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The economic consequences of single motherhood on children's cognitive outcomes in Indonesia

Wisnu Setiadi Nugroho[1*], Evi Noor Afifah[2], Andika Ridha Ayu Perdana[3], Zahra Amalia Syarifah[4]

[1,2]Department of Economics, Universitas Gadjah Mada, Yogyakarta, Indonesia
[3]Department of Economics, Universitas Islam Indonesia, Yogyakarta, Indonesia
[4]Department of Sociology, University of California, San Diego, United States
[*]Corresponding author: wisnu.nugroho@ugm.ac.id

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Authors' emails:
evinoor.afifah@ugm.ac.id
andika.ayu@uii.ac.id
zsyarifa@ucsd.edu

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Abstract

Purpose — Single motherhood is widely associated with poorer child outcomes, yet it remains unclear whether these disadvantages stem from family structure itself or from the economic shocks that accompany it. This distinction is particularly important in developing-country contexts, where weak social protection and labor market informality may amplify both channels. We examine how different pathways into single motherhood affect children's cognitive development.

Methods — We use longitudinal data from the Indonesia Family Life Survey (IFLS) and employ Structural Equation Modeling (SEM) to estimate both direct and indirect effects of maternal marital status on children's cognitive outcomes, while controlling for demographic and household characteristics.

Findings — The results show that children in single-mother households, particularly those experiencing divorce, have lower cognitive scores. Poverty plays a key mediating role, as higher poverty levels are associated with worse cognitive outcomes. Households headed by divorced individuals exhibit higher poverty, while the effect of widowhood is smaller and not statistically significant. In addition, larger household size and greater distance from economic centers increase poverty, whereas higher education of the household head and per capita expenditure reduce it.

Implication — The findings suggest that policies targeting single-mother households should address both economic vulnerability and structural constraints, including limited access to services and unequal labor market opportunities.

Originality — This paper contributes to the limited longitudinal literature in developing countries by comparing divorce and widowhood and their roles in perpetuating intergenerational disadvantages through economic and non-economic channels.

Keywords — Single Parenthood; Cognitive Development; Poverty; Family Structure; Indonesia

Introduction

Single mothers across low- and middle-income countries face a distinctive form of socioeconomic vulnerability as they must simultaneously secure income and provide intensive caregiving that often happens in contexts where both markets and states offer limited support. This dual burden is

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especially consequential in settings characterized by high labor informality and fragmented welfare systems. As a result, single motherhood represents a site where broader institutional constraints shape unequal welfare outcomes.

Recent studies attribute this vulnerability to a set of interrelated mechanisms. Gendered labor market structures expose women to wage penalties and unstable employment, particularly following marital dissolution, when caregiving responsibilities intensify, and career interruptions accumulate (Kalil & Ryan, 2020; Rees et al., 2023). These constraints reduce earning capacity and limit re-entry into formal employment. At the same time, the need to combine paid work with caregiving generates persistent job–family strain, often leading single mothers to adopt short-term coping strategies rather than long-term investment. Financial pressures are further compounded by the erosion of social support networks following divorce, which weakens informal insurance mechanisms, especially in developing-country contexts.

The economic strain in these households is further intensified by the dual burden of caregiving and income generation, often leading to significant work–family conflict (Musick & Meier, 2010; Nomaguchi & Milkie, 2020). Evidence suggests that single mothers frequently rely on short-term coping strategies to manage financial hardship and economic instability (Kalil & Ryan, 2020; McKenzie & McKay, 2018), while female-headed households face greater constraints in investing in children's education and development (Cooper & Stewart, 2021; Duncan et al., 2017). Furthermore, divorce reduces both economic and social resources, severely limiting children's developmental opportunities (Agmase, 2021). Household allocation decisions often reflect these precarious financial conditions; while female decision-makers tend to prioritize child-related and health expenditures, they do so under significant constraints (Rees et al., 2023; Ridge & Millar, 2011).

These household-level constraints have well-documented intergenerational consequences. Children in single-parent households tend to experience poorer educational, economic, and psychosocial outcomes, largely due to resource constraints and reduced parental time investment (Lee & McLanahan, 2015; McLanahan et al., 2013; McLanahan & Sandefur, 1997). Children in single-parent families also often experience worse development outcomes, with effects intensifying over time, particularly during early childhood and among boys. In resource-constrained settings, these disadvantages are often amplified as a lack of stable employment restricts households' ability to smooth shocks or invest in children's development. Beyond education, evidence also links parental absence to poorer mental health and higher substance use among children (Annor et al., 2024). Thus, single motherhood can become a channel through which structural inequalities are reproduced across generations.

Despite the issue's salience, their interaction with state support systems remains underexplored in many developing countries. Social protection programs in these contexts are often designed around poverty status or employment categories rather than family structure. This potentially overlooks the specific vulnerabilities associated with single-parent households and raises an important question on the extent to which existing welfare programs can mitigate or inadvertently reproduce the disadvantages faced by single mothers and their children.

Indonesia is particularly useful to examine this question. Over the past two decades, the country has developed an extensive social protection system, including educational transfer, conditional cash transfer, and a universal healthcare system. While these programs provide broad support to low-income households, few are explicitly designed to address the structural vulnerabilities associated with single motherhood. At the same time, rising divorce rates, persistent gender norms, and weak enforcement of child support obligations may further exacerbate these risks.

This paper builds on the broader literature on family structure and inequality by examining how maternal marital status shapes children's well-being in a developing-country context. Using longitudinal data from the Indonesia Family Life Survey (IFLS), we analyze the effects of divorce and widowhood on household poverty and children's cognitive outcomes. Combining Structural Equation Modeling (SEM) with instrumental-variable approaches, the analysis identifies both direct and mediated pathways through which family structure affects child development. In doing so, the paper contributes to a more general understanding of how gender, family structure, and welfare institutions interact to shape intergenerational inequality in developing countries.

