining greater control over household matters compared to other women in the household.

¹⁰We estimate the following model: $Y_i = \beta_0 + \beta_1 Role_i + \beta_3 X_i' + \lambda_o + \lambda_s + \epsilon_i$, where $Role_i$ represents whether the woman is mothers-in-law, sisters-in-law, or focal women.

¹¹The hierarchical structure within patrilocal households does not always align with age. Unmarried sisters-in-law (including never-married or divorced daughters of the household) often enjoy greater status and autonomy, regardless of their age relative to the young brides. As natal daughters, they retain privileged status and stronger claims within the household compared to the women who marry into the family.

Figure 3.3: Mean decision-making power across different household roles



Notes: Figure 3.3 plots the mean outcomes of women who report having a say in decision-making across different household roles: mother-in-law, sister-in-law and focal women. Each panel corresponds to a different decision domain: a) Financial decisions, b) Child-related decisions, and (c) Social decisions.

Source: Authors' own illustration based on Life in Kyrgyzstan (LiK) survey rounds 2011-2013, 2016 and 2019.

Table 3.5 presents the regression estimates comparing decision-making power across household roles. Sisters-in-law do not exhibit significantly higher decision-making power in financial and social matters, but they have significantly less say in child-related decisions compared to focal women. Their lower influence in child-related decisions may be attributed to the fact that not all sisters-in-law have children, which affects their involvement in such matters. In contrast, mothers-in-law exhibit significantly greater decision-making power across two domains. The coefficients suggest that mothers-in-law are 20.7 percentage points more likely to have financial decision-making power, and 15.6 percentage points more likely to have autonomy in social decisions. For child-related matters, they are 1 percentage point more likely to have a say, though this difference is not statistically significant. These findings highlight the dominant role of mothers-in-law in patrilocal households, reinforcing the notion that the power imbalance within these family structures is a key constraint on younger women's autonomy. As an additional test of this interpretation, we replicate the main analysis using a subsample of households without mother-in-law (i.e. she is deceased). In these households, focal women may still reside with other in-laws, such as the father-in-law and/or sister-in-law, but are no longer subject to the direct influence of the mother-in-law. The results presented in Figure 3.A.1 show that the impact of patrilocal residence on women's decision-making power is no longer statistically significant across all three domains, supporting the argument that the dominant role of mothers-in-law in patrilocal households is a key constraint on younger women's autonomy.

To further investigate the underlying mechanisms of patrilocal households' impact on women's decision-making power, we examine whether the observed effect is confounded or mediated by husbands' conservative gender attitudes.¹² Specifically, we test whether including husband's conservatism reduces the effect of patrilocal residence. Table 3.A.5 reports the results. Column (1) reproduces the main 2SLS estimates from Tables 3.2-3.4, while column (2) adds husband's conservatism as an additional control. We find that the coefficients on patrilocal residence remain unchanged across all three

¹²A list of the variables used to construct husband's conservatism is provided in Table 3.A.3.

decision-making domains, suggesting that the effect of patrilocal residence on women's autonomy operates independently of the husband's individual gender attitudes. These results reinforce the interpretation that structural power hierarchies within patrilocal households, rather than simply conservative spousal beliefs, are a central constraint on young married women's agency.

Table 3.5: Decision-making outcomes by women's role

	Financial decisions	Child-related decisions	Social decisions
Women's role: Mother-in-law	0.207*** (0.038)	0.010 (0.032)	0.156*** (0.034)
Women's role: Sister-in-law	0.030 (0.020)	-0.122*** (0.024)	0.023 (0.020)
Mean outcome for Focal women	0.254	0.532	0.333
Observations	6,127	5,532	6,017
Age (in years)	yes	yes	yes
Education (in years)	yes	yes	yes
Ethnicity	yes	yes	yes
Interview year fixed effects	yes	yes	yes
Region (oblast) and rural fixed effects	yes	yes	yes

Notes: Values are estimates of ordinary least squares. All specifications include women's characteristics such as age, education, their interaction term, and ethnicity, as well as interview year, regional (oblast) and rural residence fixed effects. Focal women (i.e., young married women) serves as the reference group. Standard errors (in parentheses) are clustered at the level of primary sampling unit. Sample includes only patrilocal households. Significance levels are indicated as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Authors' own calculations based on Life in Kyrgyzstan (LiK) survey rounds 2011-2013, 2016 and 2019.

3.5.3 Heterogeneity Analyses

In this section, we examine whether the negative impact of patrilocal residence on women's decision-making power varies across different subgroups. Specifically, we analyze three key dimensions of heterogeneity: years in marriage, urban versus rural residence, and whether the woman has given birth to a son. These factors are particu-

larly relevant as they may shape the extent to which patrilocal norms restrict women's autonomy. If the effects of patrilocal residence diminish over time, vary by geographic setting, or are mitigated by having a male child, this would suggest that certain conditions can weaken the disadvantages associated with patrilocal living arrangements. Conversely, if the constraints persist regardless of these factors, it would further support the argument that structural household norms play a dominant role in limiting women's decision-making power.

Heterogeneity by marriage duration

We test for heterogeneity in the effect of patrilocal residence by years in marriage,¹³ capturing potential life-cycle dynamics in household power structures. If decision-making power increases over time as women gain experience and establish their role within the household, we might expect the negative effect of patrilocal residence to diminish with years in marriage. Table 3.6 presents the estimation results using both OLS and 2SLS models. The OLS results indicate that the interaction between patrilocal residence and years in marriage is statistically insignificant across all three decision-making domains. This finding persists when using the 2SLS estimation, which accounts for potential endogeneity in patrilocal residence. These findings suggest that women in patrilocal households do not experience a substantial improvement in autonomy as their marriages progress, at least within the observed sample of women under age 35. The restrictive nature of patrilocal residence appears to be persistent rather than temporary, regardless of the estimation strategy.

Heterogeneity by residence type

The influence of patrilocal residence on decision-making may also vary depending on whether a woman resides in an urban or rural area. Rural households tend to adhere more strongly to traditional norms and gender roles, which may amplify the negative effects of patrilocal residence. Table 3.7 presents the estimation results from both OLS and 2SLS models. Across all three decision domains, the interaction terms between pa-

¹³The 2016 and 2019 waves did not include data on the age at which respondents entered marriage.

Table 3.6: Heterogeneous effects of patrilocal residence on women's decision-making power by years in marriage

	OLS	2SLS
Panel A: Financial decisions		
Patrilocal residence	0.291*** (0.049)	-0.471*** (0.157)
Years in marriage	0.008 (0.005)	-0.000 (0.009)
Patrilocal residence $\times$ Years in marriage	0.003 (0.005)	0.014 (0.014)
Observations	3,336	3,336
Panel B: Child-related decisions		
Patrilocal residence	-0.128*** (0.045)	0.053 (0.139)
Years in marriage	0.005 (0.004)	0.010 (0.008)
Patrilocal residence $\times$ Years in marriage	-0.001 (0.005)	-0.004 (0.014)
Observations	3,181	3,181
Panel C: Social decisions		
Patrilocal residence	-0.279*** (0.046)	-0.522*** (0.191)
Years in marriage	0.006 (0.005)	-0.003 (0.010)
Patrilocal residence $\times$ Years in marriage	0.005 (0.005)	0.015 (0.015)
Observations	3,259	3,259
Interview year fixed effects	yes	yes
Community-level gender attitudes	yes	yes
Community-level bride kidnapping rate	yes	yes
Women characteristics	yes	yes
Husband characteristics	yes	yes
Region (oblast) and rural fixed effects	yes	yes

Notes: Table reports estimates from Ordinary Least Squares and Two-Stage Least Squares models examining heterogeneity in the effects of patrilocal residence by years in marriage. Panel A presents estimates for financial decisions, Panel B for child-related decisions, and Panel C for social decisions. Standard errors (in parentheses) are clustered at the primary sampling unit level. Significance levels are indicated as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Authors' own calculations based on Life in Kyrgyzstan (LiK) survey rounds 2011-2013, 2016 and 2019.

Table 3.7: Heterogeneous effects of patrilocal residence on women's decision-making power by rural residence

	OLS	2SLS
Panel A: Financial decisions		
Patrilocal residence	-0.293*** (0.037)	-0.444*** (0.121)
Rural	-0.042 (0.047)	-0.136 (0.094)
Patrilocal residence $\times$ Rural	0.019 (0.045)	0.162 (0.132)
Observations	4,154	4,154
Panel B: Child-related decisions		
Patrilocal residence	-0.108*** (0.039)	0.084 (0.102)
Rural	0.011 (0.035)	- 0.010 (0.095)
Patrilocal residence $\times$ Rural	-0.049 (0.045)	-0.034 (0.130)
Observations	3,906	3,906
Panel C: Social decisions		
Patrilocal residence	-0.265*** (0.039)	-0.438*** (0.154)
Rural	-0.060 (0.045)	-0.133 (0.117)
Patrilocal residence $\times$ Rural	0.022 (0.049)	0.136 (0.193)
Observations	4,074	4,074
Interview year fixed effects	yes	yes
Community-level gender attitudes	yes	yes
Community-level bride kidnapping rate	yes	yes
Women characteristics	yes	yes
Husband characteristics	yes	yes
Region (oblast) and rural fixed effects	yes	yes

Notes: Table reports estimates from Ordinary Least Squares and Two-Stage Least Squares models examining heterogeneity in the effects of patrilocal residence by rural residence. Panel A presents estimates for financial decisions, Panel B for child-related decisions, and Panel C for social decisions. Standard errors (in parentheses) are clustered at the primary sampling unit level. Significance levels are indicated as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Authors' own calculations based on Life in Kyrgyzstan (LiK) survey rounds 2011-2013, 2016 and 2019.

Table 3.8: Heterogeneous effects of patrilocal residence on women's decision-making power by son presence

	OLS	2SLS
Panel A: Financial decisions		
Patrilocal residence	-0.241*** (0.034)	-0.444*** (0.111)
Woman has son	0.050 (0.030)	-0.019 (0.052)
Patrilocal residence $\times$ Woman has a son	-0.039 (0.038)	0.067 (0.077)
Observations	2,899	2,899
Panel B: Child-related decisions		
Patrilocal residence	-0.120*** (0.029)	-0.027 (0.096)
Woman has son	0.023 (0.024)	0.010 (0.049)
Patrilocal residence $\times$ Woman has a son	-0.020 (0.030)	0.001 (0.073)
Observations	2,861	2,861
Panel C: Social decisions		
Patrilocal residence	-0.245*** (0.035)	-0.447*** (0.131)
Woman has son	0.011 (0.028)	-0.005 (0.055)
Patrilocal residence $\times$ Woman has a son	0.007 (0.037)	0.030 (0.086)
Observations	2,824	2,824
Interview year fixed effects	yes	yes
Community-level gender attitudes	yes	yes
Community-level bride kidnapping rate	yes	yes
Women characteristics	yes	yes
Husband characteristics	yes	yes
Region (oblast) and rural fixed effects	yes	yes

Notes: Table reports estimates from Ordinary Least Squares and Two-Stage Least Squares models examining heterogeneity in the effects of patrilocal residence by son presence. Panel A presents estimates for financial decisions, Panel B for child-related decisions, and Panel C for social decisions. Standard errors (in parentheses) are clustered at the primary sampling unit level. Significance levels are indicated as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Authors' own calculations based on Life in Kyrgyzstan (LiK) survey rounds 2011-2013, 2016 and 2019.

patrilocal residence and rural status are small in magnitude and statistically insignificant in both OLS and 2SLS models. This reinforces the conclusion that, while rural settings may intensify certain cultural constraints, the differential impact of patrilocal residence between rural and urban areas is limited.

Heterogeneity by son presence

In many patrilineal societies, having a son can enhance a woman's status within the household, potentially granting her greater decision-making power. To assess whether this dynamic plays a role in Kyrgyzstan, we examine whether the effect of patrilocal residence differs between women who have at least one son and those who have only daughters.¹⁴ The results, presented in Table 3.8, show that the interaction term between patrilocal residence and having a son is statistically insignificant across all three decision-making domains in both OLS and 2SLS models. This suggests that, unlike in some patrilineal societies where bearing a son increases a woman's bargaining power, this is not the case in Kyrgyzstan. Women in patrilocal households remain constrained in their decision-making authority regardless of whether they have a son or not.

3.5.4 Robustness checks

As mentioned earlier, a central identifying assumption of our IV strategy is that the instrument affects women's decision-making power only through its impact on their likelihood of residing with in-laws. This implies that the instrument should not influence the outcomes of women who are unlikely to be subject to patrilocal living arrangements. To assess this assumption, we conduct a placebo test using a subsample of women who are plausibly unaffected by household-level patrilocality: (i) women who have never been married (i.e., single), and (ii) women who were formerly married but are now widowed, divorced, or separated. These women are less likely to reside with in-laws and, therefore, should not be exposed to the primary channel through which the instrument operates.

¹⁴Data on fertility history, including the gender of the firstborn child, was not collected in the 2016 and 2019 survey rounds.

We estimate the reduced-form relationship between the instrument and women's decision-making power outcomes for both placebo sub-samples. Specifically, we regress each decision-making outcome (financial, child-related, and social) on the PSU-level patrilocal measure, controlling for the same set of controls used in the main specification: women's and husbands' age, education (including their squared terms and interactions), women's ethnicity, rural residence, oblast fixed effects, year fixed effects, and community-level conservatism and bride kidnapping rates. The results, reported in Appendix Table 3.A.6, show that the instrument has no statistically significant association with decision-making outcomes among either never married or formally married women. This supports the validity of our exclusion restriction and suggests that the instrument affects women's agency primarily through its influence on actual patrilocal residence. In other words, the instrument is not capturing broader regional attitudes or economic conditions unrelated to household structure.

To further assess the robustness of our findings, we conduct an additional check. Specifically, we assess the sensitivity of our results to the exclusion of outlier PSUs with extreme values for patrilocal prevalence. Since the instrumental variable is derived from community-level variation in patrilocal measure, estimates could be disproportionately influenced by highly atypical communities where co-residence with in-laws is either exceptionally rare or nearly universal. To mitigate this concern, we re-estimate the 2SLS models after excluding PSUs in the top and bottom 5% of the patrilocal prevalence distribution. The results, reported in Table 3.A.7, show that the coefficients are similar in magnitude to the main findings across all three domains of women's decision-making. These findings confirm that the main results are not driven by a subset of outlier communities at the extreme ends of the patrilocal prevalence distribution, reinforcing the robustness of the causal estimates.

