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ABSTRACT

Parental Unemployment and Adolescents' Academic Performance

During the Great Recession, the increase in Greece's unemployment rate was the highest in the European Union. However, there exists no multivariate study which has assessed the association between parental unemployment and adolescents' grades. The study utilised panel data from the same upper high schools in the periods 2011–2013 and 2017–2019 to assess whether the grades of adolescents were associated with parental unemployment. The exogeneity of parental unemployment with respect to adolescents' grade was confirmed. The analysis revealed that parental unemployment was associated with a decline in adolescents' grades. Periods of economic decline, i.e. in 2011–2013, were found to be associated with deterioration in adolescents' grades. Moreover, during periods of economic decline, parental unemployment was associated with a deterioration in adolescents' grades. Furthermore, parental unemployment was associated with lower adolescents' grades for those households that were not homeowners and whose schools were located in working-class areas. The outcomes were found to be robust, even after including information for government expenditure on education and social protection. The potential long-lasting effects of parental unemployment on children's human capital should be considered by policymakers, as should educational interventions to support households experiencing adverse economic conditions.

JEL Classification: E24, J6, I24, J13

Keywords: economic recession, parental unemployment, grades, adolescents, academic performance

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1. Introduction

Adverse economic events, such as economic recessions, reduce the ability of governments and households to invest in education (OECD, 2018; Ananat et al., 2017; Kalil, 2013; Sfafiq, 2010; World Bank, 2009) and can negatively impact school functioning (OECD, 2018; 2013; 2011; World Bank, 2009). During periods of economic instability, families experience economic problems which are associated with children's absenteeism and drop-out rates (OECD, 2018; 2013; Ananat et al., 2017; Kalil, 2013; World Bank, 2009). In the literature, only a few studies have examined the relationships between the Great Recession, parental unemployment, and students' academic performance. For instance, in the US, Shores and Steinberg (2019) found that reduced school spending was associated with lower academic achievement, whereas in Spain, Ruiz-Valenzuela (2020) observed that paternal job loss was associated with a decline in students' academic achievements. Similarly, studies before the onset of the Great Recession declared that adverse economic conditions can be associated with a reduction in students' enrolment, attainment, attendance, and performance (Mooi-Reci et al., 2019; Gregg et al., 2012; Kalil and Wightman, 2011; Coelli, 2011; Sfafiq, 2010).

Greece has been most severely affected by the EU economic crisis (OECD, 2018), with a significant increase in the level of poverty and unemployment (OECD, 2018). In January 2009, the unemployment rate was 9.1%, and almost double (17%) ten years later (Eurostat, 2019), whilst the rate of child poverty increased to 40% in 2016 (Eurostat, 2019). Severe austerity measures adopted to address high levels of national debt reduced public health and education spending (OECD, 2018) and were achieved by massive reductions in salaries and pensions (Drydakis, 2015), thus negatively affecting the population's well-being (Drydakis, 2022; 2015). During the Great Recession, the increase in Greece's unemployment rate was the highest in the EU (OECD, 2018), but there exists no multivariate study which has assessed the association between parental unemployment and students' performance.

In the wake of a decade of severe economic recession, the Greek educational system is characterised by low resources, teachers in temporary contracts, high levels of child poverty, and a diverse student body with numerous immigrant and refugee students (Drydakis, 2022; OECD, 2018). During the Great Recession, an increasing number of students could not cover basic needs, thus leading to social inequalities in the classrooms (Drydakis, 2022; Vergeti and Giouroglou, 2018; Kakana et al., 2017; Tsakiridou et al., 2014; Gouvias et al., 2012).

The present study examined whether parental unemployment is associated with lower grades amongst adolescents. In addition, the study evaluated whether parental unemployment is associated with a deterioration in adolescents' grades during periods of economic decline than in non-economic recession periods. The project utilised two panel datasets, covering the periods 2011–2013 and 2017–2019, which were collected from the same upper high schools in the Attica region of Greece. Attica encompasses the entire metropolitan area of Athens, and is home to one-third of Greece's population. This is the first

Greek study, and amongst the first international studies, to evaluate not only how parental unemployment and recessionary periods are associated with adolescents' grades, but also whether parental unemployment can lead to a deterioration in adolescents' grades within an economic recession. The longitudinal nature of the study could provide better-informed estimates regarding the subject matter.

The potential long-lasting effects of parental unemployment and recessionary periods on children's human capital and development should be considered by policymakers. In the short term, parental unemployment could cause delays in children's behavioural growth and cognitive development (Andersen, 2013; Johnson et al., 2012; Jackson, 2003), whereas, in the long term, it could be associated with adverse mental health problems as well as greater probabilities of not being in education and employment (Egan et al., 2015; Schoon, 2014; Kind and Haisken-DeNew, 2012; Gregg et al., 2012; Oreopoulos et al., 2008). Educational interventions aiming to support households and students experiencing economic struggles should be considered (OECD, 2013; 2010), since investments in human capital can stimulate economic development (OECD, 2011). UNESCO (2010) declared that it is critical to deliver financial aid before fiscal pressures convert the Great Recession into an irreversible long-term human development crisis, with attendant consequences for educational progress.

A literature review and background information are provided in the next section, with Section 3 presenting the data collection process. Section 4 details the study's variables and estimation strategy, whilst Section 5 provides the descriptive statistics. Section 6 offers the regression outcomes, with evaluations and conclusions provided in the final section.