Indonesia provides a relevant context due to rising divorce rates and shifting family structures. Divorce cases increased substantially over the past decade, as shown in Table 1, reflecting broader social and economic changes. Qibthiyyah and Utomo (2016) document declining fertility and changing marital patterns, including reduced assortative marriage, indicating evolving household dynamics. Consistent with this trend, Indonesia exhibits relatively high divorce rates compared to other Asian countries (Dommaraju & Jones, 2011). This is reflected in household composition patterns, where female-headed households are more prevalent among younger and older age groups, corresponding to higher rates of divorce and widowhood (Table 2)[1]. Over time, the share of female household heads has also increased, as shown in Table 3.

Table 1. Divorce Cases in Indonesia 2014-2023 (Court Ruling)

Year	Number of Divorce Cases
2014	344,237
2015	347,256
2016	365,633
2017	374,516
2018	408,202
2019	439,002
2020	291,677
2021	447,743
2022	516,344
2023	463,654

Source: Director General of the Religious Courts Administration, Supreme Court of the Republic of Indonesia, and Indonesia Statistic Report

Furthermore, Dommaraju and Jones (2011) show that Indonesia has a higher divorce rate than other Asian countries, and this rate tends to increase each year. The increasing rate of divorces is evident in the household head data from the National Socio-Economic Survey (Susenas). Table 2 shows the household head's gender, age, and place of residence based on the National Socio-Economic Survey (Susenas) in 2016.

Table 2. Household Head, Age, and Living Location

Age	Male (%)			Female (%)		
	Urban	Rural	Total	Urban	Rural	Total
<18	0.06	0.04	0.05	0.4	0.17	0.3
18-25	3.34	2.41	2.89	7.75	1.22	4.65
26-40	34.55	33.76	34.16	11.86	11.93	11.89
41-50	27.92	27.58	27.76	18.4	18.18	18.32
51-60	19.99	20.35	20.18	25.8	25.69	25.73
>60	14.12	15.87	14.96	35.76	42.83	39.09

Source: Susenas 2016, author's calculations.

This study uses IFLS wave 3 and wave 5 data, which provide detailed longitudinal information on household socioeconomic conditions. IFLS enables comparison of children's well-being across divorced and widowed single-mother households in Indonesia. Many divorces are often driven by economic factors and accompanied by weak enforcement of child support obligations, increasing children's vulnerability. Despite these trends, empirical research, especially in Indonesia, remains limited and largely focuses on psychological outcomes. This study extends the literature by examining both current well-being, proxied by consumption-based poverty measures, and future well-being through educational attainment.

We examine the effects of single parenthood on children's well-being and educational outcomes. Key variables include parental marital status, per capita expenditure, access to services,

[1] We are using Susenas 2016 to match the Indonesia Family Life Surveys Data Wave 5

and children's cognitive scores. In the analysis section, we try to distinguish between divorced and widowed single-mother households to capture heterogeneous effects.

Table 3. Percentage of Female Household Head 2012 - 2022

Year	Female Household Head (%)
2012	14.42
2013	14.84
2014	14.73
2015	14.63
2016	15.02
2017	15.17
2018	15.17
2019	15.46
2020	15.82
2021	14.38
2022	12.72

Source: Statistic Bureau of Indonesia, 2012-2022.

Gender differences are also considered. Recent studies show that the effects of family disadvantage may differ by gender, although the patterns are not uniform across outcomes. Evidence suggests that boys tend to be more responsive to family environment in early educational outcomes, while gender differences in longer-term outcomes, such as educational attainment and labor market performance, are less consistent and may even favor girls in certain contexts (Autor et al., 2019; Brenøe & Lundberg, 2018). In addition, children from single-parent or divorced families are more likely to experience adverse educational outcomes, reflecting both economic and non-economic constraints (Mencarini et al., 2019). These findings indicate that gendered responses to family disruption are heterogeneous and context-dependent. To situate these mechanisms, the following section reviews the theoretical and empirical channels linking single parenthood to child outcomes.

The effects of single parenthood on children and household welfare operate through interconnected mechanisms, including economic hardship, reduced parental support, limited access to community resources, parental conflict, and family instability (Cooper & Stewart, 2021; Härkönen et al., 2017; Lee & McLanahan, 2015; McLanahan et al., 2013). These channels jointly shape children's educational, health, and psychosocial outcomes.

Single-mother households face substantially higher poverty risks than two-parent families, reflecting structural economic disadvantages associated with single parenthood (Cooper & Stewart, 2021; McLanahan & Sandefur, 1997). Economic hardship is a key mechanism, as divorce is often followed by a significant decline in household income, particularly for women and their children (Härkönen et al., 2017; Nieuwenhuis & Maldonado, 2018). As a result, children in single-mother households are more likely to experience prolonged exposure to poverty, which reduces investments in health and education (Amato & Patterson, 2017; Shiba & Kondo, 2019). Although income accounts for much of the gap in outcomes, it does not fully explain differences across family types (Magnuson & Duncan, 2006; McLanahan & Sandefur, 1997). Economic vulnerability is further worsened by unstable employment and inconsistent child support (Cancian et al., 2011). The widening inequality reinforces disparities in children's outcomes (Cancian & Meyer, 2018; Cooper & Stewart, 2021; Kalil & Ryan, 2020).

Besides income, single parenthood also often reduces parental support and supervision. Parental involvement is central to child development, yet single parents tend to face higher levels of stress and time constraints (Meier et al., 2016; Nishioka et al., 2020). Empirical evidence suggests that children in single-parent families may receive lower levels of parental monitoring and educational support, which can increase the risk of behavioral and developmental problems (Fomby & Cherlin, 2007; Kalil & Ryan, 2020; McLanahan & Sandefur, 1997). While some children develop resilience, parental absence is also widely associated with emotional distress and adjustment difficulties (Amato, 2000; Härkönen et al., 2017). This pattern is also observed in the Indonesian context (Heri et al., 2022).

Another factor is limited access to community resources. Single-parent families are more likely to face residential and neighborhood disadvantages due to economic constraints, which reduce access to quality institutions and social support (Cooper & Stewart, 2021; Fomby & Cherlin, 2007). These conditions may limit access to education and health services and increase vulnerability during periods of crisis (Cusinato et al., 2020; Moncrief et al., 2014).

