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Unemployment among single mothers and adolescent children's mental health

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Abstract

Objective: This paper studies the consequences of maternal unemployment in single-mother families on the mental health of adolescent children.

Background: The impact of parental unemployment on the health and well-being of children has received increasing attention in recent years, but little is known about these cross-over effects in single-mother households – a particularly vulnerable family setting for maternal unemployment and child health.

Method: We use data from a large, register-based panel of Finnish adolescents aged 15–21 years in 1996–2019 (n = 130,520), with repeated measures of prescribed psychotropic medication purchases in six-month periods. Event study difference-in-difference models – adjusting for time-invariant characteristics – are employed to investigate the association between maternal unemployment and adolescents' psychotropic medication purchases.

Results: Maternal unemployment is associated with a small increase in psychotropic medication purchases, especially about two years after the transition to unemployment. While the point estimates are similar for both boys and girls, the estimates for girls remain non-significant. The observed patterns cannot be explained by changes in maternal income after job loss, and non-resident fathers' income did not clearly mitigate the negative effects of single mother unemployment on adolescent psychotropic medication purchases.

Conclusion: Maternal unemployment in single-mother households is modestly associated with adolescent mental health, highlighting the need for targeted support for this vulnerable group.

Key words: Single-mother families, unemployment, adolescent children, psychotropic medication, cross-over effects, re-partnering.

1. Introduction

Beyond the well-established association between unemployment and individual health, a growing body of research examines how unemployment may affect family members (Aassve et al., 2014; Högberg & Baranowska-Rataj, 2024; Moreno-Maldonado et al., 2020; Mörk et al., 2020; Schaller & Zerpa, 2019). Parental unemployment can disrupt family dynamics and reduce access to resources, thereby negatively affecting children's mental health and overall well-being (Sleskova et al., 2006). Single mothers are more likely to experience job loss than partnered women (Covizzi, 2008; van Damme & Kalmijn, 2014) and typically have fewer financial resources to buffer against the consequences of unemployment. This renders their children particularly vulnerable to its adverse effects (McLanahan & Sandefur, 2009). Yet, most existing studies on the mental health consequences of parental unemployment focus on two-parent families or include family structure merely as a control variable (e.g. Ruiz-Valenzuela (2021)). This represents an important gap, as an increasing proportion of children are growing up in single-mother families (Bernardi et al., 2018; Koops et al., 2021).

Even within single-mother households, family circumstances vary substantially. Some mothers receive financial support from non-resident fathers (Hakovirta et al., 2019), while others experience transitions into stepfamilies, which can affect household resources (Brown et al., 2015; Brown et al., 2016; Jalovaara & Andersson, 2018; Lanau, 2023). In addition to these within-group differences, broader research on maternal job loss suggests that children's responses may be gendered, although the evidence is mixed (Bubonya et al., 2017; Nikolova & Nikolaev, 2021). Moreover, few studies have addressed selection into unemployment based on maternal characteristics such as personality (Kokko et al., 2000) or pre-existing mental health problems (Olesen et al., 2013), which may confound observed associations with children's outcomes.

In this paper, we examine whether job loss among single mothers is associated with adolescent children's mental health in the context of Finland. Adolescence is a period of rapid psychological and social development during which identity, values and orientations are formed. It is also a life stage that has enduring consequences for adult health, as many mental health disorders first manifest during this time (Kessler et al., 2005; Viner et al., 2015). These patterns underscore the importance of identifying social risk factors for adolescent mental health. To our knowledge, only one study has specifically investigated the effects of single mothers' unemployment on adolescent mental health. Brand and Simon-Thomas (2014) found that maternal job loss during adolescence significantly increased depressive symptoms among U.S. adolescents. However, such findings may not be generalizable to countries with more extensive welfare support systems. Finland represents a particularly relevant case, as single-mother families are relatively common – accounting for about 20% of all families with children in 2023 (Statistics Finland, 2024) – and the country's comprehensive welfare provisions may cushion families against economic shocks. While such support may mitigate the cross-over effects of unemployment, it remains important to assess whether maternal job loss nonetheless influences child well-being.

This study draws on theoretical insights from scholarship on family stress, gender and the life course to make three key contributions to previous literature. First, it focuses explicitly on children in single-mother families – a group often underrepresented in prior research. Second, it leverages high-quality, population-wide administrative panel data from Finland, allowing for gender-stratified analyses of the impact of maternal unemployment on adolescent mental health. While survey data often lack sufficient sample sizes to analyse children from diverse family structures, register data provide both statistical power and complete follow-up. Third, recognizing that a family history of mental health problems may elevate the risk of both maternal unemployment and poor outcomes for children, we apply a recently introduced event study difference-in-difference (DiD) approach to examine within-individual variation in outcomes over time (de Chaisemartin & D'Haultfœuille, 2022).

2. Background

2.1 Parental unemployment and children's mental health

Parental job loss is widely recognized as a major stressor that can disrupt family functioning by increasing psychological distress. Family stress models (Lavee, 2013) suggest that adverse life course events such as job

loss may provoke feelings of personal failure, anxiety, frustration, and a loss of daily structure and social ties. These stress responses can, in turn, impair parents' emotional regulation and behaviour (Frasquilho et al., 2016), reducing the quality of parent–child interactions and support (Maitoza, 2019; Mari & Keizer, 2021).

Evidence increasingly links parental unemployment in two-parent families to adverse mental health outcomes in children, including behavioural problems (Harland et al., 2002; Isaranurug et al., 2001), binge drinking (Lundborg, 2002), lower well-being (Nikolova & Nikolaev, 2021) and symptoms of depression (Kaltiala-Heino et al., 2001). A growing body of European research further highlights the interconnectedness of parental employment, family economic strain and adolescent mental health. For instance, Treanor and Troncoso (2022) found that poverty and low parental work intensity are significantly associated with elevated emotional and behavioural problems in children, underlining the potential risks associated with maternal unemployment. In a follow-up study, they emphasized the indivisibility of parental and child mental health, suggesting that adverse economic events experienced by parents, such as job loss, may have direct and indirect effects on adolescents through both material and psychosocial pathways (Treanor & Troncoso, 2023).

These effects may be particularly pronounced in single-mother families, where the absence of a second parent limits both emotional and financial buffers, potentially undermining parenting quality and the overall home environment. Emotional contagion and role model identification with an unemployed parent may also negatively affect children (Maitoza, 2019). Importantly, the financial impact of job loss tends to be greater in single-mother households, as they typically rely on one income and have limited wealth reserves (Morelli et al., 2022). While some studies have reported weaker effects of maternal job loss than paternal job loss (Moreno-Maldonado et al., 2020; Sleskova et al., 2006), others found no substantial effects (Bacikova-Sleskova et al., 2015; Mörk et al., 2020; Moustgaard et al., 2018; Schaller & Zerpa, 2019), or even positive effects (Pieters & Rawlings, 2020) of maternal job loss. However, such results may not generalize to single-mother families. Using U.S. panel data and propensity score matching techniques, Brand and Simon-Thomas (2014) found significant negative effects of maternal job displacement on adolescents' depressive symptoms in single-mother households, though the small sample size calls for caution in interpretation.