2. Literature review and theoretical considerations

2.1 International studies

Only a few studies have examined the relationships between the Great Recession, parental unemployment, and students' academic achievements. In the US, Shores and Steinberg (2019) utilised data for the periods 2008–2009 and 2012–2013, finding that reduced school spending following the onset of the Great Recession was associated with reduced students' grades in mathematics and English language arts, particularly in school districts serving more economically disadvantaged and minority students. In Spain, Ruiz-Valenzuela (2020) focused on a school in the province of Barcelona between 2007 and 2012, observing that students experienced a negative and significant decrease in average grades after paternal job loss. The impact of paternal job loss was largely concentrated amongst students whose fathers suffered long unemployment spells and those families of fathers with a low education level.

Studies focussing on relevant relationships before the onset of the Great Recession produced comparable results. In the UK, Gregg et al. (2012) observed a reduction in students' academic achievements if their fathers were displaced during the 1980 crisis. In the same region, Schoon (2014) utilised data between 2004–2006 and 2007–2010, showing that parents' worklessness was significantly

associated with their children's experience of not being in education, employment, or training for longer periods. In the Netherlands, Mooi-Reci et al. (2019) estimated a negative relationship between fathers' unemployment duration during the 1980 crisis and their children's educational attainment. Rege et al. (2011) employed data for the period spanning 2003–2005, reporting that paternal job loss reduced school grades in Norway. In the US, Ananat et al. (2011) used data for the period 1996–2009, showing that state-level job losses decreased students' academic achievements. Kalil and Wightman (2011) found that parental job loss reduced the probabilities of postsecondary education in the US during the period spanning 1968–1979, whereas Pan and Ost (2014) reported that parental job loss decreased the probabilities of higher education enrolment in 1970–1985 in the US. In Canada, Coelli (2011) discovered that job losses on the part of the main income earner reduced children's probability of university enrolment during the period spanning 1993–2007.

2.2 Greek studies

In Greece, several adverse monetary effects occurred during 2010–2018. By 2017, teacher salaries had declined to 74% of their 2008 level (OECD, 2018), and public spending in education had decreased by 36%, with cuts affecting new job openings by 88% and the number of permanent teachers falling by 28% between 2008 and 2015 (OECD, 2018). Schools merged to cut costs, with reduced school budgets affecting the implementation of personalised learning and student-orientated teaching strategies (OECD, 2018). Difficulties appeared in relation to teaching deliveries due to shortages of stationery materials, fewer education projects, heating, and maintenance issues (OECD, 2018; European Commission, 2018; Vergeti, 2014; Ziontaki, 2016). In addition, since 2015, the economic recession has been accompanied by a refugee crisis (Drydakis, 2021), resulting in the influx of thousands of school-aged children into the education system, further constraining system resources (OECD, 2018).

Additionally, parental unemployment brought about uncertainty and tensions in the family, difficulties in affording food, reduction in private tutoring sessions, and a decline in school pressure from the parents' perspective (Kokkevi et al., 2018). In the school setting, socioeconomic differences amongst students appeared (Tzanakis, 2011; Ziontaki, 2016), with vulnerable families not able to provide basic food to their children, whilst nourishment issues were observed in schools (Ziontaki, 2016; Rajmil et al., 2014). The income reduction in Greek families was so severe that schools, in collaboration with the Orthodox Church and NGOs, provided financial and material assistance (i.e. food donations, provision of clothes and stationery) to underprivileged students and their families (Vergeti and Giouroglou, 2018; Geritsidou and Paizi, 2017).

Although Greek studies on the relationship between unemployment and academic achievements do not exist, a few studies have provided important insights into the subject matter. Geritsidou and Paizi (2017) utilised data from the Programme for International Student Assessment (PISA) for 2009, 2012,

and 2015, finding that, in Greece, 15-year-old students' academic performance was reduced year by year. The authors indicated that families' low socioeconomic status and class disruption predicted low academic performance, with students whose families could ensure access to a school with more resources enjoying a better class environment (Geritsidou and Paizi, 2017). Vergeti and Giouroglou (2018) employed data from primary and secondary schools in northern Greece and found a deterioration in schools' operations due to the implications of the recession. The authors suggested that, for the period 2009–2016, social changes affected the educational system by degrading schools' operation, with negative consequences for learning outcomes due to class malfunctioning, as well as the lack of student motivation (Vergeti and Giouroglou, 2018). Difficulties in teaching, communication, and students' understanding and performance due to an increased number of students in the class were also reported, and schools could not afford their expenses, thereby negatively affecting the quality of education (Vergeti and Giouroglou, 2018). Moreover, increases in problems with students' behaviour and small-scale conflicts between children were observed (Vergeti and Giouroglou, 2018).

Tsakiridou et al. (2014) utilised data for 2012 from primary and high schools in the region of Macedonia, Greece, reporting that families heavily decreased expenditure on extracurricular activities such as private tuition, thereby boosting socioeconomic inequalities in classes. Additionally, the above study indicated that cut-offs in education spending adversely affected teachers' efficiency (Tsakiridou et al., 2014). Furthermore, 43.3% of families could not support their children's study for a university degree and students were more pessimistic over time (Tsakiridou et al., 2014). Similarly, high school students reported that their teachers became moodier over time, with teachers themselves expressing that they experienced higher adverse psychological symptoms that year due to the uncertainty in the profession (Tsakiridou et al., 2014).

Kakana et al. (2017) presented relevant patterns from three Greek Prefectures (Attica, Thessaloniki, and Magnesia) in 2016, focussing on kindergartens and primary schools, and observing that families experienced difficulties in feeding and clothing their children, as well as covering the cost of extracurricular activities (i.e. foreign language classes, dance lessons) and buying necessary school materials (Kakana et al., 2017). Most affected were students of lower socioeconomic status. Schools were struggling to renew technological equipment and maintain buildings, whilst teachers reduced the provision of stationery and materials to students and had limited training opportunities (Kakana et al., 2017).

