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ABSTRACT

Economic Recession, Parental Unemployment and Adolescents' Health-Related Quality of Life and Mental Health Outcomes in Greece

This study examines whether an association exists between parental unemployment and health-related quality of life and mental health for adolescents aged 15-18 in Athens, Greece. The gathered dataset covers the same upper high schools in two periods, 2011-2013 and 2017-2019. The study finds that parental unemployment bears an association with decreased health-related quality of life and increased adverse mental health symptoms for adolescents. Moreover, the 2011-2013 period, a period of increased parental unemployment, saw a decrease in health-related quality of life and increased adverse mental health symptoms for adolescents. In addition, parental unemployment proved more detrimental to adolescents' health-related quality of life and mental health in 2011-2013 than in 2017-2019. The present research ranks among the first studies to examine whether parental unemployment could be associated with worse health-related quality of life and mental health for adolescents during periods of increased parental unemployment. Public policies that can reduce the adverse effects of parental unemployment on adolescents' health-related outcomes require consideration. This approach proves critical because deteriorated health-related quality of life and mental health can negatively impact on adolescents' human capital, progression, income, and future health.

JEL Classification: E24, J13, I10, I14

Keywords: parental unemployment, adolescents, health-related quality of life, mental health, recession, economic crisis

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1. Introduction

In January 2009, Greece's unemployment rate stood at 9.1 percent. Ten years later, in June 2019, the unemployment rate reached a staggering 17 percent, indicating a critical economic recession (Eurostat 2019). Greece faced a debt crisis in the aftermath of the Global Financial Crisis of 2007-2008, leading to a small-scale humanitarian crisis (Bozani and Drydakis 2015). Since 2009, it has not been unusual for households in Greece to have at least one unemployed or partly employed member facing a sharp reduction in income and being unable to afford basic necessities (Bozani and Drydakis 2015).

Table Appendix I illustrates that, during the period spanning 2011-2013, the real GDP growth rate in the EU-28 was 0.5 percent, while, in Greece, it stood at -6.5 percent. During the same period, the at-risk-of-poverty rate in the EU-28 was 16.8 percent, whilst in Greece, it was 22.5 percent. Moreover, again during the same period, the unemployment rate in the EU-28 was 10.3 percent, but in Greece was 23.3 percent. Furthermore, the percentage of children at risk of poverty or social exclusion in the EU-28 was 34.6 percent during 2011-2013, while in Greece, this was 47.6 percent. Table Appendix I shows that during the 2017-2019 period, Greece continued to experience, in comparison with the EU-28, lower real GDP growth and a higher at-risk-of-poverty rate, while the rates of unemployment and children at risk of poverty or social exclusion were also higher.

[Table Appendix A1]

One of the few longitudinal studies conducted in Greece found that increased unemployment during an economic recession may negatively affect adults' physical and mental health (Drydakis 2015). International studies found comparable outcomes with evidence that the situation indicates mental health deterioration and increased suicide rates (Parmar et al. 2016; Drydakis 2016; Paul and Moser 2009). Research suggests that the above-mentioned patterns might arise because of income loss which causes a decrease in investments in health-enhancing goods, restricts access to medical health care, and increases stressors related to economic problems and accumulated debt (Aleman-Diaz et al. 2016; Drydakis 2016; Elgar et al. 2015; Kolaitis and Giannakopoulos 2015).

The present study examines whether there exists an association between paternal and maternal unemployment and adolescents' health-related quality of life and mental health outcomes in Greece. Given that adverse economic conditions can have negative future implications for children's physical and neurological development, as well as for human capital and risky behaviours (Currie 2009; Gupta et al. 2007; Shonkoff and Phillips 2000), it

remains surprising that, internationally, there is limited work examining how deteriorated economic conditions could impact children's health outcomes (Page et al. 2019; Schaller and Zerpa 2019; Reinhard et al. 2018; Rathmann et al. 2016; Sandstrom and Huerta 2013). Similarly, a relevant, unemployment-focused study has not yet taken place in Greece.

The current study utilizes two longitudinal datasets. The data came from the same upper high schools in the Prefecture of Attica. The Attica region comprises the entire metropolitan area of Athens, with 3.8 million people, equating to one-third of Greece's population. In 2011, adolescents received a questionnaire to complete. Follow-up surveys took place in 2012 and 2013. This data gathering resulted in the 2011-2013 dataset. Working with the same upper high schools in 2017-2019 allowed a comparable survey to take place. The new data gathering resulted in the 2017-2019 dataset. Utilizing the two-panel datasets enables rich evaluations, and health-related outcomes are captured through (i) the KIDSCREEN-10 inventory (Ravens-Sieberer et al., 2014), which measures health-related quality of life, and (ii) the CES-DC inventory (Weissman et al., 1980), which measures adverse mental health symptoms.

This study indicates that parental unemployment could bear an association with deteriorated health-related quality of life and mental health for adolescents. Moreover, a period of increased parental unemployment could correlate with a reduction in health-related quality of life and mental health outcomes for adolescents. Notably, the outcomes also indicate that during periods of increased parental unemployment, the association between parental unemployment and deteriorated health-related quality of life and mental health for adolescents could become stronger in magnitude. Policymakers should potentially show an interest in observing the patterns so as to inform programmes aimed at supporting families and adolescents, especially during periods of increased unemployment (Currie, 2009; Gupta et al., 2007; Shonkoff and Phillips, 2000).