2.2 Gendered responses to maternal unemployment

There is considerable evidence that men and women respond differently to adverse life events. Women are more likely to adopt an other-focused perspective (Simon, 2014), feel responsible for the distress of others (Kessler & McLeod, 1984) and react more strongly to events affecting close family members (Conger et al., 1993; Kessler & McLeod, 1984). Men, by contrast, are more vulnerable to stressors that directly impact their own lives and may express distress in ways that are more easily overlooked (Addis & Mahalik, 2003). Gender socialization theory suggests that boys are generally discouraged from expressing emotional vulnerability (Addis & Mahalik, 2003), which may lead to internalized distress that goes unrecognized until it manifests in more severe mental health symptoms.

During adolescence, youth often identify with their same-gender parent, who serves as a key role model during identity formation (Rossi & Rossi, 1990). Girls may therefore be particularly attuned to their mothers' emotional and financial well-being, making them more responsive to maternal unemployment (Frasquilho et al., 2017). However, boys raised in single-mother households – particularly those with limited or no contact with their fathers – may lack a same-gender role model for coping and emotional regulation, increasing their vulnerability to stress (Hetherington & Stanley-Hagan, 1999; Lamb, 2010). Additionally, perceived decline in social status may pose a particular threat to male identity (Michniewicz et al., 2014), suggesting that boys might react strongly to the financial consequences of maternal job loss.

Empirical findings on gendered responses to parental unemployment, mostly from studies on two-parent families, are mixed and vary by outcome and model specification. Kaltiala-Heino et al. (2001) showed that the unemployment of one or both parents was associated with an elevated risk of depression among adolescent boys but not among adolescent girls, whereas Bubonya et al. (2017) found that parental job loss affected Australian adolescent girls more negatively than boys. Nikolova and Nikolaev (2021) reported that maternal unemployment led to improved life satisfaction among German girls but not boys, while Powdthavee and Vernoit (2013) showed that paternal unemployment benefitted girls' happiness and maternal unemployment that of boys. However, these mixed findings mainly concern two-parent families. We expect maternal unemployment in single-mother families – where the mother is the sole breadwinner

and role model – to be negatively associated with the mental health of both boys and girls, albeit through different socio-emotional pathways.

Hypothesis 1: In single-mother families, maternal unemployment is associated with poorer mental health outcomes in both adolescent girls and boys.

2.3 Duration of maternal unemployment

When examining the impact of unemployment on mental health for both the individuals and their families, the duration of unemployment – or time since the onset of unemployment – is a critical factor. The transition into unemployment is often experienced as a shock, provoking acute emotional reactions such as anxiety, anger and sadness (Brand, 2015). According to adaptation theory, individuals adjust to new circumstances over time (Diener et al., 2009). In contrast, cumulative disadvantage theory posits that prolonged exposure to unemployment leads to accumulating stress, thereby exacerbating mental health problems (Warr et al., 1982). Although some longitudinal studies have found no robust evidence for causal links between long-term unemployment and adult mental health (Junna et al., 2022; Kaspersen et al., 2016; Stauder, 2019), the cumulative burden may still affect children indirectly.

This burden may be particularly acute in single-mother families, where sustained financial hardship, psychological strain and diminished parental support are likely to intensify over time. However, most studies have pooled data from single- and two-parent families. In Finland, Moustgaard et al. (2018) found that paternal unemployment predicted increased medication use for mental health problems among adolescents over time, while no effect was observed for maternal unemployment. Högberg and Baranowska-Rataj (2024) also showed that in Sweden paternal, but not maternal, job loss had a persistent impact on children's psychotropic medication use. The effect, however, was neither increasing over time nor statistically significant among adolescents. To date, no study has directly examined how the duration of unemployment among single mothers affects adolescent mental health.

Hypothesis 2: A longer duration of maternal unemployment exacerbates the negative impact on adolescent mental health over time.

2.4 The mediating role of maternal income

To understand how maternal unemployment affects adolescent mental health, it is essential to consider the interplay between employment status, income and family functioning. While some studies suggest that financial strain only partially mediates the effects of parental job loss in two-parent families (Bacikova-Sleskova et al., 2015; Powdthavee & Vernoit, 2013), the income losses in single-mother households may be more substantial due to the absence of a second earner. Changes in income can also affect adolescents' perceived social status (Karvonen & Rahkonen, 2011) – an important determinant of well-being – especially among boys, for whom financial setbacks may pose a greater identity threat (Michniewicz et al., 2014).

Nonetheless, financial mechanisms are not the sole explanation for the negative effects of unemployment. Parental distress may be transmitted directly to children (Bakker & Demerouti, 2013), and stress may deteriorate the parent–child relationship (Sleskova et al., 2006). Since parents act as role models for their children, parental unemployment may undermine an adolescent's self-perception, aspirations and, ultimately, well-being, even when the job loss is not followed by a notable loss of income. As maternal role modelling is particularly evident in single-mother families (Kalil & Ziol-Guest, 2005), non-monetary mechanisms are likely to contribute substantially. Therefore, we expect that in single-mother families, changes in disposable income will not completely explain the effects of a maternal job loss on the mental health outcomes of adolescent children.

Hypothesis 3: A loss of income following unemployment partly mediates the overall effects of a maternal job loss on adolescents' mental health.

2.5 Paternal income as a compensatory resource

An important yet understudied question is whether financial support from biological fathers can mitigate the adverse consequences of maternal unemployment. In the United States, paternal support has been

shown to alleviate some of the financial burden associated with unemployment, potentially improving children's outcomes (Choi & Pyun, 2014). Although in the Nordic context essential services are mostly public, financial compensation by the biological father may still be needed for other expenses such as activities and hobbies, which are especially important during adolescence (Blakemore & Mills, 2014). Thus, support from the biological father could serve as a compensatory resource, helping to maintain adolescents' mental health.

Hypothesis 4: The biological father's income serves as a compensatory resource, mitigating the negative effects of maternal unemployment on adolescent mental health.

2.6 The Finnish context

Finland has comprehensive welfare policies aimed at mitigating financial instability during unemployment (Bucelli & McKnight, 2023; European Commission, 2022). These include earnings-related and basic unemployment benefits, with means-tested social assistance available as a last resort (e.g. for single parents not eligible for unemployment benefits or exceeding the maximum number of benefit days). However, by comparison to other Nordic and OECD countries, the net replacement rate of unemployment benefits in Finland is not considered high: it is above that of the United States, but below the OECD average and well below that of other Nordic countries (OECD, 2024). Thus, unemployment is still likely to pose a financial challenge, especially for single mothers facing long-term unemployment, as the amount of unemployment benefits decreases over time (for a comprehensive overview of benefits and allowances, refer to the Social Insurance Institution of Finland (2024)).