Although our causal estimates rely on the 2SLS strategy, we also assess whether the observed OLS relationship between patrilocal measure and women's autonomy holds within communities. Given that our instrument is defined at the PSU level, one might argue

that unobserved community-level heterogeneity could also bias the OLS results if not fully accounted for. To address this, we re-estimate the OLS specification including PSU fixed effects. This controls for all time-invariant unobserved factors at the community level that might influence both the likelihood of patrilocal residence and women's autonomy. The estimated coefficients presented in Table 3.A.8 remain consistent with our main findings in Tables 3.2-3.4 suggesting that our OLS results are not simply driven by PSU-level selection.

3.6 Conclusion

The findings of this study highlight the persistent constraints that patrilocal residence imposes on women's decision-making power in Kyrgyzstan. Women living in patrilocal households experience substantial and statistically significant reductions in their ability to participate in financial and social decisions, while no robust effect is observed for child-related decisions. This may reflect the fact that mothers retain a degree of autonomy over child-related matters regardless of household structure, or that such decisions are more commonly shared across household members and less sensitive to generational hierarchies.

Our mechanism analysis points to the central role of intra-household hierarchy in shaping young women's autonomy. Mothers-in-law occupy dominant positions within patrilocal households, exerting significantly greater authority than young women across all decision domains. This generational power imbalance limits younger women's agency, regardless of their individual characteristics. Unlike other extended-family settings where co-residence may facilitate support for employment or childcare, the evidence here suggests that power is concentrated at the top of the generational hierarchy, reinforcing norms of seniority and control over younger women. The heterogeneity analysis further supports the structural nature of these constraints, showing that the negative effects of patrilocal residence on women's decision-making power persist across different subgroups. Neither longer marital duration nor having a male child significantly mit-

igates the restrictive effects of patrilocal residence. This suggests that the barriers to women's autonomy in patrilocal households are not simply circumstantial or temporary, but rather deeply embedded in household structures and cultural expectations.

The results align with broader literature on gender norms and kinship structures, which emphasizes the role of post-marital residence in shaping women's autonomy (Debnath, 2015; Khalil and Mookerjee, 2019; Turaeva and Becker, 2022). The influence of senior family members, particularly mothers-in-law (Anderson and Eswaran, 2009), creates a household hierarchy where younger daughters-in-law are expected to conform to established norms, limiting their ability to make independent decisions. This hierarchical structure is not unique to Kyrgyzstan, it is a feature of many patrilineal societies where traditional kinship practices reinforce gendered power imbalances within the household.

These findings have important policy implications, particularly in the context of economic policies that can shift household structures. Formal pension programs, implemented in Indonesia and Ghana, have been shown to shift intergenerational support patterns and weaken the necessity of patrilocal and matrilocal traditions (Bau, 2021). When parents no longer depend on their children for elderly care, adherence to strict post-marital residence norms declines. Moreover, housing assistance for newly married couples could reduce the economic necessity of co-residence with in-laws and enhance women's decision-making power. Kyrgyzstan already maintains a formal pension system. However, as a lower-middle-income country, its fiscal capacity to undertake large-scale pension expansion or implement broad housing subsidies remains limited.

Shifting deeply entrenched cultural and gender norms requires more than economic measures alone. ICT-based programs, such as mass media campaigns, mobile phone applications, and internet platforms, have been implemented in countries across Asia and Africa to challenge traditional gender norms. However, much of the existing evidence focuses on their effectiveness in reducing intimate partner violence, with limited research assessing their impact on women's autonomy within extended family settings.

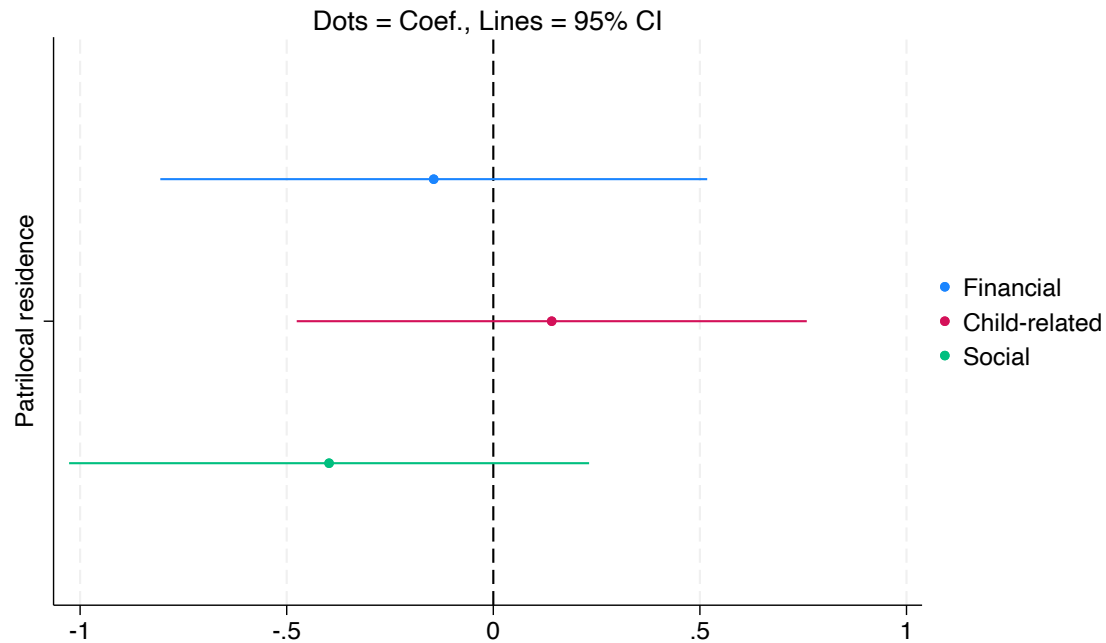
This gap is particularly relevant in contexts like Kyrgyzstan, where household hierarchies often involve not only male partners but also senior female relatives. Therefore, ICT-based programs must be carefully designed to reflect household hierarchies. Rather than focusing solely on empowering young women through individual messaging, interventions should also target senior household members, with content that encourages shared decision-making and supports intergenerational dialogue. In that context, community-based sessions that promote more balanced and democratic approaches to household decision-making offer a feasible and culturally sensitive alternative. These programs can help shift entrenched norms by engaging both men and women in discussions about gender roles, intergenerational dynamics, and shared decision-making authority within families.

While our findings provide novel evidence on the disempowering effects of patrilocal residence for young married women, this study is not without limitations. First, since we address endogeneity concerns using an instrumental variable strategy, our estimates identify a local average treatment effect, specifically, for women whose co-residence status is shaped by local norms around patrilocality. While this limits external generalizability, it enhances internal validity by offering credible causal evidence for a policy-relevant subgroup, those whose living arrangements are influenced by local tradition rather than personal preference. Second, our measure of women's empowerment focuses on household decision-making power, which may not capture broader dimensions such as mobility, psychological well-being, or intergenerational influence. Nevertheless, decision-making power remains a policy-relevant and observable outcome that reflects the distribution of authority within households. Future work could expand on this by incorporating multi-dimensional empowerment indices or using qualitative data to capture lived experiences. Third, our analysis relies on cross-sectional data, which limits the ability to study dynamic effects of marriage, childbirth, or changing family composition. However, our approach still allows us to credibly estimate the causal impact of patrilocal residence on women's empowerment at a crucial point in women's life course

(i.e. early marriage). Future research could build on this by using panel data to follow how these dynamics unfold over time and to examine how women's agency evolves in response to shifts in household structure and co-residence patterns. Lastly, although we control for key confounders and conduct robustness checks, there remains the possibility that unobserved, time-varying community-level factors could influence both residence patterns and women's outcomes. Nevertheless, the consistency and robustness of our results across model specifications reduce this concern and reinforce the credibility of our conclusions.

Appendix

Figure 3.A.1: Effect of patrilocal residence on women's decision-making (MIL is deceased)



Notes: Figure 3.A.1 displays the estimated coefficients of patrilocal residence from separate two-stage least squares (2SLS) regressions for three types of women's decision-making: financial, child-related, and social. The sample is restricted to households without mother-in-law (i.e. she is deceased). Lines represent 95% confidence intervals.

Source: Authors' own illustration based on Life in Kyrgyzstan (LiK) survey rounds 2011-2013, 2016 and 2019.

Table 3.A.1: Description of outcome variables

Variables	Description
1. Financial decisions	Statistical mean of the below variables
Whether to buy major items	Coded as 1 if woman has a say in a decision, 0 otherwise.
Whether to lend money to others	Coded as 1 if woman has a say in a decision, 0 otherwise.
Whether to borrow money from others	Coded as 1 if woman has a say in a decision, 0 otherwise.
How much to save of household income	Coded as 1 if woman has a say in a decision, 0 otherwise.
2. Child-related decisions*	Statistical mean of the below variables
Children's health	Coded as 1 if woman has a say in a decision, 0 otherwise.
Whether children attend school	Coded as 1 if woman has a say in a decision, 0 otherwise.
Whether children do their homework	Coded as 1 if woman has a say in a decision, 0 otherwise.
3. Social decisions	Statistical mean of the below variables
Negotiating with neighbors	Coded as 1 if woman has a say in a decision, 0 otherwise.
Participation in community discussions	Coded as 1 if woman has a say in a decision, 0 otherwise.
* In 2016–2019, child-related questions were combined into one question as "children's education and health"	
<i>Source:</i> Authors' own illustration based on Life in Kyrgyzstan (LiK) survey rounds 2011–2013, 2016 and 2019.	

Table 3.A.2: Standardized differences in pre-marital characteristics

Variable	Neolocal Mean	Patrilocal Mean	Std. Diff.	p-value
Mother was employed	0.858	0.871	-0.038	0.347
Father was employed	0.978	0.983	-0.037	0.368
Mother's education: high	0.336	0.307	0.063	0.123
Father's education: high	0.366	0.339	0.055	0.174
Number of siblings	4.026	3.979	0.023	0.553
Age at marriage	20.353	20.331	0.009	0.818
Women's education: secondary	0.525	0.556	-0.032	0.116

Notes: This table reports standardized mean differences in pre-marital characteristics between women living in patrilocal and neolocal households. The conventional thresholds are $p < 0.1$, $p < 0.05$, and $p < 0.01$.

Source: Authors' own calculations based on Life in Kyrgyzstan (LiK) survey rounds 2011-2013, 2016 and 2019.

Table 3.A.3: Variables used for gender attitudes

Variables	Description
Important decisions should be made by the husband rather than the wife	1 - (strongly) agree, 0 - (strongly) disagree, 0.5 - do not know.
A man's job is to earn money; a woman's job is to look after the home and family	1 - (strongly) agree, 0 - (strongly) disagree, 0.5 - do not know.
A woman is really fulfilled only when she becomes a mother	1 - (strongly) agree, 0 - (strongly) disagree, 0.5 - do not know.
A husband's career should be more important to the wife than her own	1 - (strongly) agree, 0 - (strongly) disagree, 0.5 - do not know.
A university education is more important for a boy than for a girl	1 - (strongly) agree, 0 - (strongly) disagree, 0.5 - do not know.

Notes: Gender attitudes measure used in the model is a statistical mean of 5 variables on gender roles

Source: Life in Kyrgyzstan (LiK) survey rounds 2011-2013, 2016 and 2019.

Table 3.A.4: Effect of patrilocal residence on women's decision-making power: excluding Kyrgyz women

	Financial decisions	Child-related decisions	Social decisions
Panel A: OLS estimation results			
Patrilocal residence	-0.263*** (0.042)	-0.134*** (0.045)	-0.232*** (0.047)
Observations	1,391	1,295	1,396
Panel B: 2SLS estimation results			
First stage			
Prop. of patrilocal hh in psu	0.684*** (0.102)	0.640*** (0.105)	0.688*** (0.101)
F-statistic	45.112	37.496	45.940
Observations	1,391	1,295	1,396
Second stage			
Patrilocal residence	-0.303* (0.155)	0.151 (0.145)	-0.453** (0.227)
Observations	1,391	1,295	1,396
Interview year fixed effects	yes	yes	yes
Community-level gender attitudes	yes	yes	yes
Community-level bride kidnapping rate	yes	yes	yes
Women characteristics	yes	yes	yes
Husband characteristics	yes	yes	yes
Regional (oblast) and rural fixed effects	yes	yes	yes

Notes: Table reports estimates from Ordinary Least Squares and Two-Stage Least Squares models. Kyrgyz women are restricted from the sample. All specifications include interview year fixed effects, community-level gender attitudes, and community-level prevalence of bride kidnapping, women's characteristics (age, education, their interaction term, and ethnicity), husband's characteristics (age, education, and their interaction term), as well as regional (oblast) and rural residence fixed effects. Standard errors (in parentheses) are clustered at the primary sampling unit level. Significance levels are indicated as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Authors' own calculations based on Life in Kyrgyzstan (LiK) survey rounds 2011-2013, 2016 and 2019.

Table 3.A.5: Effect of patrilocal residence on women's decision-making power: including husband's conservatism

	(1)	(2)
Panel A: Financial decisions		
Patrilocal residence	-0.355*** (0.098)	-0.354*** (0.098)
Husband's conservatism		-0.078 (0.049)
Observations	4,154	4,154
Panel B: Child-related decisions		
Patrilocal residence	0.065 (0.090)	0.066 (0.090)
Husband's conservatism		-0.051 (0.038)
Observations	3,906	3,906
Panel C: Social decisions		
Patrilocal residence	-0.362*** (0.121)	-0.362*** (0.121)
Husband's conservatism		0.007 (0.037)
Observations	4,074	4,074
Interview year fixed effects	yes	yes
Community-level gender attitudes	yes	yes
Community-level bride kidnapping rate	yes	yes
Women characteristics	yes	yes
Husband characteristics	yes	yes
Region (oblast) and rural fixed effects	yes	yes

Notes: Table reports estimates from Two-Stage Least Squares models. All specifications include interview year fixed effects, community-level gender attitudes, and community-level prevalence of bride kidnapping, women's characteristics (age, education, their interaction term, and ethnicity), husband's characteristics (age, education, and their interaction term), as well as regional (oblast) and rural residence fixed effects. Column (1) presents the same 2SLS estimates as in the main specification, while Column (2) adds husband's conservatism as an additional control. Standard errors (in parentheses) are clustered at the primary sampling unit level. Significance levels are indicated as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Authors' own calculations based on Life in Kyrgyzstan (LiK) survey rounds 2011-2013, 2016 and 2019.