The current study contributes to the literature with an analysis representing the first multivariate Greek study to examine, using panel data, whether parental unemployment correlates with deteriorated health-related quality of life and mental health outcomes for adolescents. Moreover, the study evaluates whether, during periods of increased parental unemployment, the magnitude of the association between parental unemployment and adverse health-related quality of life and mental health outcomes for adolescents could be stronger. In the literature, such assessments remain rare. The longitudinal nature of the study and the empirical specifications enable the provision of better-informed estimates. Additionally, the

two health-related indicators allow researchers to approach the phenomenon from different perspectives and offer comprehensive evaluations.

The remainder of the article is organized as follows. Section 2 offers a literature review and sets up theoretical predictions. Section 3 discusses the data gathering procedure, whilst Section 4 presents the variables and the estimation strategy. Following this, Sections 5 and 6 present the descriptive statistics and regression outcomes. Section 7 offers robustness tests before the last section provides a discussion.

2. Literature review and hypotheses

2.1 International experiences

Past studies found that adverse economic conditions could harm the physical and mental health of children under 18 due to disruption of normal family processes, restricted access to health services, reduction in well-being investments, personal unhappiness, family tension, stressful situations, conflicts between parents, and antisocial behaviours (Briody 2021; Aleman-Diaz et al. 2016; Elgar et al. 2015; World Health Organization 2012; Harper and Jones 2011; Carlo et al. 2011; Conger et al. 2010; Solantaus et al. 2004).

Rajmil et al. (2014) provided an international study concerning the impact of the 2008 economic crisis on children's health. The study found that the health of the children surveyed deteriorated, and the most vulnerable groups were disproportionately affected. Additionally, the study reported increased inequalities in health-related quality of life, increased violence against children, and a rise in infant mortality (Rajmil et al. 2014). Moreover, Fanjul (2014), in a review of the effects of the economic crisis on children's well-being in developed countries, discovered that, since 2008, the inability of families to cope with unexpected financial expenses has increased by approximately 60 percent in Croatia, Cyprus, Estonia, Greece, Hungary, Iceland, Ireland, Italy, Portugal, Latvia, Lithuania, and Spain. The study also found that the number of families with children unable to afford meat, chicken, or fish every second day more than doubled in Estonia, Greece, and Italy (Fanjul, 2014). Moreover, Rajmil et al. (2018) utilized cross-sectional data covering the period spanning 2005-2015 in 16 EU countries, finding that countries with more severe austerity measures experienced increasingly low birth weights, primarily between 2012 and 2015.

Elgar et al. (2015) utilized time-series data for students in 34 countries during the 2002-2010 period and estimated that higher national income inequality bore a link to additional psychological and physical symptoms. D'Agostino et al. (2019) used cross-sectional data and found that, in Greece and Italy, children's well-being decreased during the

period spanning 2009-2014. In the US, 9 percent of parents experienced food insecurity in 2009-2010, and 13 percent had exceedingly low food security (Bruening et al. 2012). In the same region, the poverty rate tripled, from 12 percent in 2008 to 35 percent in 2011 amongst parents experiencing six or more months of unemployment (Zedlewski and Nichols 2012), whilst students experienced reduced self-rated health and mental health (Cui and Zack 2013). Moreover, in the US, Cotti and Simon (2018) employed cross-sectional data for the period spanning 2004-2012 to estimate that declines in the stock market negatively impacted child health and hospitalizations.

In relation to the literature examining the association between unemployment and students' health, the review study of Sandstrom and Huerta (2013) presented that parental unemployment potentially leads to poor social-emotional outcomes for young children.

Pfoertner et al. (2014) and Rathmann et al. (2016) utilized data from 31 regions in Europe, Canada, Asia and the US. The dataset covered the 2005-2006 and 2009-2010 periods. Youth unemployment in 2010 increased the likelihood of psychological health complaints (Pfoertner et al. 2014). Additionally, higher inequalities in psychological health for students appeared in countries with marked increases in youth unemployment (Rathmann et al. 2016).

In Slovakia, Bacikova-Sleskova et al. (2015) utilized data from 2006. The study indicated a negative association between paternal unemployment and adolescents' health. In Spain, Rajmil et al. (2015) employed cross-sectional data and discovered that children's mental health proved slightly worse in 2012 than in 2006 for those children with all family members unemployed. In Portugal, Frasquilho et al. (2017) found that, in 2014, adolescents reported being emotionally affected by paternal unemployment. Female adolescents with low socio-economic status and poor family satisfaction were more likely to report negative emotional well-being related to parental unemployment. In Ireland, Reinhard et al. (2018) utilised longitudinal data before (2008), during (2011), and after (2013) the Great Recession. The study revealed that both reduced working hours and difficulty affording basics bore an association with an increased risk of reporting fair/poor children's health, whilst a reduction in welfare benefits correlated with an increased risk of asthma and atopy symptoms in children.