Parental conflict and family instability also play critical roles. Exposure to persistent conflict is associated with poorer child outcomes (Amato & Afifi, 2006; Camisasca et al., 2016; Kalmijn, 2016). In some cases, children in high-conflict intact families fare worse than those in divorced families, suggesting that conflict, rather than divorce per se, drives negative effects (Amato & Keith, 1991). However, post-divorce conflict often persists. More broadly, cumulative instability, including residential moves, school changes, and economic shocks, has lasting impacts on mental health and educational outcomes (Fergusson et al., 2007; Hess, 2022; Xu et al., 2008). Family instability may be as detrimental as low income itself (McLanahan & Sandefur, 1997), particularly when combined with repeated transitions (Fomby & Cherlin, 2007; Lee & McLanahan, 2015).

Gendered responses remain mixed. Some evidence suggests that boys tend to exhibit more immediate behavioral problems following family disruption, while girls may experience more internalizing difficulties, such as anxiety or depression. However, overall findings indicate that gender differences are relatively small and vary depending on the outcome and life stage (Autor et al., 2019; Härkönen et al., 2017; McLanahan et al., 2013).

Household characteristics also shape outcomes. Education of the household head is a key determinant of economic well-being, associated with higher productivity and lower poverty (Noble et al., 2015), though its impact varies across contexts. Female-headed households face higher poverty risks due to structural inequalities (Maitra & Vahid, 2006; Okojie, 2002). A larger household size increases the risk of poverty and reduces per capita investment in children.

Spatial factors further influence poverty. Rural and remote areas face persistent disadvantages due to weaker labor markets and limited opportunities (Glasmeier & Farrigan, 2003; Partridge & Rickman, 2008; Swaminathan & Findeis, 2004). Distance from metropolitan centers exacerbates poverty, although local economic growth can mitigate these effects (Fisher, 2004; Partridge & Rickman, 2008).

Method

Based on these mechanisms, this study empirically tests both direct and indirect pathways using a structural framework. This study employs Structural Equation Modeling (SEM) to examine interdependent relationships among variables. SEM allows the estimation of direct and indirect effects within a unified framework. The model follows a mediation structure, where intermediate outcomes link explanatory variables to outcomes:

$$Y_1 = \alpha_0 + \alpha_1 x_1 + \alpha_2 x_2 + \epsilon_1 \quad (1)$$

$$Y_2 = \gamma_0 + \gamma_1 Y_1 + \gamma_2 x_1 + \epsilon_1 \quad (2)$$

Whereas equation (1) is a mediation model of equation (2). Equation (2) with dependent variable Y_2 is explained by equation (1) plus other covariates closely related to the dependent variable in equation (2). The mechanism by which the model works is shown in Figure 1.

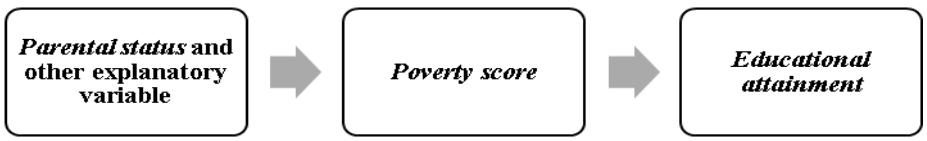

Figure 1. Mechanism Three Main Interest Variables
Source: Authors

We have two different equations (Y1 and Y2). Y1 is the dependent variable in equation (1) but becomes the independent (mediation) variable in equation (2). Here, Y_1 (poverty score) acts as

a mediator for Y_2 (cognitive score). Independent variables influence cognitive outcomes both directly and indirectly through poverty.

Table 4. Variables in The Model

Variable	Explanation
Y1	Poverty Score - Constructed based on the multidimensional poverty indicators defined by BPS RI, covering nine household characteristics, including Size of the house, type of floor mat, type of wall, level of education of household head and spouse on average, electricity access, clean water access, toilet access, kitchen and stove type, and asset ownership status. The indicators are summed to form a score ranging from 0 (non-poor) to 9 (very poor).
Y2	Cognitive Score - Derived from the IFLS5 child cognitive test (Book EK), which consists of 17 items assessing basic skills such as pattern recognition and numeracy. The score is calculated as the total number of correct answers and normalized to ensure comparability across modules.
X1	1. Dummy Married (Divorced+Widowed=1) 2. Dummy Married (Divorced=1) 3. Dummy Married (Widowed=1) - Captured using three dummy variables: (1) ever-married but currently single (divorced or widowed), (2) divorced, and (3) widowed, allowing differentiation between types of single-parent households.
X2	Household Size - The number of family members in the household.
X3	Distance from Capital - How far is the household from the nearest *Kecamatan* (Sub-district) Capital?
X4	Distance from Business Center - How far the household is from the nearest business center (traditional market or a group of shops).
X5	Household Head Education - Measures the years of schooling of the household head.
X6	Per Capita Expenditure - Shows the per capita expenditure of each individual in the household.
X7	Age - Explaining the age of respondents when taking the cognitive score test.
X8	Child Status - Explains whether children are adopted (=1) or biological children.
X9	Number of Children in the Household - Shows whether having more children means having fewer resources for each child.
X10	Gender - Child gender.
X11	Teenager (teenager=1) - Showing whether the children are already teenagers (12 years old and above).

Source: IFLS3 and IFLS5 processed by authors

Table 5. Descriptive Variables of All Samples

Variable	Observation	Mean	Standard Deviation	Min	Max
Total Cognitive Score	2,454	8.513855	4.183764	0	17
Sex (=1 Male)	2,454	0.5240424	0.4995234	0	1
Household Size	2,454	6.330073	2.394674	2	16
Distance to Capital (KM)	2,454	21.31842	24.74596	0.5	150
Distance to Business Area (KM)	2,454	3.616809	3.615004	0.2	27
Household Head Education	2,454	3.02608	0.9371464	1	5
Per Capita Expenditure (Rp)	2,454	412874.7	324657.1	54666.67	3824833
Poverty Score	2,454	2.150774	1.344496	0	8
Divorce	2,454	0.0387123	0.1929478	0	1
Share Divorce at Community (%)	2,454	4.299549	5.511272	0	50
Age	2,454	8.72599	5.541036	0	18
Number of Children in the Household	2,454	3.490628	1.84668	1	11
Children by Adoption	2,454	0.0167074	0.128199	0	1
Teenager (Dummy)	2,454	0.3031785	0.4597254	0	1

Source: IFLS3 and IFLS5 processed by authors.