Although female labour market participation is high by OECD standards, unemployment and long-term unemployment rates are also notably elevated (Farchy & Immervoll, 2021). Legally, both parents are responsible for financially supporting their children until the child turns 18. Families are entitled to a flat-rate child benefit (€94.88–192.69 per child per month in 2025). Single parents are entitled to a modest monthly supplement (€73.30 per child). The amount of child support is based on both parents' income and children's needs, but payments are modest by international standards (Haapanen & Hakovirta, 2024). Non-compliance remains a concern. The Social Insurance Institution guarantees a minimum support payment (€198.13 per child per month in 2025), but irregular contributions can still heighten financial insecurity (Nieuwenhuis & Maldonado, 2018). In Finland, separated fathers are legally obligated to support their children but not their former spouses; although paternal child support is relatively low, it plays a crucial role in alleviating poverty, especially due to the guaranteed payments (Hakovirta & Mesiäislehto, 2022).

3. Data and Methods

3.1 Sample and key measures

We used annual Finnish register data from 1996 to 2019. The data cover all adolescents aged 15 to 21, their biological parents and any other co-resident adults. Statistics Finland provided information on the annual socio-demographic and family characteristics for all these individuals. These data were linked to information on the mothers' employment and unemployment spell dates from the Labour Market Data File, and to information on the children's prescription medication purchases derived from the Social Insurance Institution.

We first identified all adolescents who were living with their biological mother, but not with their biological father, from age 15 and 16 onward in 1996–2019 and were residing in Finland until the start of the year the child turned 17 (n = 367,711). We then followed these index children up to the age of 21. To ensure all children were observed before the onset of maternal unemployment, we excluded those whose mothers already were unemployed or had never been employed before the child turned 17 (reducing the sample to n=292,891 following the exclusion). We then observed the included children for changes in maternal employment status (i.e. from employed to unemployed) in six-month time intervals from age 17 to 21 (January–June/July–December). To focus on children in single-mother families, we excluded children whose mothers were re-partnered when they were 17 (remaining n = 195,939). We also required the biological parents of the included children to not live together at any point during the study period (i.e.

excluding children whose parents resided in different households only temporarily) (remaining n = 164,158). To avoid measuring the mental health effects of maternal death, we excluded those whose mother died during the study period (remaining n = 131,358). Income data was missing for a small number of the observations (~1.0% of observations). We excluded individuals who had no valid income information across any year (~0.6% of all individuals). Our final analytical sample consisted of 1,665,306 observations among 130,520 individuals (observed between a minimum of five times and a maximum of 14 times).

Censoring occurred when the child permanently migrated out of the country (migrated n = 7,233; those who migrated temporarily were allowed to return to the data) or died (died n = 330). Given that the association of maternal unemployment and re-employment with adolescent psychotropic medication purchases is not necessarily symmetric, we censored at mother's re-employment in the main analyses. However, we also conducted robustness checks without this censoring, which produced similar results, indicating that our findings are not influenced by the censoring approach.

Adolescent mental health was measured using a binary measure of having at least one psychotropic medication purchase over each six-month time interval (yes/no) between the ages of 15 and 21. Psychotropic medication use is generally low among children and shows a marked increase starting at age 15 (Gyllenberg & Sourander, 2012; Ilona et al., 2011). The purchase data is derived from the prescription register, which includes detailed information on the date of purchase and the Anatomical Therapeutic Chemical (ATC) code of the medication. We identified drugs that are prescribed for mood, anxiety and other mental disorders – psycholeptics (N05) and psychoanaleptics (N06), excluding drugs commonly used to treat attention-deficit/hyperactivity disorder (ADHD) (NO6B) and anti-dementia drugs (N06D).

In Finland, psychotropic medications cannot be obtained over the counter and require an assessment and prescription from medical doctors, typically the general practitioners, working in either the public or the private sector. The public sector, financed primarily through taxes, provides comprehensive and affordable healthcare for all residents, while private healthcare serves a supplementary role, offering faster access and specialized services for those willing to pay out-of-pocket or who are covered by employer-provided insurance (Keskimäki et al., 2019). This dual system does not significantly impact our study's outcome, as the data on psychotropic medication purchases encompass prescriptions from both public and private healthcare providers. Importantly, the universal healthcare system ensures that all permanent residents, regardless of employment status or socioeconomic background, have access to healthcare services. Moreover, most prescription medication purchases are fully or partially reimbursed. Medications used to treat severe mental health conditions such as psychosis or severe depression are fully reimbursed, but a copayment of €4.50 is charged every time a medicine is bought. Medications prescribed for less severe mental health conditions are typically reimbursed at 40%. Higher reimbursements require a medical statement from the prescribing doctor. The reimbursement system includes an annual deductible of €70, but children and adolescents younger than 19 are exempt from this. Once annual medication expenses surpass a specified threshold (€633.17 in 2025), only a copayment of €2.50 is charged for each purchase. While there are no recent estimates of the average cost of different types of medications for the consumer, the average costs decreased between 1999 and 2005; as an example, in 2005 the average cost per day for antidepressant treatment was €0.79. Moreover, in case of very low income, means-tested social assistance can be applied for to pay for medical expenses. This provision mitigates the risk of excessive out-of-pocket expenditures and enhances equity, particularly for individuals with substantial medication requirements (Koskinen et al., 2009). This universal access minimizes sample selection bias and strengthens the reliability of psychotropic medication purchases as a proxy for mental health. Yet it is noteworthy that for our sample of adolescents, psychotropic medication purchases most likely captured relatively severe mental health problems.

Exposure to maternal unemployment within a six-month interval (yes or no) was identified using Statistics Finland employment register data, which are compiled from various register sources such as the National Incomes Register and the register of unemployed job seekers maintained by the Ministry of Economic Affairs and Employment. We opted for six-month intervals as a pragmatic compromise between temporal detail and data feasibility. Annual measures may obscure important labour market transitions, such as re-employment, by aggregating multiple events. Conversely, monthly intervals would require more detailed longitudinal tracking than the data permit. In addition, Finnish reimbursement practices for psychotropic medication typically cover up to three months, making six-month intervals more suitable for capturing meaningful changes in both employment status and medication use.

In Finland, individuals must register themselves as jobseekers with the unemployment services to obtain unemployment allowances, making this an inclusive measure. An individual is considered employed if they work at least one hour per week in paid employment, regardless of whether it is full-time or part-time. In contrast, unemployment refers to individuals who are not currently working but are actively seeking work and are available to start a job within a two-week period (Statistics Finland, 2019). We used data on time spells during which the mother was registered as unemployed. For example, if the mother registered as unemployed in January and was unemployed for a total of five months, we coded the adolescent as having experienced the mother's unemployment for the January–June period. If, however, the mother registered as unemployed in January and was unemployed for a total of eight months, we coded an unemployment spell for both the January–June and the July–December periods. In other words, we prioritized unemployment over employment: if the mother experienced both during a spell, she was defined as unemployed. However, we ignored very short unemployment spells lasting less than a total of one month in each calendar year, as these were more likely to reflect workplace changes or freelance-type working arrangements. To test for effect heterogeneity across different exposure durations, we observed maternal unemployment within an observation window of up to eight six-month periods (i.e. a maximum of four years) following the job loss event ($t = 0$).