In the US, Schaller and Zerpa (2019) utilized panel data covering 1996-2012 and found that both paternal and maternal job loss led to reductions in parental ratings of children's health and mental health. In the same region, Page et al. (2019) employed cross-sectional data for the period 1997-2012, discovering that increases in local unemployment

rates aligned with increases in the incidence of injuries and severe emotional difficulties amongst children.

Johansson et al. (2019) examined data for 27 European and North American regions across the 2001-2002, 2005-2006 and 2009-2010 survey cycles. The study found that living in a country with higher national unemployment was related to lower adolescent life satisfaction. It was also unveiled that the association was stronger amongst adolescents whose fathers or both parents were unemployed.

In Spain, Zozaya and Vallejo (2020) explored four data waves for 2002, 2006, 2010, and 2014. The study found that increased unemployment rates were linked to a higher risk of poorer health and bad habits for adolescents. However, the correlation was no longer statistically significant when indicators of family and peer relationships were included, thus suggesting a protective effect against the impact of adverse economic conditions. Finally, in Portugal and Spain, Moreno-Maldonado et al. (2020) found that, in 2014, paternal unemployment was associated with reduced adolescents' life satisfaction.

2.2 Greek patterns

In Greece, there exist no multivariate studies on the association between parental unemployment and physical and mental health outcomes during the economic crisis. Limited research has focused on children's health and mental health outcomes during the period under consideration. Anagnostopoulos and Soumaki (2013) utilized cross-sectional data for 2007 and 2011 from both public and private child psychiatric institutions across the country (Athens, Piraeus and Thessaloniki). They found that conduct disorders had increased by 28 percent, suicide attempts by 20 percent, psychosocial problems by 40 percent, early school leaving by 25 percent, use of illegal and addictive substances by 19 percent, bullying by 22 percent, and family conflicts by 51 percent.

Kokkevi et al. (2018) used cross-sectional data for the years 2006, 2010, and 2014 across Greece and estimated that students' life satisfaction reduced during the economic crisis. The number expressing high satisfaction with their lives decreased from 69 percent in 2006 to 60.1 percent in 2014 (Kokkevi et al. 2018). The study concluded that the economic crisis created tension and arguments in Greek families and financial struggles ranging from difficulties in buying food to cutting down holidays (Kokkevi et al. 2018).

Paleologou et al. (2018) examined cross-sectional data for 2013 and 2014 in Athens (Greece). The outcomes indicated that students reported 10.9 percent emotional symptoms, 11.9 percent conduct problems, 10.6 percent hyperactivity, and 4.8 percent peer problems.

The study found that students who reported a lack of food in their house during the previous month were more likely to experience the manifestation of mental health problems than were students who did not experience food insecurity. Furthermore, Zografaki et al. (2018) explored national Greek birth data for 1980-2014 and found that, during the periods 2008-2010 and 2011-2014, infant mortality increased from 2.7 percent in 2008 to 3.8 percent in 2014.

2.3 Hypotheses

The present study hypothesises that there exist several mechanisms resulting from increased parental unemployment, which can negatively impact students' health-related quality of life and mental health outcomes. If increased adverse economic conditions reduce employment rates, this scenario could also potentially increase financial struggles, reduce the quality of care that children receive, and prompt a decline in investments in health. Such conditions could, in turn, negatively impact children's well-being (Schaller and Zerpa 2019; Conger et al. 2010; Patterson 2002; McCubbin and Patterson 1983). If increased parental unemployment brings about declines in food and service budgets, higher-income poverty, and increased adverse physical and mental health symptoms for parents, then such characteristics might bear an association with increased adverse health-related outcomes for children (Alemán-Díaz et al., 2016; Fanjul, 2014; Currie, 2009; Mayer, 1997).

Research indicates that the more time a child spends living in adverse economic conditions, the higher the deterioration in health-related outcomes (Zedlewski and Nichols 2012; McKernan et al. 2009). Long-term parental unemployment might increase the likelihood of falling into poverty (Zedlewski and Nichols 2012). Additionally, increased parental unemployment aligned with country-wide severe austerity programmes could potentially boost the aforementioned relationships (Drydakis 2016; 2015; Gunnlaugsson 2016). Evidence suggests that decline in public healthcare provision and spending due to national austerity programmes, and reduced health promotion initiatives due to fewer donations and tighter budgets, could potentially proliferate the link between parental unemployment and children's health due to restricted access to quality health services (Rajmil et al. 2018; Drydakis 2015; Isaacs, 2012). Moreover, within a recessionary period, increased parental unemployment has the potential to boost the negative association between parental unemployment and adolescents' health.

This study reflects on the presented evidence and indicates that:

Hypothesis 1. Parental unemployment bears an association with deteriorated health-related quality of life and mental health for adolescents.

Hypothesis 2. A period of increased parental unemployment correlates with a reduction in health-related quality of life and mental health for adolescents.

Hypothesis 3. During a period of increased parental unemployment, the association between parental unemployment and deteriorated health-related quality of life and mental health for adolescents becomes stronger in magnitude.