The analysis uses IFLS 3 and IFLS 5 data, covering 2,454 observations. Key variables include poverty score (constructed from nine BPS indicators), cognitive score (based on IFLS child assessments), marital status (divorced and widowed), household size, remoteness (distance to capital and business centers), household head education, and per capita expenditure. Additional controls include age, gender, number of children, adoption status, and a teenage dummy (Table 4). Descriptive statistics in Table 5 show an average cognitive score of 8.51 (range 0–17) and a poverty score of 2.15 (range 0–8). Households average 6.33 members, with a mean per capita expenditure of Rp 412,874.

Divorce is relatively rare (3.87%), while the average child age is 8.73 years. Per capita expenditure averages Rp. 412,874.70, ranging from Rp. 54,666.67 to Rp. 3,824,833. The average age of children in the dataset is 8.73 years, ranging from 0 to 18 years. Households have an average of 3.49 children, ranging from 1 to 11 children. Adoption is rare, with only 2% of children adopted in the dataset. The teenager dummy variable indicates that teenagers make up 30.32% of the observations.

Results and Discussion

Factors Affecting Poverty

Poverty is a multidimensional condition reflecting economic constraints and broader vulnerabilities in living conditions. The results indicate that marital status, household size, spatial accessibility, education, and expenditure significantly shape poverty outcomes. Table 6A shows that family structure is associated with economic vulnerability. Households headed by divorced or widowed individuals exhibit higher poverty scores than married households, with a stronger effect for divorce (0.466) than widowhood (0.145, not significant). This is consistent with evidence that children in single-parent households face higher poverty risks (Rank & Hirschl, 1999), while remarriage reduces such risks (Morrison & Ritualo, 2000), and mothers are more likely than fathers to fall into poverty following separation (Bianchi et al., 1999).

Table 6A. SEM Results – Poverty Model

Variables	(1) Divorced + Widow Non-standardized	(2) Divorced + Widow Standardized	(3) Divorce Non-standardized	(4) Divorce Standardized	(5) Widow Non-standardized	(6) Widow Standardized
Marital status (1=divorced+widowed)	0.235*	0.035*	0.466*	0.036*	0.145	0.018
	(0.129)	(0.019)	(0.248)	(0.019)	(0.150)	(0.019)
Household Size	0.042***	0.075***	0.043***	0.076***	0.042***	0.075***
	(0.011)	(0.019)	(0.011)	(0.019)	(0.011)	(0.019)
Distance District Capital	0.006***	0.122***	0.006***	0.121***	0.006***	0.122***
	(0.001)	(0.020)	(0.001)	(0.020)	(0.001)	(0.020)
Distance from Business Center	0.035***	0.095***	0.034***	0.094***	0.035***	0.094***
	(0.007)	(0.020)	(0.007)	(0.020)	(0.007)	(0.020)
Household head education	-0.372***	-0.257***	-0.373***	-0.257***	-0.372***	-0.257***
	(0.029)	(0.019)	(0.029)	(0.019)	(0.029)	(0.019)
Per Capita Expenditure	-7.62e-07***	-0.178***	-7.62e-07***	-0.178***	-7.60e-07***	-0.177***
	(8.45e-08)	(0.019)	(8.45e-08)	(0.019)	(8.45e-08)	(0.019)
Constant	3.044***	2.292***	3.051***	2.297***	3.050***	2.296***
	(0.119)	(0.090)	(0.119)	(0.090)	(0.119)	(0.090)
R^2 Poverty Score	0.176	0.176	0.176	0.176	0.175	0.175
Observations	2,285	2,285	2,285	2,285	2,285	2,285

Note: Standard errors in parentheses.
*, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Household head education significantly reduces poverty (−0.372), reflecting improved labor market opportunities (Rank & Hirschl, 1999). In contrast, household size increases poverty (0.0422), consistent with resource dilution effects (Becker & Lewis, 1973; Lanjouw & Ravallion, 1995). Spatial factors also matter. A greater distance from district capitals and business centers is associated with higher poverty, reflecting limited access to economic opportunities. Overall, the model explains 17.6 percent of the variation in poverty.

Table 6B shows that poverty significantly reduces children's cognitive scores (−0.0846), consistent with evidence linking economic deprivation to lower cognitive development (Noble et al., 2015). Age is negatively associated with cognitive scores (−0.0161), and adopted children exhibit lower scores (−0.158), likely reflecting early-life disadvantages. Other factors, including gender and number of children, are not statistically significant. Adolescents also perform worse than younger children (−0.0992). Overall, the results highlight a key mechanism by which family structure influences poverty, which in turn negatively affects children's cognitive development.

Table 6B. SEM Results – Cognitive Score Model (natural log)

Variables	(1) Divorced + Widow Unstd	(2) Divorced + Widow Std	(3) Divorce Unstd	(4) Divorce Std	(5) Widow Unstd	(6) Widow Std
Poverty score	-0.085***	-0.231***	-0.085***	-0.231***	-0.085***	-0.231***
	(0.007)	(0.019)	(0.007)	(0.019)	(0.007)	(0.019)
Age	-0.016***	-0.184***	-0.016***	-0.185***	-0.016***	-0.184***
	(0.003)	(0.034)	(0.003)	(0.034)	(0.030)	(0.034)
Child Status (1=Adopted)	-0.158**	-0.042**	-0.158**	-0.042**	-0.158**	-0.042**
	(0.074)	(0.020)	(0.074)	(0.020)	(0.074)	(0.020)
Number of Children in The Household	-0.003	-0.099	-0.003	-0.010	-0.003	-0.010
	(0.005)	(0.020)	(0.005)	(0.020)	(0.006)	(0.020)
Gender (1=Male)	0.002	0.002	0.002	0.002	0.002	0.002
	(0.019)	(0.020)	(0.019)	(0.020)	(0.019)	(0.0196)
Adolescent	-0.099***	-0.094***	-0.099***	-0.094***	-0.099***	-0.094***
	(0.035)	(0.033)	(0.035)	(0.033)	(0.035)	(0.033)
Constant	2.477***	5.103***	2.477***	5.104***	2.477***	5.104***
	(0.030)	(0.082)	(0.030)	(0.082)	(0.030)	(0.082)
R^2 Cognitive Score	0.123	0.123	0.122	0.122	0.123	0.123
Observations	2,285	2,285	2,285	2,285	2,285	2,285