2.3 Theoretical considerations

Given the presented empirical patterns, potential channels could be proposed in evaluating the association between adverse economic conditions and decreased academic achievements. A reduction in family income may make it more difficult for parents to cover the costs of education such as private tuition fees and extracurricular activities (Ananat et al., 2017; Duncan et al., 2010; Shafiq, 2010), and could be detrimental to students' educational attainment because parents cannot afford educational materials (Ananat et al., 2017; Shafiq, 2010). Moreover, academic achievements might be negatively affected due to inadequate preparation and/or withdrawal from school (Ananat et al., 2017; Shafiq, 2010). Family income could enable parents to ensure better-quality environments that produce more capable children, motivating them to take advantage of educational opportunities (Carneiro and Heckman, 2003). Studies indicated that students in families with low socioeconomic status experienced lower academic performance (von Stumm, 2016; Bradley and Corwyn, 2002), and comparable patterns held for students interacting with peers from families with low socioeconomic status (Feng and Li, 2016).

Children and students could be occasionally pulled away from school to help their families by contributing to income generation (Espey and Jones, 2010; Ferreira and Shady, 2009). Adverse economic conditions can negatively affect children's health and mental health status due to restricted access to health services and reduction in well-being investments, personal unhappiness, family tension, stressful situations, conflicts between parents, and antisocial behaviours (Drydakis, 2022; Ananat et al., 2017; Duncan et al., 2010). These conditions may negatively impact children's learning ability, cognitive skills, and performance at school (Ananat et al., 2017; Frauke, 2016). Long-term parental unemployment might increase the likelihood of a family falling into poverty (Zedlewski and Nichols 2012); indeed, the more years a child has lived in adverse economic conditions, the higher the deterioration in health-related outcomes (Zedlewski and Nichols, 2012; McKernan et al., 2009).

Adverse economic conditions could increase marital tensions and conflicts in the household, thus affecting children's mental health and their ability to benefit from the academic environment in school (Frauke, 2016; Fernandez-Rivas and Gonzalez-Torres, 2013; Ferreira and Schady, 2009). Students' commitment might be shaped by their families and networks' socioeconomic experiences, as individuals coming of age during deep economic problems tend to suggest that success in life depends more on luck than on effort (Giuliano and Spilimbergo, 2014; Barling et al., 1998).

If parental unemployment is accompanied by severe austerity programmes to address a financial crisis, this can lead to a deterioration in students' performance (OECD, 2018; 2011; Drydakis, 2016; 2015; Gunnlaugsson, 2016; World Bank, 2009). Declines in public spending due to national austerity programmes, reduced donations, and tight school budgets might adversely

proliferate the association between parental unemployment and children's academic achievement (OECD, 2018; 2011; World Bank, 2009). The literature has evaluated associations between teachers' income, job satisfaction, motivation, performance, and student's academic achievements (Mertens and Beblo, 2016; Lavy, 2009), showing that decreases in teachers' income and school budgets, as well as an increased number of students due to school mergers, could negatively affect teachers' performance, with subsequent direct negative impacts on students' academic performance (OECD, 2018; 2013; 2011; Mertens and Beblo, 2016; Lavy, 2009; World Bank, 2009).

In this study, given the empirical patterns and theoretical considerations, it is hypothesised that:

Hypothesis 1: Parental unemployment is associated with deteriorated grades for adolescents.

Hypothesis 2: During an economic recession, parental unemployment is more detrimental to adolescents' grades than in non-economic recession periods.

3. Data collection

In Greece, secondary education comprises two stages, namely a three-year junior high school and a three-year upper high school. In junior high school, students are enrolled at the age of 13, while this number is 15 for upper high school. In September and October 2010, the research team randomly selected 60 upper high schools located in the Prefecture of Attica. An opening letter and participation information forms were forwarded to the principals of the upper high school detailing the nature of the study; the purpose of this was to collect information on basic socioeconomic characteristics of students and their parents, whilst also outlining the data gathering process. The research team aimed to interact with year 1 upper high school students in 2011 to complete a survey, then for the same group of students to take part in follow-up surveys in 2012 (during the second year of their studies) and in 2013 (during the third/final year of their studies). It was explained that members of the research team would be present in the class to distribute and collect the questionnaires, with students requiring approximately 20 minutes to complete the survey. Questionnaires were provided to the principals for their consideration and potential feedback, and if principals agreed to facilitate the survey, they were kindly asked to reply to the provided contact details to book an appointment. The letter also informed that the scope of the meeting would be to provide them with additional details relating to the survey's technicalities, such as how the team would distribute consensus letters and participation information sheets to the students, secure schools' and participants' anonymity, minimise any risk, and handle the data collection process during the teaching hours.

Eleven principals replied to the invitation; formal meetings were scheduled, and after the meetings the team obtained approval to proceed with the survey. Between February and March

2011, three members of the research team visited the schools during teaching time and distributed the questionnaires. To secure anonymity, students did not have to provide their full names/surnames and were given a unique code created using the first letter of their surname, and given name, the day and month of their birth, and the first letter of their mother's and father's given name. Subsequently, in February and March 2012 and 2013, the team visited the same classes to collect the 2011–2013 panel dataset.

In the initial invitation letter to the principals, it was mentioned that the research team was interested in replicating the data collection and collaborating with the same schools in the future to assess how periods during a prolonged era of economic recession might mediate key characteristics, such as students' academic performance. For the period spanning 2017–2019, the research team collaborated with the same eleven upper high schools, adopting the 2011–2013 research protocol. In February and March 2017, first-year upper high school students took part in the survey, and the same group of students provided follow-up information in 2018 and 2019[1].