3. Data

In Greece, secondary education comprises two stages: a three-year junior high school and a three-year upper high school. In junior high school, students enrol from the age of 13, whilst in upper high school, students typically enrol from the age of 15.

In September and October 2010, the research team randomly selected 60 upper high schools located in the Prefecture of Attica. Participation information and invitation letters were forwarded to upper high school principals. The letters provided information regarding the nature of the study, i.e. to assess the relationship between adverse economic conditions, such as parental unemployment, and students' health-related outcomes and progression. The documents stated that the aim was to approach year-1 upper high school students in 2011 to complete a survey. Following this, the students would complete follow-up surveys in 2012 (during their second year in upper high school) and 2013 (during their third/final year in upper high school). The letters informed the principals that members of the research team would distribute and collect the questionnaires. A questionnaire was provided for the principals to peruse. If the principals wanted to consider the case, they were kindly requested to reply to the provided contact details to book an appointment with the primary investigator. The letter stated that the meeting would provide details regarding how the research team would distribute consensus letters and participation information sheets to the students and parents, secure schools and participants' anonymity, minimize any risk, and handle the data gathering process.

A total of 11 principals responded to the invitations. Four schools were located in working-class areas (37 percent), and four others were situated in middle-class areas (37 percent), whilst three schools were located in upper-class areas (25 percent). The classification is based on the Hellenic Statistical Authority (HESA 2015), which utilizes socio-occupational criteria (e.g. percentage of white-collar, blue-collar and pink-collar employees per area). This classification is a comprehensive approach because occupational

heterogeneity captures hierarchies related to economic, cultural and social capital (HESA 2015). Hence, a diverse population responded to the call for participation.

Formal meetings with the 11 principals took place after the research team had received approval to proceed. In February and March 2011, three members of the research team visited the 11 upper high schools and distributed the questionnaires. Students did not have to provide their full names; instead, a unique code was created using the first letter of their surname and given name, the day and month of their birthday, and the first letters of their parents' names. The study followed the usual procedures for securing ethics approval and ensuring the anonymity of the participants.

In February and March 2012 and 2013, the team visited the same classes, and the coding routine created the 2011-2013 panel dataset. Each correspondence provided participants (i.e. students, parents, teachers and principals) with information on raising concerns, asking for clarifications, and/or making official complaints to the University Research Ethics Committee. However, no participant submitted a complaint.

For the period covering 2017-2019, the research team visited the same 11 upper high schools and adopted the 2011-2013 research procedure protocol. In February and March 2017, first-year upper high school students took part in the new survey, and in 2018 and 2019, the same group of students provided follow-up information. Hence, the observations of the present study consist of two-panel datasets: 2011-2013 (i.e. three waves) and 2017-2019 (i.e. three waves). Both panels contain observations from the same schools where first-year students in 2011 and 2017 provided follow-up information for three years.

4. Variables and estimation strategy

4.1 Variables

During each data-gathering session, adolescents received a request to provide information concerning their demographic characteristics, their parents' employment status (i.e. employed, unemployed but actively looking for a job, unemployed and not looking for a job), education level, and homeownership.

Health-related quality of life was captured through the KIDSCREEN-10 questionnaire (The KIDSCREEN Group Europe 2006). The KIDSCREEN-10 questionnaire represents a self-disclosure quality of life inventory for healthy and chronically ill children and adolescents, forming part of epidemiologic public health surveys and clinical intervention studies (Ravens-Sieberer et al. 2010). The KIDSCREEN-10 questionnaire contains items such as whether children and adolescents felt fit, well, and full of energy in the previous week

(Ravens-Sieberer et al. 2010). Past studies found that the KIDSCREEN-10 questionnaire is a reliable inventory in more than 40 countries (Ravens-Sieberer et al. 2014; Ravens-Sieberer et al. 2010; The KIDSCREEN Group Europe 2006). Each answer corresponds to a mark on a 5-point Likert scale. Responses are summed up, and Rasch person parameters are assigned to each possible sum score. Rasch person parameters, then, transform into values with a mean of approximately 50 and a standard deviation of approximately 10 (Ravens-Sieberer et al. 2014; Ravens-Sieberer et al. 2010; The KIDSCREEN Group Europe 2006). Higher KIDSCREEN-10 scores indicate increasing levels of health-related quality of life (The KIDSCREEN Group Europe 2006).

The Center for Epidemiological Studies Depression Scale for Children (CES-DC) assesses adverse mental health symptoms (Weissman et al. 1980). The CES-DC for children and adolescents is a 20-item self-report depression inventory. The survey includes statements such as ‘I felt down, unhappy, and sad in the past week.’ Past studies found that CES-DC has good psychometric properties for adolescents (Stockings et al. 2015; Radloff 1991). Each answer corresponds to a mark on a 4-point Likert scale. Higher CES-DC scores indicate increasing levels of depression (Stockings et al. 2015; Radloff 1991; Weissman et al. 1980).

A question on disability and/or long-term health conditions formed part of the survey (Drydakis, 2010). The child-parent relationship was measured through a single question, asking ‘In general, how close are you to your parents?’ Information on child-parent relationships tends to feature in the empirical literature (Kokkevi et al. 2018).