Table 3.A.6: Placebo Test: Association between community-level patrilocal residence and women's decision-making power among never married and formerly married women

	Never married		Formally married	
	(1)	(2)	(3)	(4)
Panel A: Financial decisions				
Prop. of patrilocal hh in psu	-0.144	-0.136	-0.100	-0.101
	(0.089)	(0.093)	(0.055)	(0.053)
Observations	1,862	1,862	2,659	2,659
Panel B: Child-related decisions				
Prop. of patrilocal hh in psu	0.072	0.089	-0.088	-0.084
	(0.104)	(0.105)	(0.083)	(0.080)
Observations	1,305	1,305	2,119	2,119
Panel C: Social decisions				
Prop. of patrilocal hh in psu	-0.114	-0.115	-0.069	-0.062
	(0.089)	(0.092)	(0.067)	(0.066)
Observations	1,843	1,843	2,683	2,683
Interview year fixed effects	yes	yes	yes	yes
Women characteristics	yes	yes	yes	yes
Husband characteristics	yes	yes	yes	yes
Region (oblast) and rural fixed effects	yes	yes	yes	yes
Community-level gender attitudes	no	yes	no	yes
Community-level bride kidnapping rate	no	yes	no	yes

Notes: Table reports estimates from Ordinary Least Squares models. The "Never married" sample includes single women, while the "formally married" sample includes women who were formerly married but are now widowed, divorced, or separated. Columns (1) and (3) control for interview year fixed effects, women's characteristics (age, education, their interaction term, and ethnicity), husband's characteristics (age, education, and their interaction term), as well as regional (oblast) and rural residence fixed effects. Columns (2) and (4) additionally control for community-level gender attitudes, and community-level prevalence of bride kidnapping. Standard errors (in parentheses) are clustered at the primary sampling unit level. Significance levels are indicated as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Authors' own calculations based on Life in Kyrgyzstan (LiK) survey rounds 2011-2013, 2016 and 2019.

Table 3.A.7: Effect of patrilocal residence after excluding outlier PSUs

	Financial decisions	Child-related decisions	Social decisions
Patrilocal residence	-0.306** (0.141)	0.136 (0.128)	-0.299* (0.170)
Observations	3,775	3,557	3,704
Interview year fixed effects	yes	yes	yes
Community-level gender attitudes	yes	yes	yes
Community-level bride kidnapping rate	yes	yes	yes
Women characteristics	yes	yes	yes
Husband characteristics	yes	yes	yes
Region (oblast) and rural fixed effects	yes	yes	yes

Notes: Table reports estimates from Two-Stage Least Squares models. Observations exclude PSUs in the top and bottom 5% of the distribution of community-level patrilocal prevalence, thereby removing communities where patrilocal residence is extremely rare or nearly universal. All specifications control for interview year fixed effects, community-level gender attitudes, community-level bride kidnapping rates, women's characteristics (age, education, their interaction term, and ethnicity), husband's characteristics (age, education, and their interaction term), and regional (oblast) and rural fixed effects. Standard errors (in parentheses) are clustered at the primary sampling unit level. Significance levels are indicated as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Authors' own calculations based on Life in Kyrgyzstan (LiK) survey rounds 2011-2013, 2016 and 2019.

Table 3.A.8: OLS estimates of patrilocal residence and women's decision-making power with PSU fixed effects

	Financial decisions	Child-related decisions	Social decisions
OLS estimation results			
Patrilocal residence	-0.273*** (0.023)	-0.155*** (0.023)	-0.242*** (0.023)
Observations	4,154	3,906	4,074
Interview year fixed effects	yes	yes	yes
Community-level gender attitudes	yes	yes	yes
Community-level bride kidnapping rate	yes	yes	yes
Women characteristics	yes	yes	yes
Husband characteristics	yes	yes	yes
PSU and rural fixed effects	yes	yes	yes

Notes: Table reports estimates from Ordinary Least Squares models. All specifications include interview year fixed effects, community-level gender attitudes, and community-level prevalence of bride kidnapping, women's characteristics (age, education, their interaction term, and ethnicity), husband's characteristics (age, education, and their interaction term), as well as psu and rural residence fixed effects. Standard errors (in parentheses) are clustered at the primary sampling unit level. Significance levels are indicated as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Authors' own calculations based on Life in Kyrgyzstan (LiK) survey rounds 2011-2013, 2016 and 2019.

4 Living Together, Worrying Less: Emotional Trade-Offs of Patrilocal Residence

4.1 Introduction

In many patriarchal societies across Central Asia, South Asia, and the Middle East, newly married women are expected to move into their husband’s parental home, a practice known as patrilocal residence. This household arrangement, deeply embedded in kinship systems, has long been associated with power asymmetries, where younger married women occupy the lowest position in household hierarchies. A large body of literature documents the implications of these arrangements for women’s agency, showing that co-residence with in-laws often restricts women’s decision-making power, limits mobility, and reduces labor market participation (Debnath, 2015; Khalil and Mookerjee, 2019; Landmann et al., 2018). Yet, much less is known about how these arrangements affect women’s psychological well-being, despite growing recognition that mental health is a critical dimension of women’s empowerment and overall quality of life.

Although much of the literature conceptualizes patrilocal living primarily as a source of constraint and psychological burden (Debnath, 2015; Khalil and Mookerjee, 2019; Landmann et al., 2018; Turaeva and Becker, 2022), this perspective remains theoretically incomplete. Extended households are complex social environments that can simultaneously impose restrictions and provide protective resources. In some contexts, co-residence may limit women’s autonomy while offering stress-mitigating benefits, such as shared childcare, pooled economic assets, or protection from certain social and financial risks (Marphatia et al., 2023; Khalil and Mookerjee, 2019; Raymo et al., 2015). However, few studies explicitly unpack these offsetting mechanisms or investigate how the trade-off between autonomy and support shapes women’s psychological well-being. Most existing research examines either empowerment indicators or mental health outcomes in isolation, leaving the channels through which household structures influence

psychological stress only partially understood.

This paper addresses this gap in the literature by estimating the causal impact of patrilocal residence on women's psychological stress in Kyrgyzstan, where extended family living arrangements remain prevalent and nearly three out of four newly married women move into their husband's parental household (Landmann et al., 2018; Grogan, 2007). Although this study refers to psychological stress as the core outcome of interest, the empirical measure is based on self-reported worries about specific life domains. In psychological research, worry is often understood as a cognitive component of anxiety, characterized by repetitive, uncontrollable thoughts about potential negative outcomes (Borkovec et al., 1983). While worry is not synonymous with clinical anxiety or stress, it is a key manifestation of everyday psychological strain, especially in settings where formal mental health diagnoses are rare or stigmatized.

In this context, worry serves as a practical and culturally sensitive proxy for psychological stress. It captures a woman's emotional response to perceived uncertainty and lack of control, both central elements of the psychological stress model. Moreover, unlike more clinical measures of anxiety or depression, worry is relatively easier to assess through survey instruments and is likely to be more meaningful and interpretable to respondents, particularly in a post-Soviet context like Kyrgyzstan where mental health discourse is still evolving. Thus, although the terms "worry," "stress," "anxiety," and "emotional conflict" refer to overlapping but distinct psychological constructs, this study uses worry as an empirically tractable indicator of broader psychosocial strain.

I use self-reported worries about women's own economic situation, own personal security, and their children's future, drawing on nationally representative data from Kyrgyzstan. Each worry item is measured on an 11-point scale from 0 (not worried at all) to 10 (extremely worried). Ordinary Least Squares (OLS) results indicate significant negative associations between patrilocal living arrangements and women's reported worries across all three domains. While informative, these OLS estimates are descriptive in nature and may be biased due to unobserved factors that influence both

household structure and women's autonomy. To address this, I employ a two-stage least squares (2SLS) approach, instrumenting patrilocal residence with the prevalence of patrilocal households within a woman's primary sampling unit. The 2SLS results reveal that women in patrilocal households report substantially lower levels of financial, personal security, and child-related worries compared to their neolocal counterparts. Specifically, co-residence with in-laws reduces economic worries by 2.91 points, personal security worries by 3.55 points, and child-related worries by 1.94 points. These findings provide evidence that despite potential autonomy constraints, living with in-laws may offer protective benefits that reduce day-to-day psychological strain.

Beyond estimating the overall effect, I also explore the mechanisms through which patrilocal living affects women's psychological stress. Building on evidence in Chapter 3 that patrilocal residence constrains women's autonomy, I first test whether diminished decision-making power mediates this relationship. Coefficients for decision-making autonomy are small and statistically insignificant across all domains, indicating that reduced autonomy cannot explain the observed psychological benefits of co-residence. I then examine whether instrumental support from in-laws such as economic contributions, child-care assistance, and conservative gender attitudes serves as a channel through which patrilocal residence affects psychological outcomes. Even after controlling for these measures, patrilocal residence continues to significantly reduce financial, personal security, and child-related worries. This indicates that in-laws' support and their conservative gender attitudes only partially account for the psychological benefits of co-residence. Interestingly, in-laws' economic contributions are positively associated with women's financial worries, suggesting that such contributions often arise in financially strained households, where underlying hardship outweighs any stress-reducing benefit of additional income. Similarly, more conservative gender attitudes among in-laws are positively associated with women's personal security worries, which is consistent with the notion that restrictive gender norms exacerbate women's feelings of insecurity. In contrast, in-laws' child-care assistance shows no statistically significant

association with women's worries about their children's future, indicating that this form of support does not play a meaningful mediating role.

In addition, I explore whether the psychological effects of patrilocal living vary across key socio-demographic subgroups. The heterogeneity analysis shows that the stress-reducing effects of co-residence are particularly pronounced for women living in rural areas, consistent with the stronger kinship networks and more entrenched child-care support systems in these settings. In contrast, the effects do not significantly differ by marital duration or women's education levels, suggesting that the benefits of patrilocal living on psychological stress are broadly shared across these groups.

This study makes three key contributions. First, it brings psychological stress into the literature on women's empowerment, which has largely focused on economic and social outcomes while overlooking mental health. Second, it advances the mental health literature by explicitly modeling autonomy and in-law support as competing mechanisms, rather than assuming a unidirectional link between co-residence and distress. Third, by employing an instrumental-variable approach, it moves beyond descriptive associations to provide credible evidence on the causal effects of patrilocal living on women's well-being.

The remainder of the paper is organized as follows. Section 4.2 provides background information on patrilocality, power dynamics and women's roles in Kyrgyz families. Section 4.3 reviews the literature on the impacts of patrilocal and joint-family arrangements on women's outcomes and identifies the key gaps this study addresses. Section 4.4 outlines the theoretical framework guiding our analysis. Section 4.5 describes the data, variables, and empirical strategy. Section 4.6 presents the main findings, including robustness checks, heterogeneity analysis, and the identification of potential mechanisms. Finally, Section 4.7 concludes with a discussion of the implications of findings and directions for future research.

4.2 Patrilocality, Power Dynamics and Women's Roles in Kyrgyz Families

Women's household roles and well-being in Kyrgyzstan are deeply shaped by embedded kinship structures and cultural norms that govern marriage, co-residence, and hierarchy within families. In Kyrgyzstan, patrilocal residence remains the dominant marital arrangement, requiring newly married women to move into their husband's parental household. Within this extended family structure, the young bride occupies a subordinate position, often expected to perform extensive housework, caregiving, and defer to the authority of elder relatives (Landmann et al., 2018). Decision-making typically rests with senior family members, severely restricting younger women's autonomy over financial decisions, mobility, and personal life choices.

These hierarchical norms result in considerable domestic and caregiving responsibilities for daughters-in-law. Studies highlight that Kyrgyz women living with in-laws spend significantly more time on eldercare and household tasks compared to those in nuclear households, without substantial reductions in their own domestic burdens (Landmann et al., 2018). Qualitative accounts from Kyrgyz women underscore the emotional toll of this limited autonomy, as many report feeling compelled to prioritize family obligations over their own well-being and aspirations (Nedoluzhko and Agadjanian, 2015).

Restrictions on women's movement further reinforce these limitations. In many patrilocal households, young women must ask for permission from their husbands or in-laws to work, attend school, or even see their own parents. These rules, often justified by appeals to family honor or traditional notions of modesty, leave women with little control over their own lives and decisions (Nedoluzhko and Agadjanian, 2015). These restrictions not only limit women's ability to engage in activities outside the household but also cut them off from important sources of emotional and social support, such as their own family members and trusted female friends. Over time, this isolation can reduce women's confidence in making life choices and limit their opportunities for

personal growth and development.

At the same time, it is important to recognize that these arrangements are not uniformly restrictive. Extended households can also offer important practical support. Mothers-in-law or other senior female relatives can provide crucial childcare, allowing younger women greater flexibility to engage in agricultural labor or informal employment (Landmann et al., 2018). In rural communities, such support is essential due to the limited availability of formal childcare. Additionally, co-residence facilitates economic pooling and shared resources, improving overall household stability and financial security (Nedoluzhko and Agadjanian, 2015). This duality highlights the multifaceted nature of patrilocal living arrangements, where constraints on autonomy coexist alongside supportive structures that may mitigate some psychological stress.

4.3 Evidence from Patrilocal Societies and Joint Families

4.3.1 Patrilocal Co-residence, Intra-Household Power Dynamics, and Women's Autonomy

A growing body of empirical research has investigated how co-residence with in-laws shapes women's autonomy, status, and well-being. Most of this work has focused on South and East Asian contexts, where extended family living is common and gender norms are highly hierarchical. Across these settings, co-residence is consistently associated with reduced decision-making power, constrained mobility, and limited access to economic resources for younger women. For example, Khalil et al. (2024) find that women living with their husband's family have consistently lower rates of sole decision-making in areas such as health care, mobility, and major expenditures across four Southeast Asian countries: Cambodia, Myanmar, Indonesia, and the Philippines. In contrast, women who live with their own natal family or independently experience notably greater autonomy. The authors argue that intra-feminine hierarchies, especially competition between mothers-in-law and daughters-in-law, are critical in understanding why patrilocal residence suppresses women's agency.