Note: Standard errors in parentheses.
*, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

The Factors Affecting Educational Attainment (Cognitive Score)

SEM results show that poverty, age, and child status significantly influence cognitive outcomes. Poverty has a strong negative effect, indicating that economic constraints reduce children's ability to achieve higher cognitive scores. As we mentioned earlier, this relationship operates through multiple channels. Lower-income households face constraints in providing educational inputs, including learning materials, stable environments, and access to quality schools. Limited parental time and resources reduce engagement in children's learning, while unstable conditions weaken school readiness. These findings are like those of Khiem and Kuo (2022), who show that improvements in household conditions enhance educational attainment.

Table 7. Factors Affecting Educational Attainment

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Total Cognitive Score (Divorce + Widow)	Total Cognitive Score (Divorce)	Total Cognitive Score (Widow)	Log of Total Cognitive Score (Divorce + Widow)	Log of Total Cognitive Score (Divorce)	Log of Total Cognitive Score (Widow)
Poverty Score	-0.568***	-0.568***	-0.568***	-0.084***	-0.084***	-0.084***
	(0.061)	(0.061)	(0.061)	(0.007)	(0.007)	(0.007)
Age	-0.165***	-0.165***	-0.165***	-0.023***	-0.023***	-0.023***
	(0.015)	(0.015)	(0.015)	(0.002)	(0.002)	(0.002)
Child Status (1=Adopted)	-0.845	-0.845	-0.845	-0.152**	-0.152**	-0.152**
	(0.629)	(0.629)	(0.629)	(0.074)	(0.074)	(0.074)
Number of Children in The Household	-0.099**	-0.099**	-0.099**	-0.002	-0.002	-0.002
	(0.045)	(0.045)	(0.045)	(0.005)	(0.005)	(0.005)
Gender (1=Male)	-0.344**	-0.344**	-0.344**	0.004	0.003	0.003
	(0.162)	(0.162)	(0.162)	(0.019)	(0.019)	(0.019)
Constant	11.71***	11.71***	11.71***	2.501***	2.501***	2.501***
	(0.241)	(0.241)	(0.241)	(0.029)	(0.029)	(0.029)
Observations	2,454	2,454	2,454	2,285	2,285	2,285

Note: Standard errors in parentheses.
*, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Family size also constrains cognitive outcomes by diluting per capita resources. The negative association between the number of children and cognitive scores supports the quantity–quality trade-off framework (Becker & Lewis, 1973). Age is negatively associated with cognitive scores, suggesting variation in learning accumulation across cohorts. Gender differences are small and statistically insignificant once socioeconomic. Consistent with prior evidence emphasizing the dominant role of household conditions over gender in shaping cognitive outcomes (Hyde, 2005).

Robustness Check

Given the potential endogeneity of the poverty score and the divorce variables, we conducted a robustness check using instrumental-variables regression. We introduced a new variable called the share of divorce in the community (in percentage). We argue that the percentage of divorce in the community will affect the individual marital status or divorce rates, but will not directly influence the cognitive scores of children. This section includes three different models, each addressing a different type of divorce. The first model estimates the total cognitive score with the divorce variable instrumented. The second model measures the effect of the instrumented divorce variable on the poverty score. Finally, we run the reduced form in the third model, which estimates the total cognitive score, instrumenting both the poverty and divorce variables. All three models will be divided into three types of divorce: divorce (both parents alive), widower (one of the parents died), and a combination of both types.

In general, the equation of this section will be:

$$X_i = p_0 + p_1 Z_i + p_2 \theta_i + v_i \quad (3)$$

$$Y_i = \beta_0 + \beta_1 \widehat{X}_i + \beta_2 \theta_i + u_i \quad (4)$$

Where X is the main interest (divorce and poverty score), Z is the instrumental variable, θ is other control variables, and Y is the variable of interest (educational attainment measured by cognitive score).

Across specifications (Table 8), divorce has a large and statistically significant negative effect on cognitive scores, with stronger effects when divorce is isolated. Household head education consistently improves cognitive outcomes, while larger household size reduces them.

Table 8. Factors Affecting Cognitive Score (Instrumented)

Variables	(1) Total Cognitive Score	(2) Total Cognitive Score	(3) Total Cognitive Score
	Divorce + Widow	Divorce	Widow
Divorce (=1)	-12.38***	-41.96***	-16.57***
	(2.022)	(12.46)	(2.866)
Sex (=1 Male)	-0.248	-0.052	-0.321*
	(0.186)	(0.234)	(0.195)
Household Size	-0.128***	-0.159***	-0.116***
	(0.041)	(0.047)	(0.043)
Distance to District Capital	-0.004	-0.000	-0.006
	(0.004)	(0.007)	(0.004)
Distance to Business Area	-0.039	-0.028	-0.042*
	(0.027)	(0.046)	(0.025)
Household Head Education	1.052***	1.091***	1.039***
	(0.108)	(0.138)	(0.114)
Per Capita Expenditure	2.65e-07	3.64e-07	2.22e-07
	(3.63e-07)	(5.52e-07)	(3.48e-07)
Constant	6.872***	6.638***	6.930***
	(0.458)	(0.561)	(0.478)
Observations	2,454	2,454	2,454

Note: Robust standard errors in parentheses.
*, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 9 shows that, once instrumented, divorce does not have a significant direct effect on poverty, whereas household size increases poverty, and education and expenditure reduce it. This

suggests that divorce affects poverty indirectly through household characteristics. Table 10 confirms that poverty has a robust negative effect on cognitive scores (approximately 4 points), while divorce continues to exert a strong independent negative effect. These results reinforce the baseline findings and support a causal interpretation. Family disruption and economic conditions jointly shape children's cognitive outcomes. The IV estimates reinforce the causal interpretation of the baseline findings.