4.2 Estimation strategy

The Random Effects model assesses the determinants of health-related quality of life and mental health. Bell et al. (2019) indicated that the Random Effects model provides everything that the Fixed Effects model provides and more, making it the superior method for most practitioners. It is indicated that the Random Effects model should be used as a starting point, at least, in all multilevel analyses (Bell et al. 2019).

Better-informed specifications can reduce omitted variable bias (Clarke 2005). After observing relevant surveys in social-epidemiology, critical information was included in the empirical specification (Drydakis 2015; Berkman et al. 2014). For each health indicator (i.e. health-related quality of life, mental health outcomes), the empirical specifications include information on 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), a father with higher education (dummy variable), a mother with higher education (dummy variable), children–parent relationship (five Likert-type scale variables), homeownership (dummy variable), and school fixed effects (ten dummy variables).

The period variable captures economic conditions (Alemán-Díaz et al. 2016; Drydakis 2015; Fanjul 2014). The parental unemployment variable supposedly captures a vector of adverse conditions such as economic struggles, stress, and tension (Alemán-Díaz et al. 2016; Fanjul 2014). The empirical specifications, by including information for both paternal and maternal unemployment, indicate that the estimates might count for income losses and economic struggles. In addition, including information on fathers' and mothers' human capital and homeownership might capture household socio-economic characteristics (Moulton et al., 2020; Lê-Scherban et al., 2016). Moreover, including school fixed effects can capture an area's socio-economic characteristics (HESA 2015).

A negative and statistically significant parental unemployment estimate indicates that parental unemployment correlates with deteriorated health-related quality of life outcomes for adolescents (Hypothesis 1). Pooling the 2011-2013 and 2017-2019 datasets and including a period control enables an assessment of whether 2011-2013 (i.e. a period of increased parental unemployment in the present dataset) bears an association with deteriorated health-related quality of life outcomes for adolescents (Hypothesis 2). To evaluate whether, in 2011-2013, the association between parental unemployment and health-related outcomes for adolescents becomes stronger in magnitude compared to the 2017-2019 period (Hypothesis 3), an interaction effect underwent estimation between parental unemployment and time period (i.e. *parental unemployment x time period*). A comparable estimation strategy was adopted for the mental health case.

The sample observes those adolescents with parents in the labour force (i.e. employed parents and those parents not employed but actively looking for a job). Excluding inactive parents can potentially reduce reverse causalities (Mork et al. 2014). Parents not in the labour force might have children with adverse health conditions that restrict their access to labour. In addition, inactive parents might experience deteriorated physical and mental health conditions (Drydakis 2015), which impact their children's physical and mental health (Mork et al. 2014).

This study involves robustness tests. The sample excludes observations from adolescents with disabilities or long-term health conditions. Excluding population groups with health impairments might create better-informed estimates on the subject matter (Berkman et al. 2014; Drydakis 2010). Moreover, the models include lagged information pertaining to

health-related quality of life and adverse mental health. For example, the 2012 wave incorporates information on health-related quality of life in 2011. Doing so might reduce potential spurious relationships, i.e. from poor health in 2011 to poor health in 2012 (Bellemare et al. 2017).

In addition, the sample diverges. Estimates are offered for the 2011-2013 period and the 2017-2019 period. This exercise could make it possible to observe whether, during periods of increased parental unemployment, the magnitude of the association between parental unemployment and adverse health-related outcomes for adolescents could become stronger. Furthermore, Pooled OLS and Fixed Effects estimates assess whether the estimates hold in the event of the utilization of alternative empirical specifications (Bell et al., 2019; Wooldridge, 2010). The study indicates that, given the longitudinal nature of the data, panel specifications shall be more appropriate than cross-sectional specifications, omitted factors may be correlated with key predictors in Random Effects models, and Fixed Effects models could remove omitted variable bias (Wooldridge 2010; Vaisey and Miles 2017).

5. Descriptive statistics

Table 1 presents the descriptive statistics. Panel I presents the descriptive statistics for 2011-2013. Panel II offers the 2017-2019 period's descriptive statistics. Panel III presents data for the 2011-2013 and 2017-2019 periods. The findings indicate that, in 2017-2019, paternal unemployment proved lower than in 2011-2013 (12.4 percent versus 20.5 percent, $p < 0.01$). In 2017-2019, maternal unemployment proved lower than in 2011-2013 (18.3 percent versus 28.3 percent, $p < 0.01$). The assessment observes that, in 2011-2013, maternal unemployment proved higher than paternal unemployment ($p < 0.01$). Comparable patterns hold in 2017-2019 ($p < 0.01$).

[Table 1]

Table 1 illustrates that adolescents' health-related quality of life (KIDSCREEN-10) in 2011-2013 proved lower than in 2017-2019 (44.0 versus 47.2, $p < 0.01$). Moreover, adolescents' adverse mental health symptoms (CES-DC) proved higher in 2011-2013 than in 2017-2019 (12.2 percent versus 9.2 percent, $p < 0.01$).