4. Variables and estimation strategy

Adolescents were asked to provide information regarding their demographic characteristics, their mothers' and fathers' employment status (i.e. employed, not employed but actively looking for a job, not employed and not looking for a job), education level, and homeownership. A question on disability and/or long-term health conditions was included in the survey. Child–parent relationships were measured through a single question – 'in general, how close are you to your parents?' – as information on child–parent relationships tends to feature in the empirical literature (Kokkevi et al., 2018). A question on adolescents' average grades (20-point grading scale) in the previous semester was asked to assess academic performance.

Given the longitudinal nature of the data, the study presents three empirical specifications, namely pooled OLS estimates, random effects estimates and fixed effects estimates (Bell et al., 2019)[2]. The study acknowledges that (i) given the longitudinal nature of the data, panel specifications shall be more appropriate than cross-sectional specifications, (ii) omitted factors may be correlated with key predictors in random effects models, and (iii) fixed effects models could remove omitted variable bias (Vaisey and Miles, 2017).

[1] Each correspondence provided to students, parents, teachers, and principals contained information on raising concerns, asking for clarification, and/or making official complaints to the University Research Ethics Committee. No complaint was received.

[2] The Breusch-Pagan LM test was performed to assess whether pooled OLS models are more appropriate than the random effects models, whilst Hausman tests (Morgan, 2013) were used to determine whether random effects models are more appropriate than the fixed effects models. These tests indicated that random effects fit the data better.

Each specification controls for paternal unemployment (dummy variable), maternal unemployment (dummy variable), period (dummy variable; 2011–2013 versus 2017–2019), adolescents' age (continuous variable), gender (dummy variable), ethnicity (dummy variable), disability or long-term health conditions (dummy variable), parents' higher education or vocational training (dummy variables), child–parent relationship (5-point Likert-type scale variable), homeownership (dummy variable), school location and socioeconomic status (two dummy variables, i.e. school located in working-class area, school located in middle-class area), and school fixed effects (ten dummy variables). The fixed effects specifications do not control for time-invariant variables. Each specification reports robust standard errors.

Parental unemployment captures a vector of adverse conditions associated with unemployment, ranging from stress and tension to family economic struggles (Drydakis, 2022; Fanjul 2014). Indeed, various empirical specifications might indirectly account for economic conditions by including information for both paternal and maternal unemployment status. Similarly, including information on parents' higher education or vocational training and homeownership might make it possible to control for family socioeconomic characteristics associated with adolescents' grades (Berkman et al., 2014). It is assumed that the period control represents a vector of changes in the country's economic circumstances and families linked to deteriorated economic conditions (Drydakis, 2022; Fanjul, 2014).

Statistically significant negative parental unemployment estimates will indicate a negative association between adolescents' grades and parental unemployment (Hypothesis 1). Pooling the two datasets, i.e. 2011–2013 and 2017–2019, and including a period dummy variable, enables estimation of an interaction effect between the period and parental unemployment to examine whether parental unemployment is associated with lower adolescents' grades in 2011–2013 than in 2017–2019 (Hypothesis 2). A statistically significant negative interaction effect will indicate that parental unemployment is more detrimental to adolescents' grades during a period of economic decline.

The sample was restricted to those adolescents whose parents were in the labour force (i.e. employed parents; and not employed parents but actively looking for a job), as the literature suggests that it might be possible to reduce endogeneity by excluding inactive parents (Drydakis, 2022; Mörk et al., 2014). Adolescents' academic performance might not be correlated with parents' labour force status, as the parents are out of the labour force because their children have severe adverse health conditions. In addition, inactive parents might be characterised by physical health and mental health conditions, which could negatively impact adolescents' academic performance. Hence, it might be feasible to reduce the influence of parental health on adolescents' performance by excluding observations from adolescents with inactive parents.

A few empirical specifications are offered to assess the robustness of the estimates. Observations from adolescents with a disability or long-term health conditions are excluded to provide better-informed estimates in case adolescents' health impairments are correlated with deteriorated academic performance. Moreover, lagged information related to adolescents' grades is included in the empirical specification; for example, the 2012 wave incorporates information on adolescents' grades in 2011. Adding lagged information on grades might reduce endogenous relationships, i.e. from poor grades in 2011 to poor grades in 2012 (Bellemare et al., 2017). Finally, parental unemployment is transformed from a dummy variable to an ordered variable to measure the total number of unemployed parents in the household (ranging from 0 to 2) and examine the joint effects (i.e. both parents unemployed) on adolescents' grades.

5. Descriptive statistics

Table 1 offers the descriptive statistics of the two data collection periods, with panel I presenting the 2011–2013 period descriptive statistics and panel II the 2017–2019 period descriptive statistics. The 2011–2013 period panel consists of 1,119 observations, whilst the 2017–2019 period panel consists of 1,083 observations[3]. Panel III pools the datasets.

Four schools were located in working-class areas (37%), four in middle-class areas (37%), and three schools in upper-class areas (25%). The classification was based on the Hellenic Statistical Authority (HESA, 2015).

The analysis revealed that adolescents' grades in 2017–2019 were 6.1% higher than in 2011–2013 ($p<0.01$). In the present study, parental unemployment was lower in 2017–2019 than in 2011–2013 ($p<0.01$). Likewise, maternal unemployment in 2017–2019 was lower than in 2011–2013 ($p<0.01$), as well as being higher than paternal unemployment in both periods. The HESA (2019) indicated that, in 2011–2013 and 2017–2019, total unemployment was 21.2%, and in the present study parental unemployment was 19.9% in the same periods.