Table 9. Factors Affecting Poverty Score (Instrumented)

Variables	(1) Poverty Score	(2) Poverty Score	(3) Poverty Score
	Divorce + Widow	Divorce	Widow
Divorce (=1)	0.703	3.535	0.782
	(0.689)	(2.826)	(0.877)
Sex (=1 Male)	0.0244	0.013	0.027
	(0.038)	(0.039)	(0.038)
Household Size	0.032*	0.034*	0.0315*
	(0.018)	(0.017)	(0.018)
Distance to District Capital	0.004	0.003	0.004
	(0.003)	(0.00)	(0.003)
Distance to Business Area	0.037	0.038	0.037
	(0.024)	(0.023)	(0.024)
Household Head Education	-0.330***	-0.339***	-0.330***
	(0.060)	(0.055)	(0.060)
Per Capita Expenditure	-4.31e-07***	-4.49e-07***	-4.28e-07***
	(1.07e-07)	(1.06e-07)	(1.07e-07)
Constant	2.723***	2.752***	2.726***
	(0.245)	(0.235)	(0.248)
Observations	3,140	3,140	3,140

Note: Robust standard errors in parentheses.
*, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 10. Factors Affecting Cognitive Score (Instrumented)

Variables	(1) Total Cognitive Score	(2) Total Cognitive Score	(3) Total Cognitive Score
	Divorce + Widow	Divorce	Widow
Poverty Score	-4.044***	-3.962***	-4.113***
	(0.852)	(0.939)	(0.864)
Divorce (=1)	-11.37***	-34.44***	-15.57***
	(2.550)	(13.24)	(3.469)
Sex (=1 Male)	-0.164	0.001	-0.233
	(0.262)	(0.287)	(0.270)
Household Size	0.060	0.030	0.074
	(0.069)	(0.077)	(0.070)
Distance to District Capital	0.021***	0.023**	0.020***
	(0.008)	(0.009)	(0.008)
Distance to Business Area	0.100**	0.107*	0.0990**
	(0.051)	(0.062)	(0.049)
Household Head Education	-0.585	-0.515	-0.626*
	(0.373)	(0.400)	(0.379)
Per Capita Expenditure	-2.47e-06***	-2.34e-06***	-2.55e-06***
	(6.92e-07)	(8.67e-07)	(6.81e-07)
Constant	19.34***	18.84***	19.62***
	(2.670)	(2.880)	(2.706)
Observations	2,454	2,454	2,454

Note: Robust standard errors in parentheses.
*, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Conclusion

This study shows that single motherhood has a substantial negative effect on children's cognitive outcomes. This is particularly salient among single motherhood through divorce, as it is often followed by a loss of social network. While poverty is an important channel, family disruption exerts an independent and larger effect, showing both economic and non-economic constraints. Household characteristics similarly play a central role, as larger household size and spatial remoteness increase poverty. Meanwhile, education and expenditure reduce it. These findings highlight the importance of economic security and human capital in mitigating intergenerational disadvantage.

These results suggest that policy responses must move beyond short-term relief toward addressing the structural barriers faced by single-parent households. Economic interventions, such as targeted income support and employment opportunities for single mothers, remain essential. Yet, they are insufficient on their own. Investments in early childhood education, improved access to services in remote areas, stronger infrastructure, and academic support are equally important for reducing persistent inequalities, particularly in improving cognitive outcomes. Expanding access to services in remote areas and strengthening infrastructure can further reduce spatial inequalities. Complementary interventions, including counseling and community support, can address non-economic disadvantages.

At the same time, policies must address constraints specific to family structure, including limited enforcement of child support and gendered labor market disadvantages. Family planning programs can mitigate resource constraints associated with larger households, while stronger enforcement of child support and gender-sensitive policies can reduce the economic risks faced by single mothers. Overall, effective policy must integrate income support, human capital investment, and institutional reforms to address both the economic and social dimensions of family disruption. Such an approach is critical to improving children's long-term outcomes.

More broadly, these findings speak to a wider challenge in developing-country contexts where social protection systems are often designed around poverty status while overlooking how family structure shapes vulnerability. By showing that the effects of single motherhood extend beyond income and operate through social and institutional channels, this study highlights the limits of narrowly targeted welfare approaches. Addressing intergenerational inequality, therefore, requires both redistributive capacity and institutional designs that recognize how gender and family disruption structure access to resources and opportunities. In this sense, the case of Indonesia illustrates a more general point: overlooking family structure in policy design risks systematically underserving some of the most vulnerable households.

DATA AVAILABILITY

The supporting data are publicly available on Mendeley Data https://data.mendeley.com/datasets/s56yk29d7b/1, DOI [10.17632/s56yk29d7b.1]

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Author contribution
All authors contributed to the conception and design of the study, data collection, analysis and interpretation of the results, and the writing of the manuscript. All authors read and approved the final version of the manuscript.

Use of AI tools declaration
Artificial intelligence tools were used to assist with language editing and to enhance the clarity and readability of the manuscript. The authors remain fully responsible for the content and conclusions of this study.

Conflict of interest
The authors declare that they have no known financial or non-financial competing interests that could have influenced the work reported in this paper. The research received no specific grant

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References

Agmase, N. G. (2021). The socio-economic effects of divorce on children in Woreta City Administration, Ethiopia. *Innovare Journal of Social Sciences*, *9*(3), 7–13. https://doi.org/10.22159/ijss.2021.v9i3.41129

Amato, P. R. (2000). The consequences of divorce for adults and children. *Journal of Marriage and Family*, *62*(4), 1269–1287. https://doi.org/10.1111/j.1741-3737.2000.01269.x

Amato, P. R., & Afifi, T. D. (2006). Feeling caught between parents: adult children's relations with parents and subjective well-being. *Journal of Marriage and Family*, *68*(1), 222–235. https://doi.org/10.1111/j.1741-3737.2006.00243.x

Amato, P. R., & Keith, B. (1991). Parental divorce and adult well-being: a meta-analysis. *Journal of Marriage and the Family*, *53*(1), 43. https://doi.org/10.2307/353132