We included periods outside of the labour market for individuals in both the employed and unemployed groups, recognizing that such episodes are relatively common. However, the meaning of being outside the labour market (neither employed nor unemployed) likely differs by prior labour market status. When following a spell of employment, these periods may reflect voluntary transitions or planned breaks (e.g. before starting a new job). In contrast, when following unemployment, they may indicate more precarious situations, such as discouragement after prolonged joblessness. Including these periods thus allows for a more nuanced representation of labour market trajectories. Furthermore, to account for the macro-level context, which may impact the duration of unemployment as well as the mother's view on her prospects of future employment, we adjusted for the regional unemployment rate.

We identified whether the index child lived in the same household with the biological mother from age 17 onward (yes/no) based on the households they were registered to reside in. Not living in the same household with the mother was controlled for using a time-varying dummy.

The household's annual disposable income (in €) was measured as the total of the household's earned and entrepreneurial income, property income, income transfers, taxes and tax-deductible expenses. Controlling for income is not intended as a robustness check, as doing so may lead to overcontrol bias, particularly when mediators are included in the model (Elwert & Winship, 2014). Instead, the change in the size of the estimated effect is interpreted as reflecting the direct effects of unemployment, net of any indirect effects mediated through income reductions. This approach ensures that the focus remains on the unemployment variable itself, rather than its mediated pathways.

In Finland, parents are jointly responsible for the support of their children even after separation, but as the payments of the non-resident parent are non-taxable income for the recipient, they cannot be identified using register data, nor were they included in the mother's disposable income. As a proxy, we considered the mean of the biological father's annual disposable income during the years the child was aged 15 to 16, divided into tertiles. For slightly under 4% of the boys and the girls, the father did not have a known Finnish personal ID. These fathers may either be unknown, or not Finnish residents. The income was coded as €0 for these fathers, as well as for deceased ones.

3.2 Robustness cheks

To assess the robustness of our findings, we conducted a series of additional analyses. First, we adjusted for maternal re-partnering following unemployment. A new partner may offer both financial (Berger et al., 2018) and emotional support to the mother and her children (Raley & Sweeney, 2020). However, the new roles within the stepfamily may also create challenges and conflicts (Gath, 2021). If, for example, adolescents are unable to adapt to new household routines, or are reluctant to share their mother's time and attention with the new partner, these new roles might be perceived as stressful (Kirby, 2006). To address this issue, we adjusted for mothers' re-partnering. We defined maternal re-partnering as when a male partner, who is not the biological father of the children, moved into the household with the single mother, or when a same-sex partner in a registered union with the biological mother moves in. The mother's re-partnering status (re-partnered/single) was measured using end-of-year information on marital and non-

marital cohabitation. Time-varying re-partnering thus consists of the observations during which the partner cohabits with the mother and her children.

Second, we addressed potential misclassification of custodial arrangements in our definition of single motherhood. Our main analyses rely on household composition in register data, identifying single mothers as those with children officially registered at their address. However, in Finland, children can be registered at only one address, which does not necessarily reflect their actual living arrangements. To reduce heterogeneity related to paternal involvement, we conducted a robustness check restricting the sample to children whose biological father resides in a different municipality. This strategy assumes that shared physical custody is less feasible over longer distances and therefore serves as a proxy for reduced paternal caregiving.

3.3 Methods

We employ the recently developed event study difference-in-difference (DiD) methodology (de Chaisemartin & D'Haultfœuille, 2022; Roth et al., 2023). Our treatment group starts as "not-yet-treated" at the ages of 15 and 16 and subsequently experiences treatment – the mother becomes unemployed – between the ages of 17 and 21. In contrast, our control group consists of adolescents whose mothers are employed and "not-yet-treated" or never treated throughout the follow-up. This approach extends the standard 2x2 DiD design involving two groups and two time points to accommodate multiple groups and staggered treatment timings, allowing for the computation of group-time average treatment effects. Specifically, treatment effects are estimated for each combination of treatment timing and control group. These estimates are then aggregated to obtain group- or time-specific average treatment effects.

In our models the outcome variable was lagged so that adolescent mental health at time t_{+1} was regressed on exposure to maternal unemployment and other variables measured at time t. This approach helps mitigate concerns about reverse causality by establishing a temporal sequence between exposure and outcome and reduce concerns about simultaneity. Focusing on the trajectories of psychotropic medication purchases, we estimate dynamic treatment effects for each period following the onset of treatment. This enables us to track the temporal progression of the treatment's effects over several post-treatment periods. We present coefficients ranging from three observations (1.5 years, t_{-3} to t_{-1}) before and up to eight observations (four years) following maternal unemployment. This approach allows for addressing concerns about the effect dynamics, that is, the possibility that maternal unemployment may have varying effects over time elapsing from the onset of exposure of an adolescent to maternal job loss. While some individuals experience longer spells of unemployment, these cases are relatively rare. Moreover, such extended durations present sample size limitations, making robust analysis challenging.

Our approach has the strength that it reveals whether effects are concentrated around the onset of maternal unemployment and fade away with time, or whether they materialize with delay or persist. Our methodology relies on the assumption that trends in psychotropic medication purchases are similar for the treatment and control groups prior to the treatment event (maternal employment at t_0), specifically during the period from t_{-3} to t_{-1}. The event study estimation enables us to evaluate parallel trends and detect potential anticipation effects by estimating coefficients for dummy variables representing each duration relative to the treatment year. If the coefficients for pre-treatment years differ significantly from the coefficient for the treatment year, the assumption of parallel trends and absence of anticipation effects is violated.

We began our modelling by regressing the child's mental health on exposure to maternal unemployment while adjusting for the regional unemployment rate and living with the biological mother (Model 1). In Model 2, we additionally included the mother's time-varying annual income to address the role of income reductions. Next, we stratified the model by the biological father's income tertile (Model 3). In robustness checks, we excluded the father's income and instead controlled for the mother's time-varying re-partnering after t_0 (see Figure A1, appendix). All analyses were conducted for girls and boys separately to identify gender-specific mechanisms.

4. Results

Our study population included 66,780 boys and 63,740 girls (Table 1). Of the sample, 4.7% of the boys and 3.7% of the girls were exposed to maternal unemployment at least once between the ages of 17 and 21. On average, both girls and boys were observed 12.8 times.

The prevalence of psychotropic medication use varied by gender and by exposure to maternal unemployment. Boys with a mother who was never unemployed had a slightly lower prevalence (3.0%) of psychotropic medication purchases than boys who experienced maternal unemployment (3.2%). The corresponding percentages for girls were 5.5% for girls with a mother who was never unemployed and 5.4% for girls who experienced maternal unemployment.