[Table 1]

6. Regression analysis

6.1 Endogeneity tests

Before presenting the main estimates, it is of importance to construct tests of the exogeneity of parental unemployment with respect to adolescents' grades. It is possible that academic performance, i.e. grades, is endogenous and is chosen by the adolescent. For instance, an adolescent may find her or himself academically underperforming due to personal circumstances, i.e. reasons

[3] The attrition rate was 4.5% in the 2011–2013 panel, and 4.1% in the 2017–2019 panel.

unrelated to her or his parents' employment status. If this is true, then personal circumstances cause lower grades rather than parents' employment status. To distinguish between the effects of exogenous and endogenous changes in adolescents' grades, Table AI (Appendix I) assesses whether a relationship exists between future paternal and maternal unemployment and current adolescents' grades. If such a relationship is found to be held, then endogeneity is present. Models I-IV indicate that, in the utilized dataset, parental unemployment was exogenous. Adolescents whose parents were employed in 2011 (2017) but became unemployed in 2012 (2018) experienced statistically insignificant different grades compared to adolescents whose parents were employed in 2011 (2017) and remained employed in 2012 (2018).

[Table AI (Appendix I)]

6.1 Pooled OLS estimates

Table 2 presents the pooled OLS estimates. Model I utilises the full sample, i.e. labour force, showing that paternal and maternal unemployment were negatively associated with adolescents' grades ($p<0.01$ and $p<0.01$, respectively); therefore, Hypothesis 1 can be accepted. The difference between paternal and maternal unemployment estimates was not statistically significant ($p>0.10$).

[Table 2]

Model II, excluding adolescents with a disability or long-term health conditions, estimated that paternal and maternal unemployment were negatively associated with adolescents' grades ($p<0.01$ and $p<0.01$, respectively).

In Model III, lagged information on adolescents' grades is included and the estimates continue to indicate a negative association between paternal and maternal unemployment and adolescents' grades ($p<0.01$ and $p<0.01$, respectively).

Model IV reports that there was a negative association between the number of unemployed parents in the household and adolescents' grades ($p<0.01$).

In Models I, II and IV, periods of economic decline, i.e. 2011–2013, brought about a decline in adolescents' grades ($p<0.01$).

6.2 Random effects estimates

Table 3 presents the random effects estimates. In Model I, the full sample, i.e. labour force, is utilised, indicating that paternal and maternal unemployment were negatively associated with adolescents' grades ($p<0.01$ and $p<0.01$, respectively); therefore, Hypothesis 1 can be accepted. The difference between paternal and maternal unemployment estimates was not statistically significant ($p>0.10$).

[Table 3]

In Model II, information on adolescents with a disability or long-term health conditions is excluded, showing that paternal and maternal unemployment were negatively associated with adolescents' grades ($p<0.01$ and $p<0.01$, respectively).

Model III, incorporating lagged information on adolescents' grades, indicates a negative association between paternal and maternal unemployment and adolescents' grades ($p<0.01$ and $p<0.01$, respectively).

Model IV reveals a negative association between the number of unemployed parents in the household and adolescents' grades ($p<0.01$).

In Models I, II and IV, periods of economic decline, i.e. 2011–2013, were associated with a decline in adolescents' grades ($p<0.01$).

6.3 Fixed effects estimates

Table 4 presents the fixed effects estimates, with time-invariant variables being excluded. Model I utilises the full sample, i.e. labour force, showing that maternal unemployment was negatively associated with adolescents' grades ($p<0.01$); therefore, Hypothesis 1 can be accepted for maternal unemployment.

Model II, excluding adolescents with a disability or long-term health conditions, reveals that maternal unemployment was negatively associated with adolescents' grades ($p<0.01$).

Model III, including lagged information on adolescents' grades, illustrates that maternal unemployment was negatively associated with adolescents' grades ($p<0.10$).

[Table 4]

Finally, Model IV reports that there was a negative association between the number of unemployed parents in the household and adolescents' grades ($p<0.01$).

6.4 Interaction effects analysis

Table 5 provides an interaction effects analysis, with Model I presenting the pooled OLS estimates and Model II the random effects estimates[4].

In Model I, the pooled OLS estimates indicate that, during periods of economic decline, i.e. in 2011–2013, paternal and maternal unemployment were associated with a deterioration in adolescents' grades ($p<0.01$ and $p<0.01$, respectively); therefore, Hypothesis 2 can be accepted. The difference between the two interaction effects was not statistically significant ($p>0.10$).

[4] Fixed effects interaction analysis was not possible because time-invariant variables could not be included in the empirical specification.

In Model II, the random effects estimates continue to indicate that, during periods of economic decline, both paternal and maternal unemployment were negatively associated with adolescents' grades ($p<0.05$ and $p<0.01$, respectively).

[Table 5]

Models III and IV offer additional random effects interaction analysis. In Model III, the analysis revealed that maternal unemployment was associated with lower adolescents' grades for adolescents whose households were not homeowners ($p<0.10$), and whose schools were located in working-class areas ($p<0.05$). Model IV finds that, during periods of economic decline, i.e. in 2011–2013, the number of unemployed parents in the household was associated with lower adolescents' grades ($p<0.01$). Moreover, the number of unemployed parents in the household was associated with lower adolescents' grades for adolescents whose schools were located in working-class areas ($p<0.05$).

Table 6 incorporates information on government expenditure on education, government expenditure on social protection, interaction effect between time period and government expenditure on education, and interaction effect between time period and government expenditure on social protection. Neither the government expenditure on education and social protection estimates nor the aforementioned interaction effects were found to be statistically significant. The estimates continue to indicate that both paternal and maternal unemployment were negatively associated with adolescents' grades ($p<0.01$ and $p<0.01$, respectively).

[Table 6]

7. Discussion and conclusions

7.1 Outcomes evaluation

The study found that paternal and maternal unemployment rates were higher in 2011–2013 than those in 2017–2019, and were associated with decreased adolescents' grades. Moreover, the association between parental unemployment and decreased grades worsened during periods of economic decline (i.e. in 2011–2013) than in non-economic recession periods (i.e., 2017-2019). Recent studies found comparable patterns. In Sweden, Mörk et al (2020) estimated that maternal job loss had some negative effects on child educational outcomes. In Denmark, Frederiksen et al. (2022) estimated that female youth, from families with unemployment had higher odds of not being enrolled in further education.