In India, Debnath (2015) uses the death of the patriarch as an instrument for selection into patrilocal setups in rural India, and finds that living in nuclear households significantly increases women's decision-making power and freedom of movement, especially among lower-caste women. The presence of in-laws, especially elder male and female relatives, emerges as a strong constraint on female autonomy, independent of the husband's characteristics. Similarly, Khalil and Mookerjee (2019) find that women residing in patrilocal households are significantly less likely to participate in major economic decisions compared to their counterparts in nuclear households across four South Asian countries: India, Nepal, Bangladesh, and Pakistan.

Evidence from Central Asia reinforces these findings. Landmann et al. (2018) show that in Kyrgyzstan co-residing women engage in more elder care, but do not receive reciprocal household support, contributing to time poverty and a lower probability of labor market participation. Their results indicate that patrilocal norms not only lower women's autonomy within the household, but also restrict their engagement in paid work, exacerbating gender inequalities in the labor market.

This body of work illustrates that patrilocal co-residence imposes structural barriers to women's empowerment by concentrating power in the hands of older family members, especially mothers-in-law, and by reinforcing gendered expectations about obedience and domestic labor. While some support may exist within extended households, it rarely translates into greater autonomy for younger women. Instead, the prevailing evidence shows that patrilocal living is a key institutional constraint on female decision-making and economic agency.

4.3.2 Household Structure and Women's Well-Being: Support vs. Stress

While most studies emphasize the constraints imposed by patrilocal living, extended family arrangements can also offer important forms of support. Co-residing with in-laws may provide help with childcare, shared household responsibilities, and financial pooling, resources that can ease women's domestic burdens and buffer against stress.

Yet the same arrangements may heighten psychological distress by limiting personal agency and subjecting women to surveillance or conflict. This tension between support and stress has received increasing attention in public health and economic research, although findings remain mixed across settings.

Notably, co-residence can reshape intra-household power dynamics in complex ways. In some contexts, the presence of extended kin appears to shield women from certain harms, even as it simultaneously limits their authority. Khalil and Mookerjee (2019) document that women in patrilocal households across South Asia report lower incidence of spousal domestic violence compared to their counterparts in nuclear households. The authors attribute this pattern to the potential deterrent effect of elder family members on husbands' abusive behavior, despite women in these households enjoying markedly less decision-making power. However, such protective effects are not universal. Anthropological research from Central Asia, for instance, highlights how the authority of elder household members, especially mothers-in-law, can generate inter-generational tension, with older women sometimes becoming direct or indirect sources of abuse toward daughters-in-law (Turaeva and Becker, 2022). These "Queen Bee" dynamics, whereby women who were previously subordinated enforce rigid hierarchies on the next generation, underscore that co-residence often reproduces household inequality rather than uniformly offering protection.

Expanding on these mixed effects, Marphatia et al. (2023) analyze rural Nepali households and find that the presence of parents-in-law can indeed serve as a source of support: women living with in-laws report better mental health outcomes on certain measures (e.g., fewer feelings of worthlessness or insomnia) compared to those in completely nuclear households. However, this comes at a cost: the same co-resident women experienced reduced economic autonomy and freedom to make decisions. By contrast, women in nuclear setups enjoyed greater decision-making power and mobility, yet were more likely to report psychological distress such as heightened overall anxiety and sleep loss. These findings illustrate a trade-off between support and constraint. Extended

families may relieve some burdens on women (and thereby improve certain aspects of well-being) even as they tighten controls on women's agency, which can generate other forms of stress.

Other research reinforces the notion that co-residence can affect women's mental health through both social support and social pressure. In China, a country where multigenerational households remain common, one study found that living with one's parents-in-law significantly increased the risk of postpartum depression among new mothers (Moon et al., 2025). The authors suggest that while grandparents can help with infant care, the arrangement also brings conflicts or expectations that exacerbate maternal anxiety. Similarly, qualitative evidence and longitudinal studies from South Asia emphasize relational stressors in joint families. Newly married women often cite difficulties in navigating the mother-in-law/daughter-in-law relationship as a key source of emotional strain. In rural Nepal, for instance, women who report poor relationship quality with their mothers-in-law are more prone to depressive symptoms in the early years of marriage (Gopalakrishnan et al., 2023a). Harmful gendered practices often tied to patrilocal norms, such as daughters-in-law eating last after all other family members, have also been linked to worse mental health outcomes like higher odds of depression (Gopalakrishnan et al., 2023b). Conversely, there is evidence that not all extended-family influences are negative: emotional and instrumental support from kin can alleviate loneliness and stress, which might explain why some studies (e.g. in Vietnam) observe mental health benefits for women in patrilocal households under certain conditions (Raymo et al., 2015).

Taken together, the literature suggests that the net impact of patrilocal co-residence on women's psychological well-being is context-dependent, hinging on the balance between the support a woman receives and the autonomy she foregoes. Crucially, most existing studies stop short of unpacking these offsetting mechanisms in detail. They tend to examine either empowerment indicators or mental health outcomes, but rarely both, leaving the interplay between autonomy, support, and psychological stress only

partially understood.

4.3.3 Gaps in the Literature: The Central Asian Context and Mechanisms for Stress

While the effects of patrilocal living on women's status and well-being have been studied in parts of South and East Asia, the Central Asian context remains markedly under-researched. Patrilocal marriage is prevalent across Central Asia. For example, Tajikistan, Uzbekistan, and Kyrgyzstan all maintain the expectation that a new wife joins her husband's parental household. Yet few quantitative studies have examined how this household structure impacts Central Asian women's lives. The cultural setting differs in important ways from other Asian regions. Decades of Soviet influence promoted female education and labor force participation, creating a generation of women with relatively high public-sphere autonomy, but these gains coexist with resilient patrilineal norms and strict deference to elders within the family. This unique mixture of egalitarian ideals and traditional patriarchy may intensify the stresses of co-residence.

Young daughters-in-law in Central Asia are often caught between modern aspirations and conservative in-law expectations, potentially facing conflict not only with husbands but also with senior women who enforce conformity. Initial evidence from Tajikistan underscores these tensions. Turaeva and Becker (2022) document that in Tajik patrilocal households, the presence of in-laws does not protect a woman from abuse by her husband. In fact, having parents-in-law in the home "abets rather than prevents" intimate partner violence and emotional abuse. Their study shows that the patrilocal arrangement can be detrimental to young wives' well-being, and draws attention to an often overlooked phenomenon: older women (mothers-in-law) acting as agents of control or even aggression toward younger women. This stands in contrast to some South Asian findings of reduced spousal violence under co-residence (Khalil and Mookerjee, 2019), suggesting that Central Asian settings may diverge due to different family power dynamics. Importantly, beyond the issue of overt violence, we know little

about how patrilocal living in Central Asia affects women's day-to-day psychological stress, or overall quality of life.

Moreover, across all regions, there is an empirical gap in linking the autonomy constraints of co-residence to women's psychological health. A growing body of research has examined how living with in-laws diminishes women's decision-making authority, freedom of movement, or labor force participation. However, few studies have sought to explicitly connect these strands of research by asking: Do the reductions in autonomy and/or the added supports in patrilocal households translate into measurable impacts on women's psychological well-being? While the literature on women's empowerment has extensively examined economic, social, and decision-making outcomes, it has largely overlooked psychological stress as a critical dimension of well-being. Conversely, research on women's psychological health has rarely incorporated autonomy and in-laws' support as mediating mechanisms, leaving the pathways through which household structures influence psychological well-being insufficiently understood.

4.4 Theoretical Framework

Psychological stress theory posits that individuals experience distress when external demands exceed their perceived control over the situation (Lazarus and Folkman, 1984). Similarly, the job demand–control model (Karasek, 1979) argues that environments characterized by high demands and low control are particularly detrimental to mental health. These frameworks are particularly relevant in the context of patrilocal households, where newly married women often face significant domestic responsibilities and restricted autonomy. In Kyrgyzstan, daughters-in-law typically occupy subordinate roles within extended families, with limited influence over household decisions, constrained mobility, and obligations to defer to elder family members.

Anthropological and sociological theories reinforce these insights by highlighting how household hierarchies institutionalize power asymmetries. Classical studies (e.g., Dyson and Moore (1983); Kandiyoti (1988)) show that patrilocal systems place young women

at the bottom of generational hierarchies. Das Gupta (1999) describes joint families as operating under a "corporate ethic", in which individual preferences, especially those of subordinate members, are subordinated to collective household goals. Such social structures create the conditions that mirror the high-demand, low-control environments associated with psychological distress.

Yet, these arrangements may also provide sources of support that mitigate stress. Senior female relatives, particularly mothers-in-law, may assist with childcare, domestic labor, and financial pooling. These supportive dynamics could offset the burdens of limited autonomy, suggesting a more nuanced relationship between co-residence and well-being. Whether co-residence is harmful or protective likely depends on the balance between autonomy constraints and available support.

To formalize this trade-off, I present a simple utility-based framework in which a woman's subjective well-being depends on her level of autonomy, support received from the extended family, and psychological stress. Let utility be defined as:

$$U = \alpha A + \beta S - \gamma C$$

where:

- A : Autonomy—freedom to make decisions and exercise agency.
- S : Support—practical assistance from in-laws (e.g., childcare, financial help).
- C : Psychological stress—worry, anxiety, or emotional conflict.

I assume $\alpha, \beta, \gamma > 0$. Autonomy and support raise utility, while stress lowers it.¹ Crucially, I model stress not as exogenous, but as a function of autonomy, support, and individual preferences:

$$C = f(A, S, \theta)$$

¹The structure of this utility function bears conceptual resemblance to multi-dimensional well-being measures such as CASP-19, a scale commonly used in aging studies to assess Control, Autonomy, Self-realization, and Pleasure (Sim et al., 2011). While CASP-19 is designed for older populations, the emphasis on autonomy and psychosocial well-being aligns with the components modeled here.

Here, θ represents heterogeneity in a woman's preference for autonomy. Women with a strong desire for independence (high θ) may experience greater distress when autonomy is constrained. Conversely, those more comfortable with traditional roles may experience less psychological cost from reduced decision-making power, particularly if supportive structures compensate for lower control.

This framework predicts that the net psychological impact of co-residence depends on how much autonomy is lost, how much support is gained, and how these interact with individual preferences. In the empirical analysis, I treat self-reported worry as a proxy for psychological stress and use it as the primary outcome to test whether autonomy and support mediate the effect of co-residence with in-laws. This approach bridges theoretical ambiguity with observable variation in women's lived experiences in Kyrgyzstan.

4.5 Empirical Strategy

4.5.1 Data and Descriptive Statistics

This study draws on data from the Life in Kyrgyzstan (LiK) survey, a nationally representative longitudinal dataset that covers a wide range of topics, including household demographics, economic activities, health, education, migration, social capital, and subjective well-being (Brück et al., 2014). The survey was first conducted in 2010, with subsequent waves in 2011, 2012, 2013, 2016, and 2019. The first wave of the survey included approximately 8,000 adults across 3,000 households. The survey covers all seven regions (oblasts) of Kyrgyzstan, as well as the cities of Bishkek and Osh, and is representative at both the national and regional levels (East, West, North, South). For the purposes of this analysis, I use data from the 2011–2013 waves, as these are the only years for which both psychological stress and decision-making power data are available.

Sample is restricted to married women under 35 to ensure that the analysis captures the population most vulnerable to patrilocal norms. Young daughters-in-law likely to

live with and defer to their husband's parents.

Outcome variables

To examine the effect of patrilocal residence on psychological stress, I use women's self-reported worries as a proxy. The survey includes around 10 distinct worry items, ranging from concerns about global terrorism to political stability. For the purpose of this study, I focus on three specific domains of worry that are most likely to be directly shaped by patrilocal residence and the accompanying intra-household dynamics. Specifically, respondents were asked: "On a scale from 0 to 10, where 0 means 'not worried at all' and 10 means 'extremely worried', how worried are you about (i) your own economic situation, (ii) your personal safety or security, and (iii) the future of your children?" Co-residence with in-laws may limit women's control over household finances, increase exposure to or fear of violence², harassment, or psychological pressure, and reduce autonomy in decisions concerning children's well-being. As such, worries related to economic insecurity, personal safety, and children's future are conceptually aligned with the types of stressors that may arise in patrilocal households. To empirically validate this conceptual grouping, I conduct a principal component analysis (PCA) using 10 worry items. The results (Table 4.A.2) show that the three selected outcomes load strongly and in the same direction on a common component, indicating that they share a latent structure distinct from other worry items.

I deliberately exclude worry dimensions that are less directly linked to household context or women's personal experience (e.g., global terrorism, corruption, or political stability). These items are more likely to reflect macro-level anxieties related to national or global conditions and are less plausibly influenced by household structure. I later use these dimensions in a placebo test to assess whether the estimated effects of patrilocal residence are specific to household-related worries.

²While domestic violence is another potential source of psychological distress, I am unable to include it as a proxy for stress in this study due to data limitations. LiK survey does not collect information on personal exposure to domestic abuse. However, worry captures perceived insecurity in domains directly shaped by household power dynamics and offers a culturally appropriate and ethically sound way to assess stress in contexts where more sensitive indicators are unavailable.

The variable of interest

The key explanatory variable is patrilocal residence.³ Using the household roster, I construct an indicator for whether a woman co-resides with any member of her husband's natal family, most often with his parents and, if present, siblings. A household is classified as patrilocal if the woman's in-laws are present in the household and listed in relation to the household head. The control group includes women in neolocal households.