Amato, P. R., & Patterson, S. E. (2017). Single-parent households and mortality among children and youth. *Social Science Research*, *63*, 253–262. https://doi.org/10.1016/j.ssresearch.2016.09.017

Annor, F. B., Amene, E. W., Zhu, L., Stamatakis, C., Picchetti, V., Matthews, S., Miedema, S. S., Brown, C., Thorsen, V. C., Manuel, P., Gilbert, L. K., Kambona, C., Coomer, R., Trika, J., Kamuingona, R., Dube, S. R., & Massetti, G. M. (2024). Parental absence as an adverse childhood experience among young adults in sub-Saharan Africa. *Child Abuse & Neglect*, *150*, 106556. https://doi.org/10.1016/j.chiabu.2023.106556

Autor, D., Figlio, D., Karbownik, K., Roth, J., & Wasserman, M. (2019). Family disadvantage and the gender gap in behavioral and educational outcomes. *American Economic Journal: Applied Economics*, *11*(3), 338–381. https://doi.org/10.1257/app.20170571

Becker, G. S., & Lewis, H. G. (1973). On the interaction between the quantity and quality of children. *Journal of Political Economy*, *81*(2, Part 2), S279–S288.

Bianchi, S. M., Subaiya, L., & Kahn, J. R. (1999). The gender gap in the economic well-being of nonresident fathers and custodial mothers. *Demography*, *36*(2), 195–203. https://doi.org/10.2307/2648108

Brenøe, A. A., & Lundberg, S. (2018). Gender gaps in the effects of childhood family environment: Do they persist into adulthood? *European Economic Review*, *109*, 42–62. https://doi.org/https://doi.org/10.1016/j.euroecorev.2017.04.004

Camisasca, E., Miragoli, S., & Di Blasio, P. (2016). Families with Distinct Levels of Marital Conflict and Child Adjustment: Which Role for Maternal and Paternal Stress? *Journal of Child and Family Studies*, *25*(3), 733–745. https://doi.org/10.1007/s10826-015-0261-0

Cancian, M., & Meyer, D. R. (2018). Reforming policy for single-parent families to reduce child poverty. *RSF: The Russell Sage Foundation Journal of the Social Sciences*, *4*(2), 91–112. https://doi.org/10.7758/RSF.2018.4.2.05

Cancian, M., Meyer, D. R., & Han, E. (2011). Child support: responsible fatherhood and the quid pro quo. *The ANNALS of the American Academy of Political and Social Science*, *635*(1), 140–162. https://doi.org/10.1177/0002716210393640

Cooper, K., & Stewart, K. (2021). Does household income affect children's outcomes? A systematic review of the evidence. *Child Indicators Research*, *14*(3), 981–1005. https://doi.org/10.1007/s12187-020-09782-0

Cusinato, M., Iannattone, S., Spoto, A., Poli, M., Moretti, C., Gatta, M., & Miscioscia, M. (2020). Stress, resilience, and well-being in italian children and their parents during the covid-19 pandemic. *International Journal of Environmental Research and Public Health*, *17*(22), 8297. https://doi.org/10.3390/ijerph17228297

Dommaraju, P., & Jones, G. (2011). Divorce trends in asia. *Asian Journal of Social Science*, *39*(6), 725–750. https://doi.org/10.1163/156853111X619201

Duncan, G. J., Magnuson, K., & Votruba-Drzal, E. (2017). Moving beyond correlations in assessing the consequences of poverty. *Annual Review of Psychology*, *68*(1), 413–434. https://doi.org/10.1146/annurev-psych-010416-044224

Fergusson, D. M., Boden, J. M., & Horwood, L. J. (2007). Exposure to single parenthood in childhood and later mental health, educational, economic, and criminal behavior outcomes. *Archives of General Psychiatry*, *64*(9), 1089. https://doi.org/10.1001/archpsyc.64.9.1089

Fisher, M. (2004). *On the empirical finding of a higher risk of poverty in rural areas: Is rural residence endogenous to poverty?* https://doi.org/https://doi.org/10.22004/ag.econ.18917

Fomby, P., & Cherlin, A. J. (2007). Family instability and child well-being. *American Sociological Review*, *72*(2), 181–204. https://doi.org/10.1177/000312240707200203

Glasmeier, A. K., & Farrigan, T. L. (2003). Poverty, Sustainability, and the Culture of Despair: Can Sustainable Development Strategies Support Poverty Alleviation in America's Most Environmentally Challenged Communities? *The ANNALS of the American Academy of Political and Social Science*, *590*(1), 131–149. https://doi.org/10.1177/0002716203257072

Härkönen, J., Bernardi, F., & Boertien, D. (2017). Family dynamics and child outcomes: an overview of research and open questions. *European Journal of Population*, *33*(2), 163–184. https://doi.org/10.1007/s10680-017-9424-6

Heri, M., Pratama, A. A., & Wijaya, I. G. A. S. (2022). Pengalaman single parent dalam mengasuh anak usia pra-sekolah(6 tahun). *Jurnal Keperawatan Silampari*, *6*(1), 290–296. https://doi.org/10.31539/jks.v6i1.4332

Hess, S. (2022). Effects of inter-parental conflict on children's social well-being and the mediation role of parenting behavior. *Applied Research in Quality of Life*, *17*(4), 2059–2085. https://doi.org/10.1007/s11482-021-10022-y

Hyde, J. S. (2005). The gender similarities hypothesis. *American Psychologist*, *60*(6), 581–592. https://doi.org/10.1037/0003-066X.60.6.581

Kalil, A., & Ryan, R. (2020). Parenting practices and socioeconomic gaps in childhood outcomes. *The Future of Children*, *30*(2020), 29–54. https://doi.org/10.1353/foc.2020.0004

Kalmijn, M. (2016). Father–child contact, interparental conflict, and depressive symptoms among children of divorced parents. *European Sociological Review*, *32*(1), 68–80. https://doi.org/10.1093/esr/jcv095

Khiem, P. H., & Kuo, Y.-C. (2022). Health insurance reform impact on children's educational attainment: evidence from Vietnam. *Review of Economics of the Household*, *20*(4), 1255–1285. https://doi.org/10.1007/s11150-021-09577-4