Parental unemployment might reduce the family budget, making it more difficult for parents to afford direct education costs, such as private tutoring (Shores and Steinberg, 2019; Drydakis, 2015; Kalil, 2013). Unemployment can bring about family tension, which is associated with

deteriorated children's mental health, school absences, and/or inadequate preparedness for school (Shores and Steinberg, 2019; Kalil, 2013). The present study found that, during periods of economic recession, the association between parental unemployment and decline in adolescents' grades was stronger. In addition, the aforementioned relationship was stronger for adolescents whose households were not homeowners and whose schools were located in working-class areas. These outcomes indicate that a lower household income and wealth might be negatively associated with adolescents' academic performance (OECD, 2018; Duncan et al., 2010).

During the economic crisis in Greece, unemployment skyrocketed, with families' inability to cope with unexpected financial expenses increasing by almost 60%, whilst the percentage of families with children that were unable to afford meat, chicken, or fish every second day more than doubled in Estonia, Greece, and Italy (Fanjul, 2014). Adolescents' life satisfaction in Greece reduced during the onset of the economic crisis (Kokkevi et al., 2018), with a 40% increase in psychosocial problems, a 28% increase in conduct disorders, a 25% increase in leaving school early, a 19% increase in the use of illegal and addictive substances, a 22% increase in bullying, a 51% increase in family conflicts, and a 20% increase in suicide attempts (Anagnostopoulos and Soumaki, 2013). Importantly, if parental unemployment is accompanied by declines in public spending on education and public health support, these events could negatively impact children's academic outcomes. In Greece, public spending on education declined by 36%, with public spending on the National Health System significantly decreasing by 37% (OECD, 2018; Economou and Kaitelidou, 2015).

In the present study, maternal unemployment was more detrimental to adolescents' grades than was paternal unemployment in certain empirical specifications (e.g. Table 4 Models I-III). In the literature, maternal unemployment was also associated with children's socio-behavioural problems, problem behaviour in school, negative educational outcomes, decreased adolescents' belief in self-determination, and decreased likelihood of college attendance (Mörk et al., 2020; Frauke, 2016; Johnson et al., 2012). If the aforementioned associations are applicable in the Greek context, then maternal unemployment could be detrimental to adolescents' grades. The literature indicates that maternal employment may improve students' performance if working mothers serve as positive role models for their children (Dunifon et al., 2013). Although working reduces the time mothers spend with their children, working mothers protect quality time with their children (Bianchi, 2000). In the current study, the descriptive statistics indicated that maternal unemployment was higher than paternal unemployment. If a household's well-being relies on both parents' income, and maternal unemployment is higher than paternal unemployment, then, given the provided insights (Frauke, 2016; Dunifon et al., 2013; Johnson et al., 2012; Bianchi, 2000),

maternal unemployment could represent a critical adverse household event associated with a reduction in adolescents' performance.

Children growing up in industrialized, Western societies may receive mixed gender role signals (Wiese and Freund, 2011). In Western societies, children might be less likely to witness a more traditional gender role division at home (Wiese and Freund, 2011). Mothers' employment and higher employment history can increase the self-sufficiency and self-esteem of students (Nasirabadi et al., 2020). In the present study, adolescents might be less academically motivated because their role model mothers lost their job due to exogenous reasons (Dunifon et al., 2013). The study's outcomes may highlight that women's employment is of fundamental importance, because it positively contributes to personal and family income, empowerment, self-esteem enhancement and adolescents' academic performance (Drydakis, 2022; Panitsidou et al., 2012).

Moreover, the study found that the association between maternal unemployment and reduction in adolescents' grades was higher for households without homeownership and in schools located in working-class areas. There was also a negative association between the number of unemployed parents in the household and adolescents' grades in working-class areas. It might be the case that, in less wealthy families, characterised by a weaker socioeconomic profile, income losses due to an increased number of unemployed parents may be detrimental to adolescents' performance (Drydakis, 2015). Past studies indicated that students in families with low socioeconomic status experienced lower academic performance (Feng and Li, 2016; von Stumm, 2016; Bradley and Corwyn, 2002).

7.2 Policy implications

The present study's findings suggest that policies should be implemented to moderate the adverse effects of parental unemployment on adolescents' academic performance (Kalil, 2013; Oreopoulos et al., 2008). The outcomes of the study indicated that government expenditure on education and social protection did not have a significant impact on adolescents' grades. Greece has some of the largest gaps in the social protection system of all EU Member States (World Bank, 2016). Nearly half of the poorest 40% of the population receive either no transfers or very insufficient transfers (World Bank, 2016). The allocated budgets might not be sufficient to address the association between parental unemployment and reduction in adolescents' academic performance.

Following the findings of international literature, in the school environment, interventions and prevention educational programmes should be designed and implemented to address inequalities due to families' financial conditions. Such interventions (i.e. food and clothing provision, academic support, studying preparation, psychological support) can boost children's

social and psychological development prosperity and educational progress (Nores and Barnett, 2010; Apple, 2010).

Shafiq (2010) evaluated the experiences of regions that have coped better with a recession, indicating that families can benefit from school cash transfers, fee reductions, and provision of block grants to schools which enable them to pay for costs and sustain academic quality. In addition, preventative programmes should support children by adopting whole-family and/or whole-school approaches, as well as supporting teaching staff in identifying and managing behaviour (Graham et al., 2019). Positive outcomes can be realised by focusing on intervening early before problems become entrenched, thus creating a positive school ethos to guide staff in identifying and managing behaviour in positive ways, and supporting families and children (Graham et al., 2019).