Control variables

The regressions are controlled for the set of personal, husband, and geographic characteristics. First, I include women's personal characteristics such as educational attainment, age, and ethnicity. More educated women may face fewer economic worries, possess greater autonomy in household decisions, and have stronger coping mechanisms, all of which may reduce reported stress. I treat women's education as predetermined with respect to current co-residence status. In Kyrgyzstan, marriage often marks the end of women's educational attainment, especially for those who marry young. Upon marriage, decision-making authority over a woman's education typically shifts from her own hands to her husband and parents-in-law. While their pre-marriage educational achievements are generally accepted and valued, further education is often strongly discouraged. Woman's age is another important factor that may influence both household structure and psychological outcomes. Younger women, particularly newly married brides, are more likely to enter patrilocal households and to experience increased emotional vulnerability due to limited bargaining power, support, and status within the extended family. Furthermore, Kyrgyzstan is a multiethnic society with ethnicity-specific gender norms and marital customs (Landmann et al., 2018). For instance, the practice of bride kidnapping (*ala-kachuu*) is almost exclusively observed among Kyrgyz.

³“Patrilocal residence” as used in this paper, differs from the broader concept of “patrilocality” commonly used in anthropology. The anthropological concept of patrilocality refers to post-marital residence with or near the husband's extended family. In line with the economics literature, I use the term “patrilocal residence” to refer specifically to co-residence with the husband's natal family. This definition reflects the most observable and restrictive form of patrilocality.

However, the absence of such practices among other groups, such as Uzbeks, does not necessarily imply more egalitarian gender norms. Other ethnic groups may maintain strict patriarchal structures, too. I account for the two main ethnic groups in the sample (Kyrgyz and Uzbek) and summarize the remaining groups as "other ethnicity".⁴ Second, husband's characteristics include his age and educational attainment to capture husband's attitudes on gender roles relevant for the woman's agency and well-being. Third, the set of variables relates to the residence of the women and helps us account for geographic heterogeneity. The North is historically more economically developed than the South, and urban areas are more developed than rural areas (Anderson and Pomfret, 2002; Fletcher and Sergeyev, 2002). Thus, I control for regional and rural fixed effects.

Descriptive Statistics

Table 4.1 presents summary statistics for the full sample and separately for women residing in patrilocal and neolocal households.⁵ The majority of women in the sample (67.4%) live in patrilocal households.

There is no significant difference in the average years of education between women in patrilocal and nuclear households. However, women in neolocal households are, on average, about four years older than those in patrilocal households. A similar age gap is observed for husbands, along with comparable educational attainment between the two household types.

Women in neolocal families report consistently higher levels of worry across all three domains. Specifically, neolocal women report an average worry score of 6.80 regarding their own economic situation, compared to 6.12 among patrilocal women. Similarly, worries about personal security average 5.91 among neolocal women versus 5.30 among their patrilocal counterparts. Concerns about the future of children follow the same

⁴Other ethnicity mainly comprises Russians, Uigurs, Tajiks, and Kazakhs, but also includes a number of smaller ethnic groups.

⁵Cases of matrilineal residence, where a woman resides with her own parents after marriage, are extremely rare in Kyrgyzstan and negligible in the sample. Therefore, such cases are grouped with neolocal households.

pattern, with neolocal women reporting an average score of 7.38 compared to 6.78 among patrilocal women.

Table 4.1: Summary Statistics

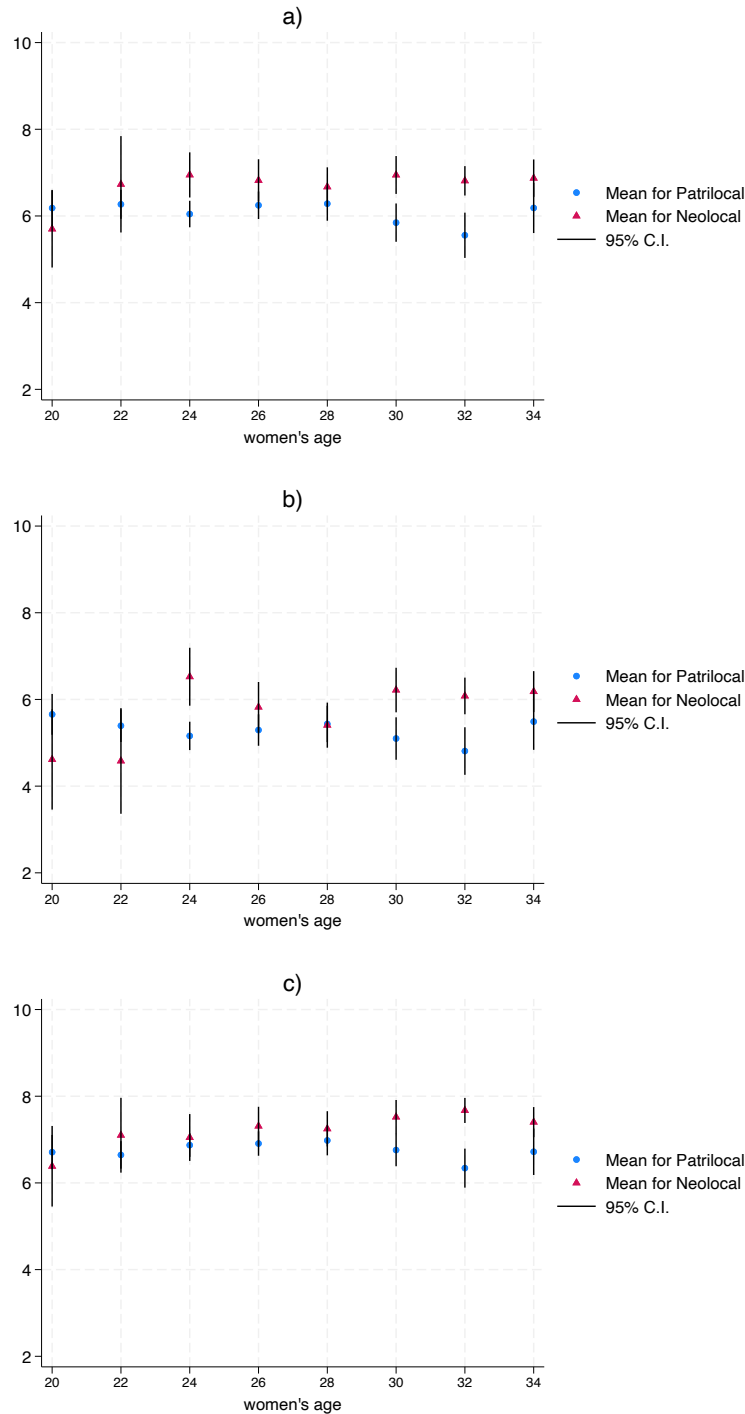
Variables	Full Sample		Neolocal		Patrilocal	
	Mean	SD	Mean	SD	Mean	SD
Outcome variable						
Worried about:						
own economic situation	6.332	2.785	6.800	2.482	6.116	2.889
own personal security	5.498	3.282	5.914	3.163	5.295	3.321
the future of her children	6.978	2.603	7.380	2.345	6.782	2.699
Instrumental variable						
Prop. of patrilocal hh in psu	0.650	0.233	0.505	0.262	0.720	0.181
Explanatory variables						
Women's age	26.390	4.203	28.860	3.712	25.197	3.896
Women's education: in years	11.909	2.406	12.105	2.554	11.764	2.318
Women's ethnicity						
Kyrgyz	0.672	0.469	0.683	0.465	0.667	0.471
Uzbek	0.159	0.366	0.098	0.298	0.188	0.391
Other	0.169	0.374	0.218	0.413	0.145	0.352
Husband's age	30.487	5.543	33.398	5.221	29.080	5.132
Husband's education: in years	11.590	2.422	11.818	2.558	11.474	2.343
Rural residence	0.703	0.457	0.596	0.491	0.755	0.430
Bride kidnapping (psu)	0.051	0.065	0.051	0.067	0.051	0.064
Gender attitudes (psu)	35.210	5.776	35.870	6.153	34.891	5.559
Observations	2,812		916		1,896	

Notes: Table shows means and standard deviations for the full sample and separately by household type. Worry indicators range from 0 (not worried at all) to 10 (extremely worried).

Source: Own calculations based on Life in Kyrgyzstan (LiK) survey rounds 2011, 2012 and 2013.

Figure 4.1 illustrates women's worries by age. If patrilocal women simply worried less because they are younger, then the difference should be most pronounced at younger ages. However, the figure shows the opposite: at ages 20–22, patrilocal women

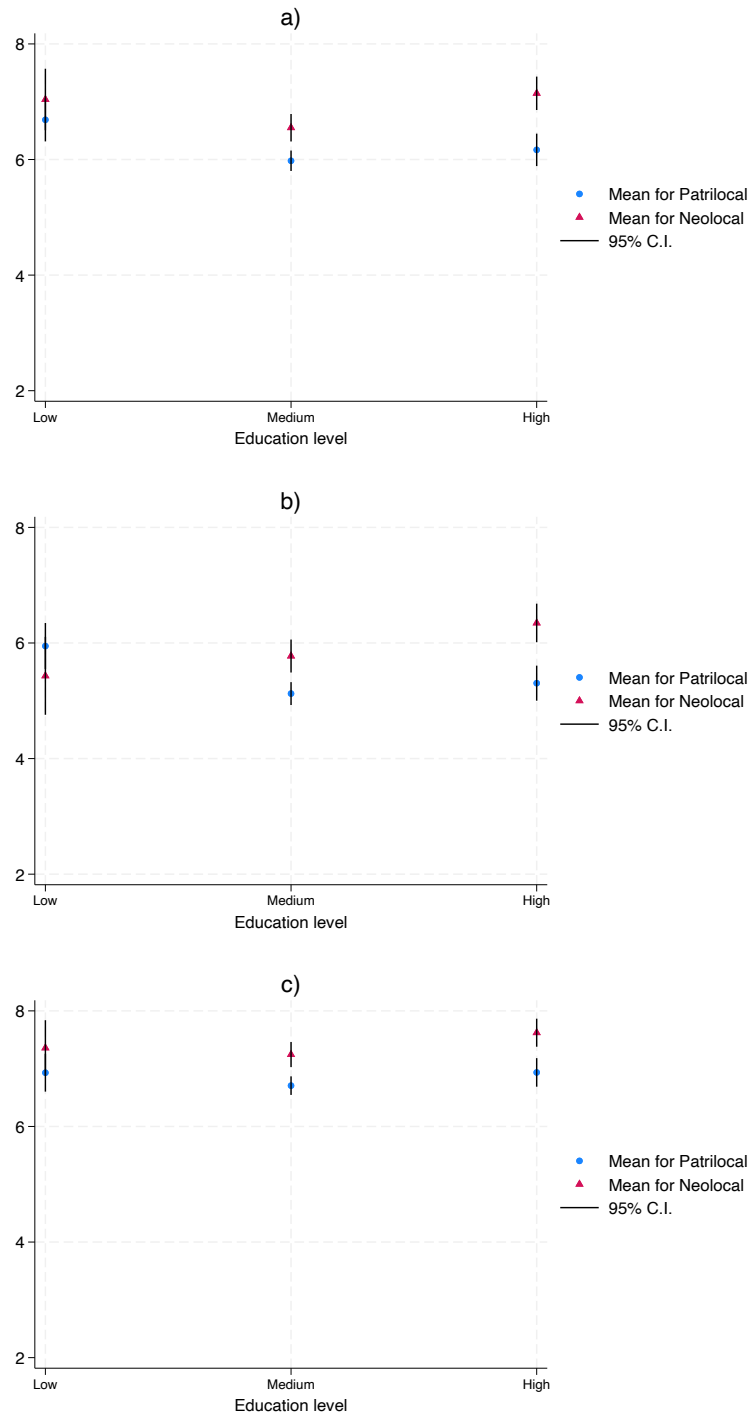
Figure 4.1: Women's self-reported worries by age



Notes: Figure 4.1 plots the mean outcomes of women's self-reported worries by age groups. Each panel corresponds to a different worry domain: a) Own economic situation, b) Own personal security, and (c) Children's future.

Source: Author's own illustration based on Life in Kyrgyzstan (LiK) survey rounds 2011, 2012 and 2013.

Figure 4.2: Women's self-reported worries by education level



Notes: Figure 4.2 plots the mean outcomes of women's self-reported worries by education level. Each panel corresponds to a different worry domain: a) Own economic situation, b) Own personal security, and (c) Children's future.

Source: Author's own illustration based on Life in Kyrgyzstan (LiK) survey rounds 2011, 2012 and 2013.

sometimes report higher worries, and only later does the pattern reverse. Alternatively, Figure 4.2 plots worry outcomes by the education level: low, medium and high, separately for patrilocal and neolocal households. The figure shows that patrilocal women consistently report lower worries than their neolocal counterparts regarding their economic situation and their children's future, regardless of education level. However, for personal security, patrilocal women with lower education levels report slightly higher worries than neolocal women. This pattern suggests a potential interaction between education and perceptions of safety, which I examine further in the heterogeneity analysis (Section 4.6.3).

4.5.2 Instrument and Identifying Assumptions

A central empirical challenge in estimating the causal effect of patrilocal residence on women's psychological stress lies in the potential endogeneity of co-residence with in-laws. Household living arrangements are unlikely to be random: families may select into patrilocality based on unobservable cultural preferences, financial necessity, or inter-generational expectations, factors that may also influence women's autonomy, support networks, and mental health.⁶ To address this concern, I employ an instrumental variable (IV) strategy that leverages exogenous variation in community-level norms, in line with recent literature on household formation and gender outcomes in patriarchal settings (Becker et al., 2017; Bazarkulova and Compton, 2021).

The instrument is the prevalence of patrilocal residence at the primary sampling unit (PSU) level, and it is defined as the proportion of married women in a PSU who report living with their in-laws. This measure captures the strength of shared expectations surrounding patrilocal residence within a community and serves as a proxy for the local environment influencing household structure. The underlying assumption is that women are more likely to co-reside with in-laws in areas where patrilocal living is

⁶Appendix Table 4.A.4 presents standardized differences for key observable pre-marital characteristics, including parental education, parental employment, number of siblings, age at marriage, and women's education level before marriage. Secondary education is used as some women may marry immediately after completing secondary school, making higher education an outcome rather than a pre-determined characteristic.

common and socially reinforced, regardless of their own preferences or psychological disposition (relevance).