The attrition rate was 4.5 percent in the 2011-2013 panel and 4.1 percent in the 2017-2019 panel. The mean adolescents' health-related quality of life, adverse mental health symptoms, and parental unemployment rates of those who were lost to follow-up (because they were not present in the class in the follow-up surveys or because they did not want to

participate in the follow-up surveys) were not statistically significantly different from those who provided follow-up information.

Table 2 offers a correlation matrix. The correlation matrix indicates that both paternal and maternal unemployment negatively correlated with adolescents' health-related quality of life ($r = -0.41, p < 0.01$; $r = -0.45, p < 0.01$, respectively) and positively correlated with adolescents' adverse mental health symptoms ($r = 0.44, p < 0.01$; $r = 0.50, p < 0.01$, respectively). Moreover, there exists a negative correlation between adolescents' health-related quality of life and adverse mental health symptoms ($r = -0.65, p < 0.01$).

[Table 2]

The findings show that the 2011-2013 period positively correlated with increased paternal unemployment ($r = 0.10, p < 0.01$), maternal unemployment ($r = 0.11, p < 0.01$), and adolescents' adverse mental health symptoms ($r = 0.23, p < 0.01$). The 2011-2013 period negatively correlated with adolescents' health-related quality of life ($r = -0.15, p < 0.01$).

6. Regression outcomes

6.1 Health-related quality of life (KIDSCREEN-10)

In Table 3, Model I indicates that paternal and maternal unemployment bore a negative association with health-related quality of life for adolescents ($b = -8.443, p < 0.01$; and $b = -7.802, p < 0.01$). Hypothesis 1, for the health-related quality of life indicator, is thus supported. The difference between the two coefficients is statistically insignificant ($\chi^2 = 0.54, p > 0.10$). Moreover, estimates suggest that the 2011-2013 period aligned with a reduction in health-related quality of life for adolescents compared to 2017-2019 ($b = -1.335, p < 0.01$). Hypothesis 2, for the health-related quality of life indicator, is thus supported.

[Table 3]

Estimates suggest that the male adolescents had a better health-related quality of life than the female adolescents ($b = 1.897, p < 0.01$). The same pattern held when adolescents' mothers had higher education ($b = 1.487, p < 0.01$) and when a family-owned their home ($b = 1.693, p < 0.05$). The opposite held for adolescents with disabilities or long-term health conditions ($b = -10.466, p < 0.01$). The findings show age's negative association with adolescents' health-related quality of life ($b = -0.502, p < 0.01$).

Model II presents an interaction effect analysis. Paternal and maternal unemployment in 2011-2013 aligned with lower health-related quality of life for adolescents ($b = -3.670, p < 0.01$, and $b = -2.184, p < 0.05$, respectively). Hypothesis 3, for the health-related quality of

life indicator, is thus supported, indicating that paternal and maternal unemployment was more detrimental to adolescents' health-related quality of life in 2011-2013 than in 2017-2019.

6.2 Adverse mental health symptoms; CES-DC

In Table 3, Model III presents the adverse mental health symptoms estimates. The findings show that paternal unemployment correlated with increased adverse mental health symptoms for adolescents ($b= 5.657, p<0.01$). Comparable outcomes are estimated for maternal unemployment ($b= 5.939, p<0.01$). Hypothesis 1, for the adverse mental health symptoms indicator, is thus supported. The difference between the paternal and maternal unemployment coefficients is statistically insignificant ($\chi^2=0.25, p>0.10$).

The period estimate indicates that, in 2011-2013, adverse mental health symptoms for adolescents were more prevalent than in 2017-2019 ($b= 1.735, p<0.01$). Hypothesis 2, for the adverse mental health symptoms indicator, can thus be supported.

Moreover, the findings show that the male adolescents experienced fewer adverse mental health symptoms than their female counterparts ($b= -0.511, p<0.10$). The same outcomes held when adolescents' mothers had higher education ($b= -0.829, p<0.01$). The disabled adolescents or those with long-term health conditions experienced higher adverse mental health symptoms ($b= 6.026, p<0.01$). Age was positively associated with adolescents' adverse mental health symptoms ($b= 0.425, p<0.01$).

Model IV presents an interaction effect analysis. Paternal unemployment in 2011-2013 aligned with higher adverse mental health symptoms for adolescents ($b= 1.846, p<0.05$). Hypothesis 3, for the adverse mental health symptoms indicator, and in relation to paternal unemployment, can thus be supported. That is, paternal unemployment was more detrimental to adolescents' mental health in 2011-2013 than in 2017-2019.

7. Robustness tests

7.1 Health-related quality of life (KIDSCREEN-10)

Table 4 presents robustness tests. Model I excludes information on disabled adolescents or those with long-term health conditions. It was found that health-related quality of life for adolescents was negatively correlated with paternal and maternal unemployment ($b= -8.728, p<0.01$, and $b= -8.192, p<0.01$, respectively). Additionally, in 2011-2013, adolescents experienced deteriorated health-related quality of life compared to 2017-2019 ($b= -1.651, p<0.01$).