7.3 Limitations and future work

The study outcomes should be considered with caution, as the data was collected in a specific region of Greece, which, although accounting for one-third of the country's population, might not present experiences from other regions not covered in the study. The number of schools that participated in the study does not allow for generalisations, and so additional studies should be conducted with more schools across Greece for generalisation. The present study used only one indicator of academic performance i.e. the previous academic semester's average grade. Indeed, a new study might consider focusing on a certain module (i.e. mathematics, grammar) and offering insights. There was no gathering of information on part-time jobs, household formation (single parents, number of children in the family, specialisation), family income, wages, reasons for unemployment, unemployment spells and parents' health. Although the study attempted to deal with endogeneity, the estimated patterns might have been affected by unobserved heterogeneity. Information on the aforementioned variables and matched child and parent's data might provide more insights and minimise endogeneity.

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Table 1. Descriptive statistics

	Panel I 2011-2013 period (3 annual waves)	Panel II 2017-2019 period (3 annual waves)	Panel III 2011-2013 and 2017-2019 periods (6 annual waves)
Adolescents' grades (c.)	13.45 (2.17)	14.28 (2.03)	13.86 (2.14)
Paternal unemployment^ (%)	20.55 (0.40)	12.46 (0.33)	16.50 (0.37)
Maternal unemployment^^ (%)	28.23 (0.45)	18.37 (0.38)	23.38 (0.42)
Adolescents' age (c.)	15.93 (0.86)	15.86 (0.89)	15.90 (0.88)
Adolescents' gender: Male (%)	43.43 (0.49)	42.38 (0.49)	42.91 (0.49)
Adolescents' ethnicity: Non-Greek (%)	6.16 (0.24)	8.67 (0.28)	7.40 (0.26)
Adolescents with disability or long-term health condition (%)	3.93 (0.19)	2.94 (0.16)	3.44 (0.18)
Fathers with higher education or vocational training (%)	37.53 (0.48)	36.47 (0.48)	37.01 (0.48)
Mothers with higher education or vocational training (%)	32.61 (0.46)	32.22 (0.46)	32.42 (0.46)
Children-parents relationship (c.)	3.07 (0.81)	3.42 (0.79)	3.24 (0.82)
Homeownership (%)	73.27 (0.44)	76.17 (0.42)	74.70 (0.43)
Observations	1,119	1,083	2,202

Notes: The sample consists of information from adolescents whose parents were in the labor force. (^) The reference category is paternal employment. (^^) The reference category is maternal employment.

Table 2. Adolescents' grades. Pooled OLS				
	Model I Total sample	**Model II Excludes adolescents with disability or long-term health conditions**	**Model III Lagged variables**	**Model IV Total sample**
Paternal unemployment^	-1.180 (0.117)*	-1.251 (0.122)*	-0.245 (0.061)*	-
Maternal unemployment^^	-1.488 (0.108)*	-1.572 (0.113)*	-0.266 (0.063)*	-
2011-2013 period^^^	-0.573 (0.082)*	-0.578 (0.084)*	-0.007 (0.044)	-0.573 (0.082)*
Lagged adolescents' grades	-	-	0.878 (0.010)*	-
Number of unemployed parents in the household	-	-	-	-1.340 (0.074)*
F	39.15	36.87	441.92	40.45
Prob>F	0.000	0.000	0.000	0.000
Observations	2,202	2,126	1,385	2,202

Notes: The sample consists of people belonging in the labor force. Each model controls for adolescents' age, gender, ethnicity, disability or long-term health conditions, parents' higher education or vocational training, children-parent relationship, homeownership, school location and socioeconomic status, and school fixed effects. (^) The reference category is paternal employment. (^^) The reference category is maternal employment. (^^^) The reference category is the 2017-2019 period. Robust standard-errors are in parenthesis. (*) Statistically significant at the 1%.

Table 3. Adolescents' grades. Random Effects

	Model I Total sample	**Model II Excludes adolescents with disability or long-term health conditions**	**Model III Lagged variables**	**Model IV Total sample**
Paternal unemployment^	-0.377 (0.104)*	-0.361 (0.108)*	-0.265 (0.059)*	-
Maternal unemployment^^	-0.615 (0.094)*	-0.655 (0.098)*	-0.302 (0.063)*	-
2011-2013 period^^^	-0.688 (0.134)*	-0.705 (0.137)*	-0.024 (0.046)	-0.688 (0.134)*
Lagged adolescents' grades	-	-	0.844 (0.010)*	-
Number of unemployed parents in the household	-	-	-	-0.497 (0.067)*
Wald x^2	207.56	175.66	9,147.26	197.91
Prob>x^2	0.000	0.000	0.000	0.000
Observations	2,202	2,126	1,385	2,202

Notes: The sample consists of people belonging in the labor force. Each model controls for adolescents' age, gender, ethnicity, disability or long-term health conditions, parents' higher education or vocational training, children-parent relationship, homeownership, school location and socioeconomic status, and school fixed effects. (^) The reference category is paternal employment. (^^) The reference category is maternal employment. (^^^) The reference category is the 2017-2019 period. Robust standard-errors are in parenthesis. (*) Statistically significant at the 1%.