The identification strategy relies on the assumption that the prevalence of patrilocal residence in a woman's PSU influences her psychological well-being only through its effect on her likelihood of co-residing with in-laws (exclusion restriction). I argue that this exclusion restriction is plausible for three reasons. First, the instrument varies at the community level and captures shared social expectations rather than individual-level characteristics or family-specific dynamics. Second, it is unlikely to directly affect a woman's mental health except via its influence on her household structure, specifically, the likelihood of co-residing with elder family members who may shape her autonomy, workload, and access to support. Third, the instrument does not reflect actual stressors or mental health conditions, but rather the prevailing social norms surrounding residential decisions.

Nonetheless, one potential concern is that PSU-level patrilocal prevalence could correlate with broader local gender norms that independently affect women's mental health. To strengthen the credibility of the exclusion restriction, I explicitly control for two key community-level characteristics that may confound the relationship between local norms and psychological outcomes: (i) Average gender attitudes⁷ in the PSU, capturing prevailing views about women's role in society; and (ii) Prevalence of bride kidnapping, a proxy for forced marital practices and deeply patriarchal environments. By including these controls, I aim to isolate variation in co-residence that stems specifically from the strength of patrilocal traditions, rather than broader forms of gender conservatism or marital constraint.

I further validate the identification strategy using a placebo test, showing that PSU-level patrilocal prevalence does not predict worries unrelated to household structure (see Section 4.6.4, Table 4.A.7). This supports the interpretation that the instrument influences psychological stress primarily through household living arrangements rather than unobserved community-level factors.

⁷A list of the variables used to construct gender attitudes is provided in Table 4.A.3.

Importantly, my instrument is continuous, while the endogenous treatment (co-residence with in-laws) is binary. Recent methodological advances show that in such settings, the two-stage least squares (2SLS) estimates can still be interpreted causally. As shown by Alvarez and Toneto (2024), under standard assumptions (exclusion and relevance), the 2SLS coefficient identifies a weighted average of local average treatment effects among subpopulations whose treatment status responds to marginal changes in the instrument. These so-called “marginal compliance” groups are defined with respect to deviations in the instrument from its conditional mean. The weights are positive and sum to one, with greater weight placed on more extreme values of the instrument, that is, values further from the local mean. This interpretation reinforces the credibility and policy relevance of the estimated effects, as it captures the impact of co-residence on women whose living arrangements are most responsive to community norms. It also avoids the need to discretize the instrument or adopt the stronger assumptions required for marginal treatment effect models.

While no instrumental variable is immune to critique, I argue that PSU-level patrilocal prevalence offers a theoretically grounded and empirically credible source of exogenous variation in co-residence. It allows to estimate the effect of extended-family living arrangements on young married women’s emotional well-being, while addressing concerns of self-selection and omitted variable bias.

4.5.3 Two-Stage Least Squares Estimation

The empirical analysis estimates the effect of co-residence with in-laws on women’s psychological stress using a two-stage least squares (2SLS) framework. The 2SLS strategy proceeds in two stages. The first-stage model estimates the effect of the prevalence of patrilocal residence in a woman’s community on her likelihood of living in a patrilocal household:

$$\text{Patrilocal residence}_i = \alpha_0 + \alpha_1 IV_{p(i)} + \alpha_2 B_{p(i)} + \alpha_3 G_{p(i)} + \alpha_4 X'_i + \rho_0 + \lambda_s + \nu_i \quad (4.1)$$

where $Patrilocal\ residence_i$ is a binary indicator equaling to 1 if woman i lives with her husband's natal family. $IV_{p(i)}$ is the prevalence of patrilocal residence in the respondent's primary sampling unit p , excluding her own household to avoid mechanical correlation. $B_{p(i)}$ is the prevalence of bride kidnapping in PSU $p(i)$, capturing local norms related to marriage formation. $G_{p(i)}$ is the average level of gender attitudes in PSU $p(i)$, capturing prevailing views about women's roles in society. X'_i is a vector of individual-level characteristics, while ρ_o and λ_s are oblast and survey-year fixed effects, respectively. ν_i is the first-stage error term. Standard errors are clustered at the PSU level. α_1 is the coefficient of interest in the first stage, indicating the strength of the instrument. I confirmed the validity of the potential instrument regressor using the Bound et al. (1995) test. The first-stage regression results are reported in the Panel B of Tables 4.2-4.4.

In the second stage, I estimate the effect of predicted patrilocal residence (from the first stage) on psychological stress outcomes:

$$Y_i = \beta_0 + \beta_1 \widehat{Patrilocal\ residence}_i + \beta_2 B_{p(i)} + \beta_3 G_{p(i)} + \beta_4 X'_i + \delta_0 + \gamma_s + \epsilon_i \quad (4.2)$$

where Y_i is the outcome of interest for the woman i : either her worries about her own economic situation, her personal security, or her children's future. $\widehat{Patrilocal\ residence}_i$ is the fitted value of patrilocal residence from the first stage. X'_i is a vector of individual-level characteristics, while δ_o and λ_s capture oblast and survey-year fixed effects, respectively. As in Eq. (4.1), $B_{p(i)}$ and $G_{p(i)}$ capture PSU-level bride kidnapping prevalence and average gender attitudes, respectively. ϵ_i is the second-stage error term. The key parameter of interest is β_1 , which captures the causal effect of co-residing with in-laws on psychological stress, proxied by worry scores. Standard errors are clustered at the PSU level.

4.6 Results

This section presents the empirical findings on the impact of patrilocal residence on women's stress. I begin by reporting the main results from OLS and 2SLS regressions, which estimate the overall impact of living in a patrilocal household on self-reported worry across three key domains: own economic situation, own personal security, and the future of children. To assess the robustness of the findings, I implement sample restriction checks to ensure consistency across outcomes. I then explore the mechanisms that may explain these effects, with a particular focus on intra-household hierarchy and co-residence with a mother-in-law. Finally, I present results from heterogeneity analyses along key dimensions, including rural versus urban residence.

4.6.1 Main Results

Tables 4.2–4.4 report the estimated effects of patrilocal residence on women's worry levels across three domains: financial matters, child-related issues, and personal security. In each table, Panel A presents the OLS estimates, followed by the 2SLS results in Panel B. Column (1) includes only community-level controls and year fixed effects. Column (2) adds women's individual characteristics: age, education, their interaction term, and ethnicity. Column (3) further includes husband's characteristics: age, education, and their interaction term. Column (4) additionally controls for regional (oblast) and rural fixed effects.

The OLS estimates presented in Panel A of Tables 4.2–4.4 reveal a strong and statistically significant negative relationship between patrilocal residence and women's self-reported worries across all three domains. As additional covariates at individual, spousal, and geographic level are sequentially included across specifications (1) to (4), the estimated coefficients decline modestly but remain consistently negative. Specifically, the magnitude of the association declines from -0.77 to -0.61 for financial worry, from -0.70 to -0.50 for personal security worry, and from -0.60 to -0.39 for worries about children's future. This relatively stable pattern suggests that omitted variable

bias due to observable characteristics is limited. However, OLS estimates may still suffer from bias due to unobserved factors that simultaneously affect both household structure and women's emotional well-being. For example, women may end up residing in patrilocal households based on unobserved cultural preferences, financial necessity, or inter-generational expectations, factors that may also influence their autonomy, support networks, and emotional well-being, thus leading to downward bias in OLS estimates. Therefore, 2SLS regressions are estimated to address the potential endogeneity of co-residence with in-laws and to obtain more credible estimates of its causal impact on women's psychological well-being.

The top parts of Panel B of Tables 4.2–4.4 report the first-stage regression results that assess the strength and relevance of the instrument. Across all three outcomes and specifications, the prevalence of patrilocal households in a woman's primary sampling unit (PSU) is a strong and statistically significant predictor of individual-level patrilocal residence. In the fully controlled specifications (column 4), a 10 percentage point increase in the local share of patrilocal households is associated with a 6.3 to 6.4 percentage point increase in the likelihood that a woman resides with her in-laws. The F-statistics, ranging from 304 to 384, comfortably exceed conventional thresholds for weak instruments, confirming the relevance and strength of the instrument. These results validate the first-stage relationship and support the use of community-level patrilocal residence as a strong instrument in the 2SLS framework.

The bottom parts of Panel B of Tables 4.2–4.4 present the second-stage estimates of the causal effect of patrilocal residence on women's worry outcomes. The results reveal a consistent pattern of large and statistically significant negative effects across all three domains. Importantly, the coefficients remain modestly stable across specifications (1) to (4), despite the progressive inclusion of individual-, husband-, and region-level controls. This consistency indicates that the causal estimates are not sensitive to the inclusion of observed covariates and reinforces the robustness of the IV results.

Table 4.2: Effect of patrilocal residence on women's own economic worry

	(1)	(2)	(3)	(4)
Panel A: OLS estimation results				
Patrilocal residence	-0.771*** (0.181)	-0.737*** (0.175)	-0.767*** (0.178)	-0.612*** (0.153)
Observations	2,344	2,344	2,344	2,344
Panel B: 2SLS estimation results				
First stage				
Prop. of patrilocal hh in psu	0.865*** (0.031)	0.756*** (0.041)	0.748*** (0.043)	0.643*** (0.056)
F-statistic	774.552	346.292	307.078	303.925
Observations	2,344	2,344	2,344	2,344
Second stage				
Patrilocal residence	-2.865*** (0.750)	-3.024*** (0.863)	-3.190*** (0.881)	-2.908*** (0.855)
Observations	2,344	2,344	2,344	2,344
Interview year fixed effects	yes	yes	yes	yes
Community-level gender attitudes	yes	yes	yes	yes
Community-level bride kidnapping rate	yes	yes	yes	yes
Women characteristics	no	yes	yes	yes
Husband characteristics	no	no	yes	yes
Region (oblast) and rural fixed effects	no	no	no	yes

Notes: Table reports estimates from Ordinary Least Squares and Two-Stage Least Squares models. All specifications include interview year fixed effects, community-level gender attitudes, and community-level prevalence of bride kidnapping. Column (2) additionally controls for women's characteristics: age, education, their interaction term, and ethnicity. Column (3) further includes husband's characteristics: age, education, and their interaction term. The preferred specification in column (4) additionally controls for regional (oblast) and rural residence fixed effects. Standard errors (in parentheses) are clustered at the primary sampling unit level. Significance levels are indicated as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Own calculations based on Life in Kyrgyzstan (LiK) survey rounds 2011, 2012 and 2013.

Table 4.3: Effect of patrilocal residence on women's own personal security

	(1)	(2)	(3)	(4)
Panel A: OLS estimation results				
Patrilocal residence	-0.701*** (0.245)	-0.650*** (0.248)	-0.663*** (0.241)	-0.499** (0.210)
Observations	2,604	2,604	2,604	2,604
Panel B: 2SLS estimation results				
First stage				
Prop. of patrilocal hh in psu	0.878*** (0.026)	0.765*** (0.037)	0.753*** (0.039)	0.631*** (0.053)
F-statistic	1110.99	426.898	367.831	360.931
Observations	2,604	2,604	2,604	2,604
Second stage				
Patrilocal residence	-3.206*** (0.988)	-3.765*** (1.169)	-3.899*** (1.188)	-3.553*** (1.228)
Observations	2,604	2,604	2,604	2,604
Interview year fixed effects	yes	yes	yes	yes
Community-level gender attitudes	yes	yes	yes	yes
Community-level bride kidnapping rate	yes	yes	yes	yes
Women characteristics	no	yes	yes	yes
Husband characteristics	no	no	yes	yes
Region (oblast) and rural fixed effects	no	no	no	yes

Notes: Table reports estimates from Ordinary Least Squares and Two-Stage Least Squares models. All specifications include interview year fixed effects, community-level gender attitudes, and community-level prevalence of bride kidnapping. Column (2) additionally controls for women's characteristics: age, education, their interaction term, and ethnicity. Column (3) further includes husband's characteristics: age, education, and their interaction term. The preferred specification in column (4) additionally controls for regional (oblast) and rural residence fixed effects. Standard errors (in parentheses) are clustered at the primary sampling unit level. Significance levels are indicated as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Own calculations based on Life in Kyrgyzstan (LiK) survey rounds 2011, 2012 and 2013.

Table 4.4: Effect of patrilocal residence on women's worry about children future

	(1)	(2)	(3)	(4)
Panel A: OLS estimation results				
Patrilocal residence	-0.597*** (0.153)	-0.452*** (0.158)	-0.459*** (0.160)	-0.385*** (0.138)
Observations	2,596	2,596	2,596	2,596
Panel B: 2SLS estimation results				
First stage				
Prop. of patrilocal hh in psu	0.880*** (0.027)	0.771*** (0.037)	0.759*** (0.039)	0.645*** (0.051)
F-statistic	1077.46	443.837	381.471	383.933
Observations	2,596	2,596	2,596	2,596
Second stage				
Patrilocal residence	-2.127*** (0.621)	-1.944** (0.800)	-2.042** (0.822)	-1.943** (0.797)
Observations	2,596	2,596	2,596	2,596
Interview year fixed effects	yes	yes	yes	yes
Community-level gender attitudes	yes	yes	yes	yes
Community-level bride kidnapping rate	yes	yes	yes	yes
Women characteristics	no	yes	yes	yes
Husband characteristics	no	no	yes	yes
Region (oblast) and rural fixed effects	no	no	no	yes

Notes: Table reports estimates from Ordinary Least Squares and Two-Stage Least Squares models. All specifications include interview year fixed effects, community-level gender attitudes, and community-level prevalence of bride kidnapping. Column (2) additionally controls for women's characteristics: age, education, their interaction term, and ethnicity. Column (3) further includes husband's characteristics: age, education, and their interaction term. The preferred specification in column (4) additionally controls for regional (oblast) and rural residence fixed effects. Standard errors (in parentheses) are clustered at the primary sampling unit level. Significance levels are indicated as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Own calculations based on Life in Kyrgyzstan (LiK) survey rounds 2011, 2012 and 2013.

In the fully controlled specifications (column 4), patrilocal residence reduces women's financial worries by 2.91 points, personal security worries by 3.55 points, and child-related worries by 1.94 points. These effects are substantially larger in magnitude than the corresponding OLS estimates, which is consistent with the previously discussed con-

cern that OLS may be downward biased due to selection on unobservables. I interpret this as consistent with the local average treatment effect (LATE) captured by the IV.