[Table 4]

Model II includes lagged information on health-related quality of life. The findings show that health-related quality of life for adolescents bore a negative association with paternal and maternal unemployment ($b = -5.715$, $p < 0.01$, and $b = -6.441$, $p < 0.01$, respectively). Additionally, in 2011-2013, adolescents faced deteriorated health-related quality of life compared to 2017-2019 ($b = -1.665$, $p < 0.01$).

In Models III-IV, the sample is split. Model III offers estimates from 2011-2013. It was found that the health-related quality of life for adolescents bore a negative association with paternal and maternal unemployment ($b = -10.137$, $p < 0.01$, and $b = -9.587$, $p < 0.01$, respectively). Model IV presents that, in 2017-2019, health-related quality of life for adolescents negatively correlated with paternal and maternal unemployment ($b = -5.681$, $p < 0.01$, and $b = -5.626$, $p < 0.01$, respectively). The findings show that the magnitude of the estimates proved lower compared to those presented in Model III. The outcomes indicate that, during periods of increased parental unemployment, the magnitude of the association between parental unemployment and adverse health-related outcomes for adolescents could become stronger.

7.2 Adverse mental health symptoms; CES-DC

In Table 4, Model V, by excluding adolescents with disabilities or long-term health conditions, shows that parental unemployment continued to have an association with adverse mental health symptoms. The same pattern held in Model VI by adding lagged adverse mental health symptoms. Moreover, in Models VII-VIII, in 2011-2013, parental unemployment bore a more pronounced link with adverse mental health symptoms for adolescents.

7.3 Pooled OLS and Fixed Effects estimates

Finally, Table 5 reports Pooled OLS and Fixed Effects estimates (Bell et al., 2019). Regardless of the specification, parental unemployment was associated with deteriorated health-related quality of life and increased adverse mental health symptoms. Estimates indicate that, in 2011-2013, there occurred a deterioration in both health-related quality of life and mental health for adolescents.

[Table 5]

8. Discussion

8.1 Outcomes' evaluation

For more than ten years, Greece has experienced the adverse effects of the economic crisis. In 2019, the unemployment rate approximately doubled compared to before the onset of the economic recession in 2009 (Eurostat 2019). In the same period, no research took place on the association between parental unemployment and health-related outcomes for adolescents. The present study assessed the associations between parental unemployment and health-related quality of life (KIDSCREEN-10) and adverse mental health symptoms (CES-DC) for adolescents aged 15-18. Two-panel datasets from the same high schools in Attica captured the 2011-2013 and 2017-2019 periods.

The study estimated an association between parental unemployment and decreased health-related quality of life for adolescents. Moreover, an association was found between parental unemployment and increased adverse mental health symptoms for adolescents. The 2011-2013 period (i.e. a period of increased parental unemployment) involved a decrease in health-related quality of life and an increase in adverse mental health symptoms. In addition, parental unemployment proved more detrimental to adolescents' health-related quality of life and mental health status in 2011-2013 than in 2017-2019. The outcomes proved robust across different specifications.

The results of this study require evaluation through a combination of channels. For instance, parental unemployment might align with economic struggles, reductions in health-enhancing goods and services, food unavailability, and income poverty, which can negatively impact adolescents' health (Schaller and Zerpa 2019; Gunnlaugsson 2016; Aleman-Diaz et al. 2016; Elgar et al. 2015; World Health Organization 2012; Harper and Jones 2011; Conger et al. 2010; McKernan et al. 2009). In Greece, during the period spanning 2011-2013, 47.6 percent of children proved to be at risk of poverty or social exclusion (Eurostat 2017). In addition, strict austerity policies were implemented between 2011 and 2016, resulting in reduced public spending on the National Health System (Kolaitis and Giannakopoulos 2015; Drydakis 2015; Anagnostopoulos and Soumaki 2013). If parental unemployment is accompanied by a prolonged recessionary period with declines in family income and public healthcare provision spending, such events could deteriorate well-being.

The outcomes indicated that parental unemployment proved more detrimental for adolescents' health-related quality of life and mental health status in 2011-2013 than in 2017-2019. The findings suggest that health-related outcomes for adolescents correlate not only with parental unemployment but also with the socio-economic environments in which they grow up. During an economic recession, economically unstable families may suddenly find themselves caught in the poverty trap and experience well-being deteriorations (Alemán-Díaz

et al. 2016; Fanjul 2014; Currie 2009). In Greece, during the economic recession, vulnerable population groups experienced physical health and mental health deterioration (Drydakis 2022a, 2022b; 2021a, 2021b).

Additional outcomes indicated that the female adolescents experienced worse health-related quality of life and mental health status than the male adolescents. Past studies found that female adolescents face a higher risk of poor health attributable to different experiences of puberty and internalised emotions (Cavallo et al. 2006). Similarly, the present study estimated that adolescents with disability or long-term health conditions faced worse health-related quality of life and mental health status than healthy adolescents. The literature indicated that disability amongst adolescents is associated with poorer quality of life and mental health (King et al. 2018; Sacks and Kern 2008). Additionally, in the current study, key socio-economic characteristics, such as parental education and homeownership, were found to provide better health-related quality of life and mental health status for adolescents. Households' good socio-economic condition is associated with children's physical health and psychological outcomes (Moulton et al. 2020; Lê-Scherban et al. 2016). Finally, the study found that age is associated with deteriorated quality of life and mental health status for adolescents. The outcome indicated that third-year upper high school students experienced deteriorated well-being. Studies have found that students who prepare themselves for critical examinations, such as college entrance examinations, experience poor well-being due to schoolwork pressures, enduring stress, fatigue, deprived sleep, and reduced happiness (Yin-Nei Cho and Chan, 2020).