Lanjouw, P., & Ravallion, M. (1995). Poverty and household size. *The Economic Journal*, *105*(433), 1415. https://doi.org/10.2307/2235108

Lee, D., & McLanahan, S. (2015). Family structure transitions and child development: instability, selection, and population heterogeneity. *American Sociological Review*, *80*(4), 738–763. https://doi.org/10.1177/0003122415592129

Magnuson, K. A., & Duncan, G. J. (2006). The role of family socioeconomic resources in the black–white test score gap among young children. *Developmental Review*, *26*(4), 365–399. https://doi.org/10.1016/j.dr.2006.06.004

Maitra, P., & Vahid, F. (2006). The effect of household characteristics on living standards in South Africa 1993–1998: a quantile regression analysis with sample attrition. *Journal of Applied Econometrics*, *21*(7), 999–1018. https://doi.org/10.1002/jae.853

McKenzie, H., & McKay, F. H. (2018). Thinking outside the box: Strategies used by low-income single mothers to make ends meet. *Australian Journal of Social Issues*, *53*(3), 304–319. https://doi.org/10.1002/ajs4.48

McLanahan, S., & Sandefur, G. (1997). *Growing up with a single parent: what hurts, what helps*. Harvard University Press. https://doi.org/10.2307/j.ctv22tnmnn

McLanahan, S., Tach, L., & Schneider, D. (2013). The causal effects of father absence. *Annual Review of Sociology*, *39*(1), 399–427. https://doi.org/10.1146/annurev-soc-071312-145704

Meier, A., Musick, K., Flood, S., & Dunifon, R. (2016). Mothering experiences: how single parenthood and employment structure the emotional valence of parenting. *Demography*, *53*(3), 649–674. https://doi.org/10.1007/s13524-016-0474-x

Mencarini, L., Pasqua, S., & Romiti, A. (2019). Single-mother families and the gender gap in children's time investment and non-cognitive skills. *Review of Economics of the Household*, *17*(1), 149–176. https://doi.org/10.1007/s11150-017-9385-x

Moncrief, T., Beck, A. F., Simmons, J. M., Huang, B., & Kahn, R. S. (2014). Single parent households and increased child asthma morbidity. *Journal of Asthma*, *51*(3), 260–266. https://doi.org/10.3109/02770903.2013.873806

Morrison, D. R., & Ritualo, A. (2000). Routes to Children's Economic Recovery after Divorce: Are Cohabitation and Remarriage Equivalent? *American Sociological Review*, *65*(4), 560. https://doi.org/10.2307/2657383

Musick, K., & Meier, A. (2010). Are both parents always better than one? Parental conflict and young adult well-being. *Social Science Research*, *39*(5), 814–830. https://doi.org/10.1016/j.ssresearch.2010.03.002

Nieuwenhuis, R., & Maldonado, L. C. (2018). The triple bind of single-parent families: Resources, employment and policies. In *The triple bind of single-parent families* (pp. 1–28). Policy Press.

Nishioka, D., Saito, J., Ueno, K., & Kondo, N. (2020). *Single-parenthood and health conditions among children receiving public assistance in Japan: a cross-sectional study*. https://doi.org/10.21203/rs.3.rs-35089/v1

Noble, K. G., Houston, S. M., Brito, N. H., Bartsch, H., Kan, E., Kuperman, J. M., Akshoomoff, N., Amaral, D. G., Bloss, C. S., Libiger, O., Schork, N. J., Murray, S. S., Casey, B. J., Chang, L., Ernst, T. M., Frazier, J. A., Gruen, J. R., Kennedy, D. N., Van Zijl, P., … Sowell, E. R. (2015). Family income, parental education and brain structure in children and adolescents. *Nature Neuroscience*, *18*(5), 773–778. https://doi.org/10.1038/nn.3983

Nomaguchi, K., & Milkie, M. A. (2020). Parenthood and well-being: a decade in review. *Journal of Marriage and Family*, *82*(1), 198–223. https://doi.org/10.1111/jomf.12646

Okojie, C. E. E. (2002). *Gender and education as determinants of household poverty in Nigeria* (Number 2002/37). https://www.econstor.eu/handle/10419/52915

Partridge, M. D., & Rickman, D. S. (2008). Distance from urban agglomeration economies and rural poverty*. *Journal of Regional Science*, *48*(2), 285–310. https://doi.org/10.1111/j.1467-9787.2008.00552.x

Qibthiyyah, R., & Utomo, A. J. (2016). Family matters: demographic change and social spending in indonesia. *Bulletin of Indonesian Economic Studies*, *52*(2), 133–159. https://doi.org/10.1080/00074918.2016.1211077

Rank, M. R., & Hirschl, T. A. (1999). The economic risk of childhood in america: estimating the probability of poverty across the formative years. *Journal of Marriage and the Family*, *61*(4), 1058. https://doi.org/10.2307/354024

Rees, E., Beeber, S. N., Sampson, R., & Lietz, J. P. (2023). Empowering single parents: navigating socio-economic challenges and fostering resilience in family well-being. *Law and Economics*, *17*(2), 131–150. https://doi.org/10.35335/laweco.v17i2.5

Ridge, T., & Millar, J. (2011). Following families: working lone-mother families and their children. *Social Policy & Administration*, *45*(1), 85–97. https://doi.org/10.1111/j.1467-9515.2010.00755.x

Shiba, K., & Kondo, N. (2019). The Global Financial Crisis and Overweight among Children of Single Parents: A Nationwide 10-Year Birth Cohort Study in Japan. *International Journal of Environmental Research and Public Health*, *16*(6), 1001. https://doi.org/10.3390/ijerph16061001

Swaminathan, H., & Findeis, J. L. (2004). Policy intervention and poverty in rural america. *American Journal of Agricultural Economics*, *86*(5), 1289–1296. https://doi.org/10.1111/j.0002-9092.2004.00679.x

Xu, A., Zhang, J., & Xia, Y. R. (2008). Impacts of parents' divorce on chinese children: a model with academic performance as a mediator. *Marriage & Family Review*, *42*(3), 91–119. https://doi.org/10.1300/J002v42n03_05