Specifically, the instrument identifies the effect of co-residence for women whose likelihood of living with in-laws is shaped by the local prevalence of patrilocal residence. These women may have had weaker initial preferences for co-residence but complied due to local residential practices. In this sense, the larger negative effect found in the 2SLS estimation highlights how the causal effect of co-residence may be stronger for those women whose household arrangements are shaped by local constraints. Overall, these findings suggest that patrilocal residence substantially reduces psychological stress among young married women in Kyrgyzstan.

4.6.2 Mechanisms

In this section, I investigate the mechanisms behind the observed impact of patrilocal residence on women's psychological well-being. Building on the findings in Chapter 3 that co-residence with in-laws restricts young women's decision-making power, I test whether this reduction in autonomy helps explain the lower levels of psychological stress observed among women in patrilocal households. Specifically, I examine whether part of the effect of patrilocal residence on women's worries operates through diminished decision-making autonomy.⁸ Importantly, I adopt a domain-specific approach by aligning each worry outcome with its corresponding dimension of decision-making power. Financial worries are linked to financial decision-making autonomy (e.g., ability to make decisions about household finances). Child-related worries are linked to child-related decision-making autonomy (e.g., authority over children's education, health care). Personal security worries are linked to social decision-making autonomy (e.g., negotiating with neighbors, participation in community discussions). If the estimated effect of co-residence on stress diminishes when decision-making is included, this provides evidence of a mediation effect, supporting the theoretical framework.

⁸The model is estimated using the same 2SLS specification as in Eq.2, with decision-making autonomy added as an additional explanatory variable.

The results are presented in Panel A of Table 4.5. Including domain-specific decision-making autonomy does not meaningfully alter the strong negative impact of patrilocal residence on women's worries across all domains, where a negative coefficient indicates a reduction in reported worry levels. While the coefficients for decision-making autonomy remain statistically insignificant, patrilocal residence continues to significantly reduce financial worries (-3.21), personal security worries (-3.72), and child-related worries (-1.92). This pattern suggests that reduced decision-making power does not mediate the impact of co-residence on women's psychological stress. Instead, it points toward alternative mechanisms such as support from in-laws as more plausible pathways.

Therefore, I examine whether instrumental support from in-laws serves as a mediating pathway through which patrilocal residence influences women's psychological stress. Specifically, I assess whether the presence of in-laws who contribute economically, assist with childcare, or hold more conservative gender attitudes is associated with lower worry levels among co-residing women.⁹ I adopt a domain-specific approach for this exploratory mechanism, aligning each worry outcome with a theoretically relevant type of in-law support: financial worries with in-laws' economic contributions to household income, personal security worries with in-laws' gender attitudes, and child-related worries with in-laws' involvement in childcare. For women in neolocal households, support measures are coded as zero, as these forms of instrumental assistance are not available outside of co-residing arrangements.

The results are presented in Panel B of Table 4.5. Patrilocal residence continues to significantly reduce financial (-3.33), personal security (-3.61), and child-related worries (-2.31) even after controlling for in-law support measures, indicating that these factors only partially account for the psychological benefits of co-residence. Notably, economic contributions from in-laws are significantly and positively associated with women's financial worries (0.87). While counterintuitive, this likely reflects that such

⁹Each model is estimated using the same 2SLS specification as in Eq.2, with income contribution, gender attitudes, or child-care support added as an additional explanatory variable.

Table 4.5: Potential mechanisms

	Own economic situation	Own personal security	Children's future
Panel A: Decision-making power			
Patrilocal residence	-3.206*** (0.982)	-3.724*** (1.376)	-1.921** (0.806)
Financial decisions	-0.517 (0.377)		
Social decisions		-0.333 (0.467)	
Child-related decisions			0.190 (0.179)
Observations	2,344	2,604	2,596
Panel B: In-laws' support			
Patrilocal residence	-3.333*** (1.050)	-3.609*** (1.189)	-2.311** (1.024)
Income contribution	0.868** (0.416)		
Gender attitudes		0.689*** (0.188)	
Child-care support			0.658 (0.476)
Observations	2,344	2,604	2,596
Interview year fixed effects	yes	yes	yes
Community-level gender attitudes	yes	yes	yes
Community-level bride kidnapping rate	yes	yes	yes
Women characteristics	yes	yes	yes
Husband characteristics	yes	yes	yes
Region (oblast) and rural fixed effects	yes	yes	yes

Notes: Table reports estimates from Two-Stage Least Squares models examining potential mechanisms through which patrilocal residence affects women's worries. Panel A includes domain-specific decision-making autonomy (financial, social, and child-related) as explanatory variables, while Panel B includes measures of in-law support: income contributions to the household, in-laws' gender attitudes (higher values indicate more conservative attitudes), and in-law child-care assistance. Gender attitudes are measured using five self-reported items capturing views on gender roles. All items are used to conduct a factor analysis and to extract one single latent factor. For women in neolocal households, support variables are coded as zero. Standard errors (in parentheses) are clustered at the primary sampling unit level. Significance levels are indicated as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Own calculations based on Life in Kyrgyzstan (LiK) survey rounds 2011, 2012 and 2013.

contributions occur in financially strained households, where underlying economic difficulties may amplify rather than ease women's concerns. In-laws' conservative gender attitudes are also significantly and positively associated with personal security worries (0.69), suggesting that living with more conservative in-laws may intensify women's sense of insecurity, potentially due to stricter controls over their mobility, autonomy, and household participation. In contrast, in-law child-care support shows no statistically significant association with child-related worries, indicating that this form of assistance does not meaningfully reduce women's concerns about their children's future.

To strengthen the credibility of the analyses, I conduct a formal coefficient comparison test to examine whether the differences in the patrilocal residence coefficients between the baseline 2SLS model and the models including mediators are statistically significant. This provides a more rigorous basis for evaluating the role of each proposed mechanism. The test results presented in Table 4.A.5 indicate that the changes in the coefficients are not statistically significant, reinforcing the conclusion that the observed psychological benefits of patrilocal residence are not primarily explained by variation in decision-making power or instrumental support from in-laws.

4.6.3 Heterogeneity Analyses

To explore whether the protective effects of patrilocal residence on women's psychological well-being vary across subgroups, I conduct a series of heterogeneity analyses. These analyses are motivated by the idea that the psychological benefits of co-residence with in-laws may not be uniform but instead depend on women's position within the household and broader socio-cultural context.

First, I examine heterogeneity by marriage duration. In patrilocal households, newly married women typically occupy the lowest position in the household hierarchy and face stricter controls over their autonomy, while these dynamics may evolve as they age and gain status within the family. If adaptation over time or improved household standing

reduces psychological distress, I expect the beneficial effects of patrilocal residence to be stronger among women in longer-term marriages. Results are presented in Panel A of Table 4.6. The interaction between patrilocal residence and years married is statistically insignificant across all domains, indicating that the psychological effects of co-residence are relatively stable over the course of marriage. Nevertheless, the main effect of patrilocal residence remains negative and statistically significant, suggesting that the stress-reducing benefits of co-residence persist regardless of marital duration.

Second, I assess differences by urban versus rural residence. Extended family structures and traditional gender norms are more entrenched in rural areas, which may intensify the psychological effects of patrilocal living. Conversely, urban contexts often provide women with greater access to external networks and employment opportunities, potentially mitigating the stress associated with co-residence. Results are presented in Panel B of Table 4.6. The interaction between patrilocal residence and rural location is large, negative, and statistically significant across economic, personal security, and child-related worries. This pattern suggests that the protective effects of co-residence on psychological well-being are more pronounced for rural women. This finding is consistent with the interpretation that rural extended households have more entrenched kinship systems and stronger in-law support networks, which may provide meaningful mitigation against economic uncertainty, personal insecurity, and concerns about children's futures.

Finally, I explore differences by women's years of education. Educated women may have stronger preferences for autonomy and greater exposure to egalitarian norms, potentially making the restrictive aspects of patrilocal living more psychologically costly. In contrast, less educated women may rely more heavily on in-laws for economic security, childcare, and personal protection, which could reduce their psychological stress within patrilocal households. To test these possibilities, I stratify the sample by education level and re-estimate the models within each group. Results are presented in Panel C of Table 4.6. Neither the main effect of education nor its interaction with patrilocal

Table 4.6: Heterogeneity in the effects of patrilocal residence on women's worry

	Own economic situation	Own personal security	Children's future
Panel A: By marriage duration			
Patrilocal residence	-3.625*** (1.091)	-4.010*** (1.416)	-2.193** (1.046)
Marriage years	-1.223* (0.644)	-1.307* (0.750)	-0.616 (0.610)
Patrilocal residence×Marriage years	1.156 (0.824)	0.762 (0.972)	0.263 (0.789)
Observations	2,181	2,421	2,415
Panel B: By rural/urban residence			
Patrilocal residence	-0.907 (0.747)	-1.815 (1.263)	-0.285 (0.664)
Rural	2.639*** (0.975)	2.388 (1.468)	2.575*** (0.990)
Patrilocal residence×Rural	-4.207*** (1.355)	-3.896* (2.026)	-3.872*** (1.356)
Observations	2,344	2,604	2,596
Panel C: By education years			
Patrilocal residence	-0.192 (2.759)	-3.900 (3.395)	-2.512 (2.570)
Education years	0.049 (0.507)	-0.252 (0.599)	-0.064 (0.448)
Patrilocal residence×Education years	-0.219 (0.215)	0.031 (0.262)	0.042 (0.207)
Observations	2,344	2,604	2,596
Interview year fixed effects	yes	yes	yes
Community-level gender attitudes	yes	yes	yes
Community-level bride kidnapping rate	yes	yes	yes
Women characteristics	yes	yes	yes
Husband characteristics	yes	yes	yes
Region (oblast) and rural fixed effects	yes	yes	yes

Notes: Table reports estimates from Two-Stage Least Squares models. Panel A presents estimates by marriage duration, Panel B by rural versus urban residence, and Panel C by women's education. All specifications control for interview year fixed effects, community-level gender attitudes, community-level bride kidnapping rates, women's characteristics (age, education, their interaction term, and ethnicity), husband's characteristics (age, education, and their interaction term), and regional (oblast) and rural fixed effects. Standard errors (in parentheses) are clustered at the primary sampling unit level. Significance levels are indicated as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Own calculations based on Life in Kyrgyzstan (LiK) survey rounds 2011, 2012 and 2013.

residence is statistically significant in any domain. This implies that the psychological benefits of co-residence are broadly similar across educational groups, indicating that education does not substantially shape how women experience the stress-related implications of patrilocal living.

4.6.4 Robustness Checks

To ensure the robustness of the findings, I conduct the following analyses. First, I assess the sensitivity of the results to the exclusion of outlier PSUs with extreme values for patrilocal prevalence. Since the instrument relies on community-level variation in patrilocal prevalence, removing PSUs at the upper and lower tails of this distribution allows me to verify that the findings are not driven by a small set of highly atypical communities. Table 4.A.6 reports the results after excluding PSUs in the top and bottom 5% of the community-level patrilocal prevalence distribution, thereby removing communities where co-residence is extremely rare or nearly universal. The estimated effects remain negative, statistically significant, and similar in magnitude to the baseline results across all three domains: patrilocal residence reduces financial worries by 4.63 points, personal security worries by 4.39 points, and child-related worries by 2.87 points. These findings confirm that the main results are not driven by a subset of outlier communities at the upper or lower tails of the patrilocal prevalence distribution.

Second, I conduct a placebo test by estimating the effect of patrilocal residence on an outcome theoretically unrelated to household structure: worries about global terrorism, political stability, and corruption. Non-significant results on this placebo outcome would support the interpretation that the main findings are not driven by unobserved confounders affecting overall worry tendencies beyond household-related domains. Results are presented in Table 4.A.7. In line with expectations, the coefficients are small and statistically insignificant across all three placebo outcomes, underscoring that the observed effects of patrilocal residence are specific to household-related worries rather than reflecting a broader tendency toward elevated or generalized worry.

4.7 Conclusion

This study provides the first causal evidence on the psychological effects of patrilocal residence for young married women in Kyrgyzstan. Contrary to common assumptions that co-residence with in-laws uniformly increases stress by restricting women's autonomy, the findings reveal a more complex picture: women in patrilocal households report significantly lower levels of worry about their economic situation, personal security, and their children's future compared to women in neolocal households. This suggests that, in this context, extended family living arrangements may provide protective effects against psychological distress, despite their well-documented constraints on women's autonomy.

Beyond estimating the overall effect, this study sheds light on the mechanisms underlying the relationship between patrilocal residence and women's psychological stress. The analysis shows that diminished decision-making autonomy does not explain the lower worry levels observed among women in patrilocal households, as coefficients for decision-making autonomy are small and statistically insignificant across all domains. Instead, financial support from in-laws and their conservative gender attitudes emerge as partial channels. However, even after accounting for in-laws' economic contributions, child-care assistance, and gender attitudes, patrilocal residence continues to significantly reduce financial, personal security, and child-related worries. These findings indicate that while in-law financial support and gender attitudes explain some of the psychological benefits of co-residence. Notably, in-laws' economic contributions are positively associated with women's financial worries, reflecting that such contributions often occur in households under financial strain, where underlying hardship outweighs any stress-relieving effect of additional income. Similarly, conservative gender attitudes among in-laws are linked to higher personal security worries, underscoring the potential psychological costs of restrictive social norms. In contrast, in-laws' child-care assistance shows no significant association with mothers' worries about their children's future.

The heterogeneity analysis further reveals that the stress-reducing effects of patrilo-

cal living are especially pronounced for rural women, likely reflecting stronger kinship networks and more embedded child-care support systems in these communities. In contrast, the effects do not significantly differ by marital duration or women's education, implying that the psychological benefits of co-residence are broadly shared across these groups.

These findings contribute to broader debates on the role of kinship systems in shaping women's well-being. While patrilocal living has been widely characterized as disempowering, this study shows that its effects on psychological stress are not uniformly negative and may even be protective under certain conditions. This has important implications for policy. Interventions aimed at improving women's well-being in patrilocal societies should not solely focus on increasing autonomy but also consider how to preserve and enhance the supportive functions of extended families such as child-care, financial pooling, and collective protection while mitigating their more restrictive aspects.