There were large differences in the average annual income of mothers and biological fathers depending on the child's exposure to maternal unemployment, with averages lower for those who were ever exposed than for those who were not. The large differences in the average income of fathers depending on exposure to maternal unemployment suggest that adolescents with unknown, deceased or low-income fathers were more likely than others to experience maternal unemployment. During the observation window, only a small share of the children – between 6% and almost 8% – had mothers who re-partnered, while the majority of mothers remained single. A higher proportion of girls than boys had moved out. Additionally, within each gender, this proportion was greater among children whose mothers did not experience unemployment. The regional unemployment rate is comparable across all four groups (around 7%)

Table 1: Sample characteristics, Finnish adolescents aged 15–21 in 1996–2019 by exposure to maternal unemployment

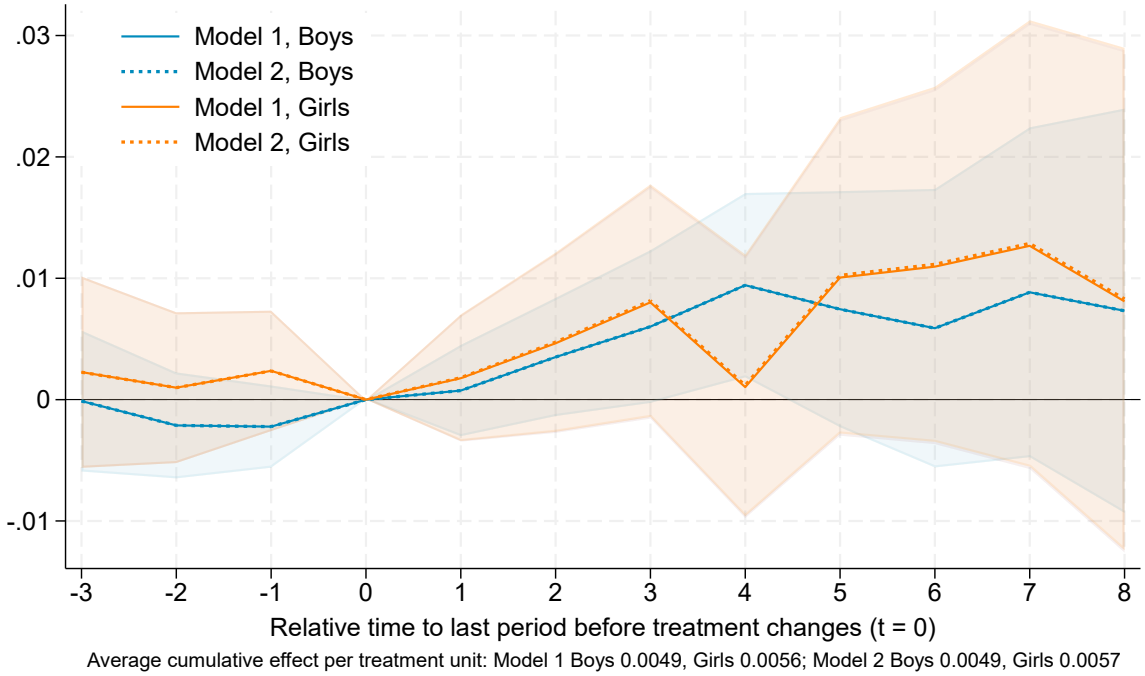
	Boys		Girls	
	Mother never unemployed	Mother experienced unemployment	Mother never unemployed	Mother experienced unemployment
N of individuals,	60,675	6,105	58,897	4,843
%	46.5	4.7	45.1	3.7
N of observations	788,252	63,652	764,862	48,540
Psychotropic medications purchase, % of observations	3.0	3.2	5.5	5.4
Child's age, mean	18.1	17.6	18.1	17.6
[SD]	2.0	1.8	2.0	1.8
Mother's age, mean	47.6	46.3	47.6	46.1
[SD]	5.5	6.1	5.5	6.2
Mother completed tertiary education, % of observations	45.8	29.0	46.7	29.1
Mother's annual income, mean	27,310.6	22,911.9	27,403.0	23,196.2
[SD]	11,811.2	10,673.8	11,732.1	10,767.4
Biological father's income*	22,864.6	20,835.1	23,468.4	20,863.8
[SD]	19,365.4	18,846.4	19,492.6	19,561.0
Mother re-partnered, % of observations	7.2	5.9	7.7	5.9
Child moved out, % of observations	38.9	29.5	44.7	35.3
Regional unemployment rate in %, mean	7.2	7.3	7.2	7.3
[SD]	2.0	2.1	2.0	2.0

Note: Abbreviations: SD = standard deviation. *As unknown or deceased fathers have an income of €0, the average income is relatively low.

The regression model estimates are presented in Figures 1 through 3, illustrating how the likelihood of psychotropic medication purchases among adolescent boys and girls evolves before and after maternal unemployment. The figures indicate that estimates for the pre-unemployment period are close to zero, with overlapping confidence intervals. Statistical tests of model assumptions (Tables A1–A8, appendix) suggest parallel pre-trends and the absence of an anticipation effect prior to the treatment, reinforcing the appropriateness of using the not-yet-treated group as a valid comparison.

Figure 1 (Tables A1 and A2, appendix) illustrates the results from Model 1 and Model 2, with estimates for boys shown in blue and for girls in orange. Model 1, depicted with solid lines, shows that psychotropic medication use slightly increases immediately following maternal unemployment (compared to time point t0), lending some support to Hypothesis 1. The gradual rise in estimates over the subsequent six half-year periods (spanning three years) offers partial support for Hypothesis 2, which posits that the association between maternal unemployment and children's mental health may strengthen over time. However, the effect sizes remain small and confidence intervals are wide, indicating uncertainty around the estimates.

Figure 1: Changes (percentage points compared to t0) in psychotropic medication purchase probability among boys and girls aged between 15 and 21 years, before and after maternal unemployment.