Table 4. Adolescents' grades. Fixed Effects

	Model I Total sample	**Model II Excludes adolescents with disability or long-term health conditions**	**Model III Lagged variables**	**Model IV Total sample**
Paternal unemployment^	-0.123 (0.111)	-0.099 (0.114)	0.029 (0.123)	-
Maternal unemployment^^	-0.278 (0.096)*	-0.304 (0.099)*	-0.229 (0.141)***	-
Lagged adolescents' grades	-	-	-0.019 (0.038)	-
Number of unemployed parents in the household	-	-	-	-0.200 (0.069)*
Observations	2,202	2,126	1,385	2,202

Notes: The sample consists of people belonging in the labor force. The sample consists of information from adolescents' whose parents were in the labor force. Each model controls for adolescents' age, gender, ethnicity, disability or long-term health conditions, parents' higher education or vocational training, children-parent relationship, and homeownership. Time invariant variables are omitted. (^) The reference category is paternal employment. (^^) The reference category is maternal employment. Robust standard-errors are in parenthesis. Stata did not provide information on F and Prob>F. Stata has done that so as to not be misleading. (*) Statistically significant at the 1%. (***) Statistically significant at the 10%.

Table 5. Adolescents' grades. Interaction Effects

	Model I Pooled OLS	Model II Random Effects	Model III Random Effects	Model IV Random Effects
Paternal unemployment^	-0.828	-0.147	-0.338	-
	(0.166)*	(0.138)	(0.103)*	
Maternal unemployment^^	-0.999	-0.361	-0.394	-
	(0.157)*	(0.111)*	(0.147)*	
2011-2013 period^^^	-0.282	-0.475	-0.536	-0.459
	(0.096)*	(0.144)*	(0.140)*	(0.143)*
Homeownership	0.343	0.677	0.545	0.730
	(0.112)*	(0.154)*	(0.175)*	(0.181)*
Schools located in working class areas	-0.479	-0.506	-0.418	-0.398
	(0.173)*	(0.291)***	(0.293)	(0.293)
Number of unemployed parents in the household	-	-	-	-0.130
				(0.139)
2011-2013 period × paternal unemployment	-0.608	-0.513	-	-
	(0.224)*	(0.204)**		
2011-2013 period × maternal unemployment	-0.855	-0.523	-0.609	-
	(0.191)*	(0.183)*	(0.180)*	
Schools located in working class areas × maternal unemployment	-	-	-0.418	-
			(0.202)**	
Homeownership × maternal unemployment	-	-	0.336	-
			(0.183)***	
2011-2013 period × number of unemployed parents in the household	-	-	-	-0.546
				(0.128)*
Schools located in working class areas × number of unemployed parents in the household	-	-	-	-0.309
				(0.136)**
Homeownership × number of unemployed parents in the household	-	-	-	-0.020
				(0.136)
F	36.66	-	-	-
Prob>F	0.000	-	-	-
Wald x^2	-	213.06	226.44	216.56
Prob>x^2	-	0.000	0.000	0.000
Observations	2,202	2,202	2,202	2,202

Notes: The sample consists of information from adolescents' whose parents were in the labor force. OLS and random effects models control for adolescents' age, gender, disability or long-term health conditions, parents' higher education or vocational training, children-parent relationship, school location and socioeconomic status and school fixed effects. (^) The reference category is paternal employment. (^^) The reference category is maternal employment. (^^^) The reference category is the 2017-2019 period. Robust standard-errors are in parenthesis. (*) Statistically significant at the 1%. (**) Statistically significant at the 5%. (***) Statistically significant at the 10%.

Table 6. Adolescents' grades. Interaction Effects

	Model I Pooled OLS	**Model II Random Effects**
Paternal unemployment^	-1.186 (0.117)*	-0.383 (0.105)*
Maternal unemployment^^	-1.480 (0.109)*	-0.606 (0.096)*
2011-2013 period^^^	86.409 (59.191)	102.080 (76.011)
Government expenditure on education (% of GDP)	145.641 (188.300)	167.344 (190.395)
Government expenditure on social protection (% of GDP)	335.121 (223.271)	388.948 (280.202)
2011-2013 period × Government expenditure on education (% of GDP)	-644.120 (512.327)	-802.050 (662.134)
2011-2013 period × Government expenditure on social protection (% of GDP)	-296.144 (201.165)	-340.495 (240.210)
F	33.15	-
Prob>F	0.000	-
Wald x^2	-	237.25
Prob>x^2	-	0.000
Observations	2,202	2,202

Notes: The sample consists of information from adolescents' whose parents were in the labor force. OLS and random effects models control for adolescents' age, gender, ethnicity, disability or long-term health conditions, parents' higher education or vocational training, children-parent relationship, homeownership, school location and socioeconomic status, and school fixed effects. (^) The reference category is paternal employment. (^^) The reference category is maternal employment. (^^^) The reference category is the 2017-2019 period. Robust standard-errors are in parenthesis. (*) Statistically significant at the 1%.

Appendix I

Table AI. Adolescents' grades. Endogeneity of parental unemployment with respect to adolescents' grades				
	Model I	**Model II**	**Model III**	**Model IV**
Employed fathers in 2011 who became unemployed in 2012 versus Employed fathers in 2011 who remained employed in 2012	-0.312 (0.359)	-	-	-
Employed mothers in 2011 who became unemployed in 2012 versus Employed mothers in 2011 who remained employed in 2012	-	-0.111 (0.508)	-	-
Employed fathers in 2017 who became unemployed in 2018 versus Employed fathers in 2017 who remained employed in 2018	-	-	-0.575 (0.352)	-
Employed mothers in 2017 who became unemployed in 2018 versus Employed mothers in 2017 who remained employed in 2018	-	-	-	-0.199 (0.391)
F	4.29	1.80	5.06	6.04
Prob>F	0.000	0.024	0.000	0.000
Observations	318	181	332	307

Notes: Pooled OLS estimates. The sample consists of information from adolescents' whose parents were in the labor force. Each model controls for adolescents' age, gender, ethnicity, disability or long-term health conditions, parents' higher education or vocational training, children-parent relationship, homeownership, school location and socioeconomic status, and school fixed effects. Robust standard-errors are in parenthesis.