Despite these contributions, this study has limitations. First, the use of an instrumental variable strategy identifies a local average treatment effect, capturing the impact of patrilocal residence for a subset of women, whose living arrangements are influenced by the local prevalence of patrilocal households. This limits external generalizability, as the estimated effect may not apply to women whose living arrangements are unaffected by community norms (i.e., always-takers or never-takers). However, the approach strengthens internal validity by providing credible causal evidence for a policy-relevant subgroup, whose decisions are responsive to prevailing community norms. Second, our primary outcome measure self-reported worry levels captures an important dimension of psychological stress but does not reflect the multidimensional nature of mental well-being, such as depression, anxiety, or subjective life satisfaction. Nevertheless, worry intensity is a well-established proxy for underlying stress and is policy-relevant, as it reflects perceived threats to economic security, personal safety, and children's futures. Future research could expand on this by incorporating multidimensional mental health

indicators or using qualitative approaches to better understand how women interpret and cope with psychological distress within extended family settings. Third, the data are cross-sectional, limiting insights into how psychological well-being evolves over time within changing household structures. Future research could build on these findings by using longitudinal data to examine dynamic effects and by incorporating qualitative methods to better understand the lived experiences of women in multi-generational households. Lastly, although we control for key confounders and conduct extensive robustness checks, unobserved, time-varying community-level factors could still influence both residence patterns and women's stress outcomes. However, the consistency of results across specifications and the placebo tests mitigates this concern and reinforces the credibility of conclusions made.

Overall, this study underscores the importance of moving beyond a singular focus on autonomy to capture the complex trade-offs of co-residence with in-laws. In doing so, it advances our understanding of how household structure, kinship norms, and intra-household dynamics jointly shape women's psychological well-being in patrilineal societies.

Appendix

Table 4.A.1: Eigenvalues and explained variance by the principle components

Components	Eigenvalues	Variance	Cumulative variance
PC1	3.780	0.378	0.378
PC2	1.239	0.124	0.502
PC3	1.014	0.101	0.603
PC4	0.763	0.076	0.679
PC5	0.6977	0.070	0.749
PC6	0.598	0.060	0.809
PC7	0.539	0.054	0.863
PC8	0.515	0.052	0.915
PC9	0.492	0.049	0.964
PC10	0.359	0.036	1.0000

Notes: The table shows the eigenvalues, the percentage of variance explained by each principal component as well as the cumulative explained variance.

Source: Own calculations based on Life in Kyrgyzstan (LiK) survey rounds 2011, 2012 and 2013.

Table 4.A.2: Loadings on the principle component

Variables	Loadings
Worried about:	
Your own economic situation	0.535
Your personal security	0.460
The future of your children	0.469
Quality of education	0.179
Corruption	0.019
General economic development	-0.205
Energy supply to your household	-0.218
Environmental protection	-0.165
Global terrorism	-0.055
The stability of the political system	-0.135

Notes: The table shows loadings on the relevant principle component (component 2). Worries on own economic situation, personal security and future of own children have relatively strong positive loadings on component 2, showing they cluster separately from other types of worry.

Source: Own calculations based on Life in Kyrgyzstan (LiK) survey rounds 2011, 2012 and 2013.

Table 4.A.3: Variables used for gender attitudes

Variables	Description
Important decisions should be made by the husband rather than the wife	1 - (strongly) agree, 0 - (strongly) disagree, 0.5 - do not know.
A man's job is to earn money; a woman's job is to look after the home and family	1 - (strongly) agree, 0 - (strongly) disagree, 0.5 - do not know.
A woman is really fulfilled only when she becomes a mother	1 - (strongly) agree, 0 - (strongly) disagree, 0.5 - do not know.
A husband's career should be more important to the wife than her own	1 - (strongly) agree, 0 - (strongly) disagree, 0.5 - do not know.
A university education is more important for a boy than for a girl	1 - (strongly) agree, 0 - (strongly) disagree, 0.5 - do not know.

Source: Life in Kyrgyzstan (LiK) survey rounds 2011, 2012 and 2013.

Table 4.A.4: Standardized differences in pre-marital characteristics

Variable	Neolocal Mean	Patrilocal Mean	Std. Diff.	p-value
Mother was employed	0.870	0.877	-0.021	0.696
Father was employed	0.974	0.979	-0.039	0.459
Mother's education: high	0.202	0.172	0.076	0.145
Father's education: high	0.244	0.219	0.060	0.257
Number of siblings	3.870	3.981	0.054	0.267
Age at marriage	20.406	20.373	0.013	0.793
Women's education: secondary	0.525	0.556	-0.032	0.116

Notes: This table reports standardized mean differences in pre-marital characteristics between women living in patrilocal and neolocal households. The conventional thresholds are $p < 0.1$, $p < 0.05$, and $p < 0.01$.

Source: Own calculations based on Life in Kyrgyzstan (LiK) survey rounds 2011, 2012 and 2013.

Table 4.A.5: Formal test of coefficient differences across mechanism models

Outcome	Model Comparison	Diff.	z-value	p-value
Financial worry	Baseline vs. + financial decisions	0.298	0.229	0.818
Personal security worry	Baseline vs. + social decisions	0.171	0.093	0.926
Child-related worry	Baseline vs. + child decisions	-0.022	0.019	0.985
Financial worry	Baseline vs. + income support	0.425	0.314	0.754
Personal security worry	Baseline vs. + gender attitudes	0.056	0.033	0.924
Child-related worry	Baseline vs. + child-care support	0.368	0.284	0.777

Notes: The table reports the differences in the estimated IV coefficients for patrilocal residence from the baseline 2SLS model and the models including potential mediators. The p-values are based on two-sided z-tests using the formula: $z = \frac{\beta_1 - \beta_2}{\sqrt{SE_1^2 + SE_2^2}}$. The absence of statistically significant differences ($p > 0.1$) suggests that adding mediators does not meaningfully change the estimated causal effect.

Source: Own calculations based on Life in Kyrgyzstan (LiK) survey rounds 2011, 2012 and 2013.

Table 4.A.6: Effect of patrilocal residence after excluding outlier PSUs

	Own economic situation	Own personal security	Children's future
Patrilocal residence	-4.627*** (1.195)	-4.391*** (1.699)	-2.870** (1.170)
Observations	2,123	2,358	2,349
Interview year fixed effects	yes	yes	yes
Community-level gender attitudes	yes	yes	yes
Community-level bride kidnapping rate	yes	yes	yes
Women characteristics	yes	yes	yes
Husband characteristics	yes	yes	yes
Region (oblast) and rural fixed effects	yes	yes	yes

Notes: Table reports estimates from Two-Stage Least Squares models. Observations exclude PSUs in the top and bottom 5% of the distribution of community-level patrilocal prevalence, thereby removing communities where patrilocal residence is extremely rare or nearly universal. All specifications control for interview year fixed effects, community-level gender attitudes, community-level bride kidnapping rates, women's characteristics (age, education, their interaction term, and ethnicity), husband's characteristics (age, education, and their interaction term), and regional (oblast) and rural fixed effects. Standard errors (in parentheses) are clustered at the primary sampling unit level. Significance levels are indicated as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Own calculations based on Life in Kyrgyzstan (LiK) survey rounds 2011, 2012 and 2013.

Table 4.A.7: Placebo test: Effect of patrilocal residence on unrelated worry outcomes

	Global terrorism	Political stability	Corruption
Patrilocal residence	0.029 (1.020)	-1.373 (0.857)	-1.051 (0.666)
Observations	2,366	2,561	2,529
Interview year fixed effects	yes	yes	yes
Community-level gender attitudes	yes	yes	yes
Community-level bride kidnapping rate	yes	yes	yes
Women characteristics	yes	yes	yes
Husband characteristics	yes	yes	yes
Region (oblast) and rural fixed effects	yes	yes	yes

Notes: Table reports estimates from Two-Stage Least Squares models. Outcomes include worries that are theoretically unrelated to household structure. All specifications control for interview year fixed effects, community-level gender attitudes, community-level bride kidnapping rates, women's characteristics (age, education, their interaction term, and ethnicity), husband's characteristics (age, education, and their interaction term), and regional (oblast) and rural fixed effects. Standard errors (in parentheses) are clustered at the primary sampling unit level. Significance levels are indicated as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Own calculations based on Life in Kyrgyzstan (LiK) survey rounds 2011, 2012 and 2013.

5 Conclusion

This dissertation has explored how household structure affects child nutrition, women’s empowerment, and psychological well-being, illustrating that extended households function as systems of both constraint and support.

In Chapter 2 (joint work with Dana Bazarkulova), we have examined the causal relationship between birth order and child nutritional outcomes in Kyrgyzstan using mother fixed effects and harmonized data from three rounds of the Multiple Indicator Cluster Surveys. By comparing siblings within the same family, the study isolated the effect of birth order from unobserved household-level characteristics. The results showed that later-born children face sizable nutritional disadvantages relative to first-borns, particularly in height-for-age, which reflects long-term growth and cumulative deprivation. These findings underscore that resource dilution remains a salient mechanism shaping child health in low- and middle-income contexts. A key contribution of the chapter is its demonstration that intergenerational co-residence can mitigate these disadvantages. The presence of co-residing grandmothers significantly attenuates the negative birth-order gradient, suggesting that extended households may partially compensate for parental time and resource constraints by redistributing childcare and support. This highlights the central role of intergenerational caregiving in shaping early-life health outcomes and contributes to broader debates on how family structure mediates the production of child well-being.

The policy implications of these findings are substantial. First, child nutrition interventions should explicitly account for intra-household inequalities, particularly the vulnerability of later-born children in families with closely spaced births or limited resources. Targeted programs, such as conditional cash transfers or food supplementation, could prioritize households with multiple young children to counteract resource dilution. Second, policy efforts should combine community-level engagement with strategies that reduce families’ reliance on older children as economic contributors. Finally, strengthening maternal education remains a powerful lever for reducing birth-order disparities.

Policies that support girls' education and enhance maternal knowledge of child health can foster more equitable allocation of time and resources across siblings.

Next, in Chapter 3 (joint work with Dana Bazarkulova), we have examined how patrilocal living arrangements shape women's empowerment in Kyrgyzstan, drawing on nationally representative data from the Life in Kyrgyzstan survey and an instrumental variable strategy exploiting community-level variation in patrilocality. The analysis focused on three domains of household decision-making (financial, social, and child-related decisions) and provided the first causal evidence from a Central Asian context on how co-residence with in-laws affects women's agency in everyday life. The results show that patrilocal residence substantially reduces women's decision-making power, particularly in financial and social matters. No robust effect is observed for child-related decisions, suggesting that mothers retain some degree of authority over childcare or that these decisions are shared within extended families. A central insight from the chapter is the importance of intra-household hierarchies. Mechanism analysis reveals that the reduction in women's agency is not primarily driven by husbands' conservatism or gender attitudes, but rather by the dominant role of mothers-in-law within patrilocal households. This generational hierarchy places young women at the bottom of the authority structure, limiting their influence regardless of their education, employment, or other individual characteristics. The structural nature of these constraints is further supported by heterogeneity analysis. Neither longer marriage duration nor the birth of a son significantly mitigates the disempowering effects of patrilocality.

The findings also carry important policy implications. Formal pension programs in Indonesia and Ghana, for instance, have been shown to alter intergenerational support patterns and reduce the necessity of patrilocal and matrilocal living arrangements once parents are no longer financially dependent on their adult children (Bau, 2021). Similarly, housing support for newly married couples can lessen the economic incentives for co-residing with in-laws, though in Kyrgyzstan the fiscal space for large-scale pension expansion or housing subsidies remains limited. However, shifting deeply en-

trenched cultural and gender norms requires more than economic instruments alone. ICT-based programs, including mass media campaigns, mobile applications, and online platforms, have been increasingly used across Asia and Africa to challenge traditional gender norms. Yet, existing evidence largely focuses on their effectiveness in reducing intimate partner violence, with much less known about their ability to enhance women's autonomy within extended family systems. This gap is particularly important in contexts like Kyrgyzstan, where authority within households is often shared among multiple generations, including senior female relatives such as mothers-in-law. For this reason, ICT-based interventions must be tailored to reflect household hierarchies. Instead of targeting only young women with empowerment messages, programs should also include content directed at senior household members, encouraging shared decision-making and fostering intergenerational dialogue. Complementary community-based initiatives that promote egalitarian household practices provide a culturally grounded and feasible pathway for change. By engaging both men and women in conversations about gender roles, power dynamics, and joint decision-making, such programs can help gradually transform the norms that underpin women's constrained autonomy in patrilocal households.

Finally, in Chapter 4, I have extended the analysis of patrilocal residence to the psychological domain, exploring whether living with in-laws affects women's subjective well-being. Contrary to the common assumption that co-residing with in-laws uniformly increases stress by restricting women's autonomy, the findings reveal a more nuanced outcome. Women in patrilocal households report significantly lower levels of financial, personal security, and child-related worries than their neolocal counterparts. These results suggest that, in this context, extended family living arrangements can offer protective effects against psychological distress even when they constrain women's formal decision-making power as documented in the chapter 3. Beyond the average effect, the study also uncovers the mechanisms linking patrilocal residence to women's psychological outcomes. Reduced autonomy does not account for the lower worry levels

in patrilocal households. Instead, financial support from in-laws and their conservative gender attitudes partially mediate the relationship. Heterogeneity analysis further indicates that the stress-reducing effects of patrilocality are strongest for rural women, likely reflecting stronger kin networks. The effects do not vary by marital duration or education, suggesting that the psychological benefits of co-residence extend broadly across these groups.

While patrilocality is often portrayed primarily as a source of disempowerment for young married women, this study demonstrates that its consequences for psychological well-being are not uniformly negative and may be beneficial in settings where multigenerational households provide meaningful support, security, and shared responsibility. This has important policy implications. Improving women's well-being in patrilineal societies requires recognising both the restrictive and protective aspects of extended families. Policies should aim not only to expand women's autonomy but also to strengthen the supportive functions of co-residence, such as childcare sharing, financial pooling, and collective protection, while addressing the norms and hierarchies that limit individual agency.

Together, these studies provide new evidence on how family systems shape individual well-being in Kyrgyzstan. By combining robust causal identification with a context-specific understanding of kinship norms, the dissertation contributes to broader debates on the role of traditional family institutions in development. It underscores the importance of considering intra-household relations when designing policies aimed at improving child health, enhancing young women's agency and well-being.

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