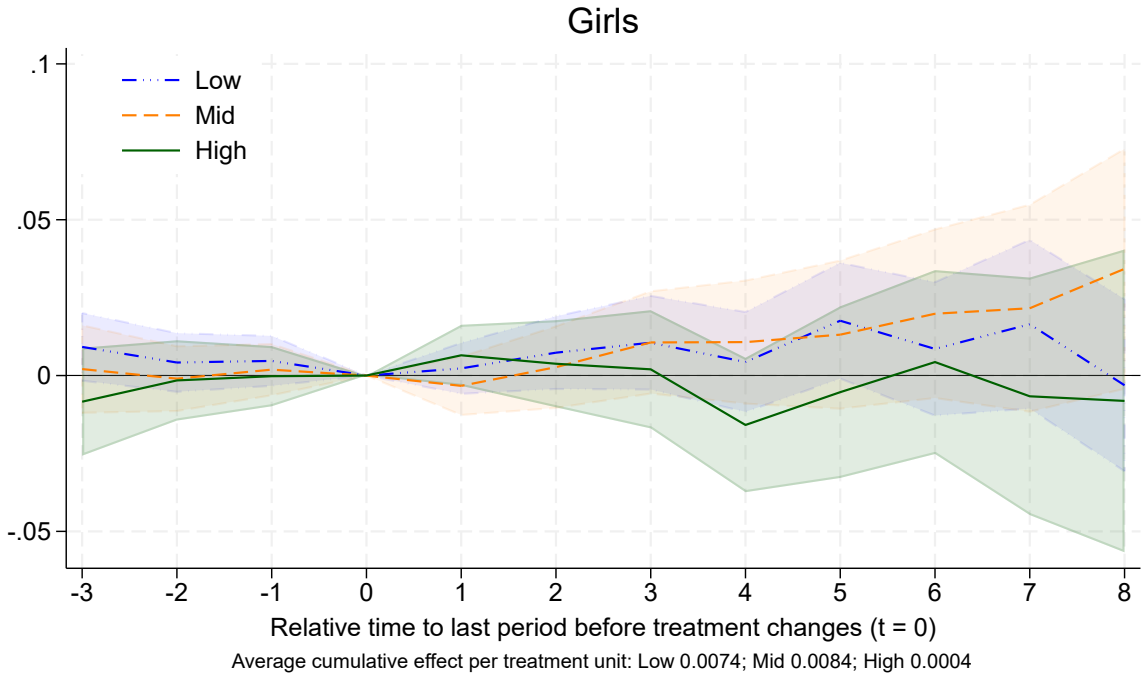


Note: Model 1: Regional unemployment rate and living with the mother (yes/no); Model 2: Model 1 + maternal income.

Model 2, shown with dashed lines, examines whether changes in household income mediate this relationship. Including time-varying income in the model has a negligible impact on the estimated trajectories of psychotropic medication use (Table A2, appendix), contradicting Hypothesis 3, which suggested that income loss following maternal unemployment would mediate its effect on adolescent mental health.

Figures 2 (for girls) and 3 (for boys) display estimates stratified by the biological father's income, categorized into low (in blue), middle (in orange) and high terciles (in green), to test the moderating role of paternal income. Among girls (Figure 2, Table A3, appendix), those in the highest paternal income group show little to no change in the probability of psychotropic medication use following maternal unemployment, except for a modest decline around two years after onset (t = 4). In contrast, girls in the middle-income group exhibit a more steady and gradual increase over time. Girls in the lowest income group show a more variable pattern, though with an overall trend toward a moderate rise. These findings suggest a possible compensatory role of high paternal income among girls throughout the follow-up period.

Figure 2: Changes (percentage points compared to t0) in psychotropic medication purchase probability among girls aged between 15 and 21 years, before and after maternal unemployment.



Note: Model 3: Model 2 + stratification by average paternal income prior to t0, split into tertiles (low, medium, high).

Among boys (Figure 3, Table A4, appendix), the patterns differ. Boys in the highest paternal income group display little immediate response to maternal unemployment, with some indication of increased psychotropic medication use emerging after several years. By contrast, boys in the low- and middle-income groups exhibit earlier increases followed by some indication of a decline, suggesting a more immediate effect of maternal job loss. These findings imply that high paternal income may provide short-term protection for boys, but this buffering effect appears to diminish over time.

Taken together, these results offer partial support for Hypothesis 4, indicating that higher paternal income may buffer the adverse mental health consequences of maternal unemployment – more consistently for girls, and more transiently for boys. However, given the wide confidence intervals, these patterns should be interpreted with caution.

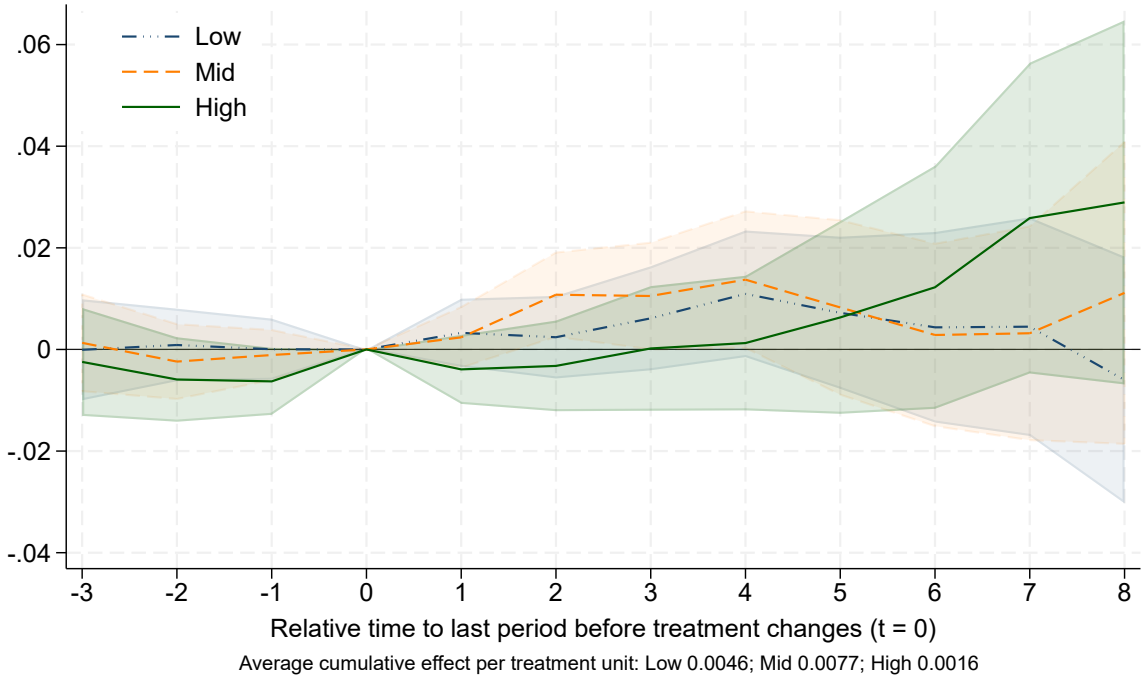
Based on these analyses, there is some indication that both boys and girls exhibit increases in psychotropic medication purchases following maternal unemployment. While the findings align with Hypothesis 1, the associations are weak and mostly statistically non-significant. The same is true for Hypothesis 2, with findings showing that prolonged exposure to maternal unemployment may be associated with a slight increase in psychotropic medication purchases among adolescents.

Our results do not support Hypothesis 3, as maternal income did not appear to mediate the relationship between maternal unemployment and adolescent mental health outcomes after adjusting for the other included confounders. However, the stratified analyses based on biological fathers' income showed limited support for a compensatory effect, which aligns with Hypothesis 4.

To assess the robustness of our findings, we conducted supplementary analyses. First, we controlled for maternal re-partnering as a time-varying covariate to account for changes in household composition and potential emotional or financial support from a new partner (Figure A1, Table A5, appendix). The inclusion of this variable did not substantially alter the trajectories of psychotropic medication use among boys or girls, suggesting that re-partnering has a limited impact on adolescents' mental health outcomes following maternal unemployment. Second, to address potential misclassification of custodial arrangements, we restricted the sample to children whose biological father lived in a different municipality – using geographic distance as a proxy for a lower likelihood of shared custody and thus a clearer identification of primarily maternal residence. The results from this geographically restricted sample remained broadly consistent

with our main findings, though confidence intervals were somewhat wider (Tables A6–A8, appendix). However, it is important to note that this restriction reduced the sample size considerably, as most separated parents in Finland continue to live within the same urban or suburban area.

Figure 3: Changes (percentage points compared to t0) in psychotropic medication purchase probability among boys aged between 15 and 21 years, before and after maternal unemployment.



Note: Model 3: Model 2 + stratification by average paternal income prior to t0, split into tertiles (low, medium, high).

5. Discussion

This study has extended existing research about the intergenerational cross-over effects of unemployment on mental health by focusing on the growing subgroup of families in which adolescents are living with their mother, but not with their biological father. Compared to a mother in a two-parent family, a single mother is more likely to be the primary breadwinner (Artazcoz et al., 2004; Moustgaard et al., 2018), and her job loss can thus be expected to take a greater toll on the mental health of her children. The only previous study that addressed this issue showed that in the U.S. context, single mothers' unemployment indeed had strong effects on the depressive symptoms of their adolescent children (Brand & Simon-Thomas, 2014).

We analysed this association in a Nordic welfare state context using register-based panel data from Finland. The results indicated that in single-mother families, maternal unemployment may have a small harmful impact on adolescent mental health even after controlling for confounding due to unobserved, time-invariant maternal and child characteristics such as personality, genetics or family history as well as following adjustment for time-varying maternal income. This suggests that the association, even if small, is not entirely driven by selection into maternal unemployment based on stable maternal or adolescent characteristics, or by the family's economic situation following the mother's job loss.

Our approach, the recently developed event study difference-in-difference (DiD) methodology (de Chaisemartin & D'Haultfœuille, 2022; Roth et al., 2023), also allows for exploring effect dynamics, that is, the possibility that maternal unemployment may have varying effects over time: whether associations between maternal unemployment and adolescent mental health are concentrated around the onset of maternal unemployment and fade away with time, or whether they materialize with long-term unemployment.

Based on existing literature on gendered responses to maternal unemployment, we expected that both girls and boys would experience a decline in mental health following maternal unemployment, albeit potentially through different mechanisms. Our findings reveal largely similar patterns in psychotropic medication use following maternal unemployment for both boys and girls. Boys show statistically significant increases in medication use in the second year following maternal unemployment, while the estimates for girls remain non-significant. Gender differences in responses to maternal unemployment might still be expected, given known differences between boys and girls in coping strategies and available resources (Simon, 2002; Thoits, 1995; Turner & Lloyd, 1999; Turner et al., 1995).

Prolonged exposure to maternal unemployment was found to be associated with a slight and gradual increase in psychotropic medication purchases among adolescents, although the patterns were not consistent, and estimates remained not-significant. Our findings cautiously align with previous research that pooled single- and two-parent families. Moustgaard et al. (2018) observed an increase in the impact of unemployment over time for both mothers and fathers; however, the effect was only statistically significant for paternal unemployment, with the strongest associations reported in the final observation year (i.e. the fifth year). This pattern is further supported by Högberg and Baranowska-Rataj (2024), who emphasize the cumulative effects of repeated job losses.

Moreover, our results do not support the idea that maternal income mediates the relationship between maternal unemployment and adolescent mental health outcomes. These findings add to previous research suggesting that mechanisms related to financial strain cannot fully account for the higher incidence of mental health problems or reduced well-being among children with unemployed parents (Bacikova-Sleskova et al., 2015; Pedersen et al., 2005; Powdthavee & Vernoit, 2013; Sleskova et al., 2006). Importantly, income does not play a central role in our two-way difference-in-difference specification, which already accounts for a range of individual-level factors – such as maternal personality, employment history and other time-invariant characteristics – that are likely to influence both income and unemployment. In alternative model specifications that do not account for these stable confounders, such as logistic regression, maternal income might appear to matter more. It is also plausible that the role of income is context specific. Unlike in the United States, where parental unemployment may be associated with more severe income losses (Kalil & Ziol-Guest, 2008), this potential mechanism may be less important in the Finnish context, where the welfare state provides social benefits that are likely to compensate for the detrimental effects of unemployment in general.

We also investigated the role of the non-resident biological father's income in the association between maternal unemployment and the mental health of adolescents. Stratified analyses based on biological fathers' income gave some support for a compensatory effect of paternal income, although patterns were inconsistent by gender and unemployment duration.

Controlling for maternal re-partnering did not change the patterns of a slight increase in psychotropic medication purchase over time, suggesting that financial or social support from the new partner does not mitigate the consequences of maternal unemployment on adolescent mental health. Nevertheless, single-mother families may benefit from other forms of support through policies and social transfers (Bernardi et al., 2018), as well as from support from other family members (Metsä-Simola et al., 2024).

The Finnish welfare state, with its robust safety net, likely contributes to the relatively modest impact of maternal unemployment on children's well-being. However, our results cannot be fully attributed to the welfare state alone, as previous research in Finland has shown that paternal job loss significantly harms children's mental health (Moustgaard et al., 2018). The authors' proposed explanation is that fathers, who often are primary breadwinners, experience job loss as a greater financial and emotional burden, which then has an impact on the well-being of the family. Our findings challenge this interpretation by showing that even when mothers are sole breadwinners, their job loss does not result in a substantial decline in children's mental health.

Furthermore, research in the sociology of mental health suggests that men and women tend to respond to stress differently, with men often exhibiting externalizing behaviours, such as anger or substance abuse, and women showing internalizing behaviours, such as sadness (Simon, 2002). These gendered responses to stress may also shape how the unemployed parents cope with the experience of job loss. For example, men's externalizing behaviour could create conflicts in the household, exacerbating adverse outcomes for children. In contrast, women may respond to job loss with coping mechanisms such as seeking support in their social networks, potentially mitigating the impact of maternal unemployment on children. This raises the possibility that the effect of parental job loss on children's mental health is influenced not only by

economic roles but also by gendered behavioural responses. Future intergenerational studies could investigate how these behavioural responses interact with economic and emotional stressors to influence adolescent mental health, offering valuable insights into the nuanced dynamics of family well-being.

Methodological considerations

The major strengths of our study include our use of large register-based data, which provided us with an objective mental health measure and a dataset on mothers and their offspring with full national coverage. The data had no nonresponses or attrition, which are important advantages when assessing unemployment and mental health in a panel setting. An additional advantage of using registry data over survey data is the ability to avoid self-reporting biases. This eliminates common issues such as recall bias, where individuals may misremember past events, and social desirability bias, where respondents might alter their answers to present themselves more favourably. Notably, research has shown that proxy respondents (typically parents) often underestimate mental health issues, reflecting a parental positivity bias (Lagattuta et al., 2012). Furthermore, our study design – a panel of six-month periods for up to seven years – enabled us to estimate the probability of psychotropic medication purchases during periods of maternal employment and unemployment, and to compare these within individuals. This allowed us to control for many important time-invariant characteristics that are difficult to measure. In addition, we were able to longitudinally observe changes in the economic resources of families headed by single mothers and thus examine how these might mediate the association between maternal unemployment and adolescent children's health.

However, this study also has some limitations. The mental health measure we used was based on clinical evaluations. While our measure was objective, it only captured treated individuals. It is likely that not all individuals with mental health issues sought treatment. Therefore, our mental health measure only observed those individuals who had mental health problems and were also willing and able to seek treatment – likely representing more severe cases. Consequently, our findings may underestimate the full impact of maternal unemployment on adolescent mental health, as milder or untreated cases are not captured in the data. Another limitation is the inability to examine younger age groups, which could offer valuable insights into the developmental impacts of maternal unemployment at earlier life stages. Psychotropic medication purchases among younger children are typically lower, but these ages represent critical periods for emotional and psychological development. Studying these earlier stages could illuminate whether and how the effects of maternal unemployment differ depending on a child's developmental stage. Moreover, the argument regarding gendered responses to stress suggests that psychotropic medication purchases may not fully capture boys' mental health, as boys are more likely to externalize stress, while girls may internalize it (Simon, 2002). This distinction implies that our findings may offer a more conservative estimate of the mental health impacts of maternal unemployment for boys compared to girls, as externalizing behaviours may not always result in psychotropic medication use.

In addition, we examine the role of paternal financial contributions to single-mother households. However, the available data lacks direct measures of these contributions, requiring us to use paternal income as a proxy. While paternal income provides an indication of financial capacity, it does not accurately reflect the actual support received by the household. This approach assumes a correlation between income and contributions but cannot account for variations in payment compliance, informal support or unreported transfers. This limitation underscores the importance of more detailed data on inter-household financial transfers to better understand the scope and impact of paternal financial support.

Our findings should be interpreted in light of several limitations. A key concern is the potential misclassification of custodial arrangements among single-mother households. We define single motherhood based on household composition in register data – specifically, children registered as living with their biological mother – but cannot observe whether custody is formally shared or the extent of paternal involvement. This limitation is particularly relevant in Nordic contexts, where joint physical custody has become more prevalent (Bernardi et al., 2018). To address this, we conducted a robustness check by restricting the sample to children whose biological father resides in a different municipality, under the assumption that shared custody is less feasible when parents live farther apart. The results from this restricted sample were broadly consistent with our main findings.

Beyond issues of measurement, it is important to recognize that shared custody rarely implies symmetry in legal, economic or practical responsibilities. Even when parenting time is formally divided

equally, the mother – unless re-partnered – is typically the sole economic provider in her household and must independently shoulder fixed costs such as housing. For example, she may need a larger dwelling than would be necessary if living alone, regardless of how much time the child spends with the non-resident father. These financial obligations are not substantially alleviated by shared custody. Furthermore, the parent with whom the child is officially registered – usually the mother – is legally responsible for daily caregiving and subject to constraints that do not apply to the non-resident parent. In practice, most post-separation custody arrangements do not represent equal sharing (Kitterød & Lyngstad, 2012; Steinbach & Augustijn, 2021). These asymmetries likely shape the material and emotional environment in which maternal unemployment affects adolescents. Future research should aim to better capture the variability in post-separation paternal involvement and its potential moderating role.

6. Conclusions

Our study showed that in single-mother families, maternal unemployment led to only a slight increase in adolescents' psychotropic medication use, emerging two years after maternal job loss. This association was not explained by income losses experienced by the unemployed mother. However, the non-resident father's income appeared to have a modest moderating effect, which varied by the adolescent's gender and the duration of the unemployment spell. Further research is needed to investigate the mechanisms that might contribute to adolescent mental health in single parent families

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Data availability statement

T In accordance with the data protection regulations of the national register holders, the data cannot be made available to third parties. Researchers interested in accessing the data may apply directly to the relevant register-holding institutions: Statistics Finland (https://www.stat.fi/tup/mikroaineistot/index_en.html) and Findata (https://findata.fi/en/permits/)

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Information in German

Deutscher Titel

Arbeitslosigkeit alleinerziehender Mütter und die mentale Gesundheit von Jugendlichen

Zusammenfassung

Fragestellung: Diese Studie untersucht den Zusammenhang zwischen mütterlicher Arbeitslosigkeit in alleinerziehenden Familien und der mentalen Gesundheit von Jugendlichen.

Hintergrund: Die Folgen elterlicher Arbeitslosigkeit für die Gesundheit und das Wohlbefinden von Kindern sind in den letzten Jahren stärker in den Fokus der Forschung gerückt. Über die ‚Cross-over'-Zusammenhänge in Haushalten alleinerziehender Mütter – einem besonders vulnerablen Familienkontext – ist jedoch bislang wenig bekannt.

Methode: Die Analyse stützt sich auf ein großes, registerbasiertes Panel finnischer Jugendlicher im Alter von 15–21 Jahren (1996–2019; n = 130.520) mit wiederholten Messungen verschriebener Psychopharmaka in Halbjahresintervallen. Der Zusammenhang zwischen mütterlicher Arbeitslosigkeit und dem Medikamentengebrauch von Jugendlichen wird mittels Event-Study-Difference-in-Differences-Modellen unter Kontrolle zeitinvarianter Charakteristika untersucht.

Ergebnisse: Mütterliche Arbeitslosigkeit ist mit einem moderaten Anstieg von Psychopharmakakäufen verbunden, insbesondere etwa zwei Jahre nach dem Übergang in die Arbeitslosigkeit. Während die Schätzungen für Jungen und Mädchen ähnlich ausfallen, erreichen die Befunde für Mädchen keine statistische Signifikanz. Diese Verläufe lassen sich weder durch Einkommensverluste der Mutter noch eindeutig durch das Einkommen der nicht im Haushalt lebenden Väter erklären.

Schlussfolgerung: Die Befunde weisen auf einen moderaten Zusammenhang zwischen mütterlicher Arbeitslosigkeit und der mentalen Gesundheit von Jugendlichen in Alleinerziehenden-Haushalten hin und betonen die Relevanz gezielter Unterstützungsmaßnahmen.

Schlagwörter: Alleinerziehende Mütter, Arbeitslosigkeit, Jugendliche, Psychopharmaka, Cross-over-Effekte, Wiederverpartnerung.

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