Children's physical and mental health can determine their future wellness, progression, and income (Reinhard et al. 2018; Rathmann et al. 2016; Sandstrom and Huerta 2013). Policies that moderate the adverse effects of parental unemployment on children's health-related outcomes require consideration. Policymakers should consider physical/mental health programmes with a focus on the most vulnerable families (Rajmil et al., 2018; Alemán-Díaz et al., 2016; Kolaitis and Giannakopoulos, 2015; Elgar et al., 2015; Fanjul, 2014).

Policymakers ought also to consider which individual and family support, debt relief, and active labour market programmes could minimise adolescents' health-related problems, specific health situations, and substance use. Furthermore, policymakers should acknowledge that the extent to which economic recessions could affect children's physical/mental health depends upon children's level of protection from vulnerability (Drydakis 2016).

8.2 Limitations and future research

The patterns of this study require cautious consideration. The project took place in a certain region (Attica) which, although accounting for one-third of the country's population, might not represent patterns from other regions. Additionally, the number of schools participated in the study does not necessarily allow for firm generalizations. Thus, new studies with a higher number of participating schools across the country would be necessary for generalization. Moreover, the present study utilized data from a country that had experienced a ten-year recession. New studies should consider regions where economic fluctuations due to the economic recession proved less severe compared to the Greek case.

Participants in the present study were adolescents aged 15-18. New studies should consider adolescents of a younger age, whilst there also exists a need for policymakers to collect longitudinal data on parental unemployment to allow representative research to take place. Moreover, additional health inventories and questions on health conditions should be employed to gain further insights. The present study utilised self-reported physical and mental health conditions, whilst new studies ought to employ GP diagnoses on certain health conditions for informative evaluations.

Additionally, future surveys should include questions on reasons for unemployment, duration of unemployment, and parents' health. Although the present study attempted to address reverse causality through a variety of empirical specifications, the estimated patterns might have been impacted by unobserved heterogeneity. Matched child-parent data could provide more insights and minimise causality concerns. Similarly, although key socio-economic characteristics were included in the empirical specification, such as parental unemployment and education, homeownership, schools fixed effects and recessionary time periods, there was no inclusion of information on households' income. Future studies should incorporate into their analysis how family income, unemployment benefits and social transfers impact adolescents' well-being. It might be that, upon incorporating the aforementioned information, the magnitude of the association between parental unemployment and adolescents' health-related quality of life and mental health might be lower. If public health services and the level and duration of family benefits can reduce adverse health-related outcomes for adolescents, this information might prove vital for public policies.

9. Conclusion

The study found that parental unemployment was associated with decreased health-related quality of life and increased adverse mental health symptoms for adolescents in

Greece. Moreover, it was estimated that, during periods of increased parental unemployment, there would be a decrease in health-related quality of life and an increase in adverse mental health symptoms for adolescents. In addition, it was found that parental unemployment was more detrimental to adolescents' health-related quality of life and mental health in 2011-2013 (i.e. a period of increased parental unemployment) than in 2017-2019. Policymakers should consider policies addressing parental unemployment's adverse effects on adolescents' health-related outcomes, especially during economic recessions.

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Table 1. Descriptive statistics			
	Panel I	Panel II	Panel III
	2011-2013 period (3 annual waves)	2017-2019 period (3 annual waves)	2011-2013 and 2017-2019 periods (6 annual waves)
Paternal unemployment [^] (percent)	20.55 (0.40)	12.46 (0.33)	16.50 (0.37)
Maternal unemployment ^{^^} (percent)	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 (percent)	43.43 (0.49)	42.38 (0.49)	42.91 (0.49)
Adolescents' ethnicity: Non- Greek (percent)	6.16 (0.24)	8.67 (0.28)	7.40 (0.26)
Adolescents with disability or long-term health conditions (percent)	3.93 (0.19)	2.94 (0.16)	3.44 (0.18)
Fathers with higher education (percent)	37.53 (0.48)	36.47 (0.48)	37.01 (0.48)
Mothers with higher education (percent)	32.61 (0.46)	32.22 (0.46)	32.42 (0.46)
Children-parents relationship (Likert-type)	3.07 (0.81)	3.42 (0.79)	3.24 (0.82)
Homeownership (percent)	73.27 (0.44)	76.17 (0.42)	74.70 (0.43)
Health-related quality of life (KIDSCREEN-10 score) (c.)	44.07 (9.70)	47.27 (10.67)	45.64 (10.31)
Adverse mental health symptoms (CES-DC) (c.)	12.20 (6.41)	9.20 (5.71)	10.73 (6.26)
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. Correlation matrix

	Paternal unemployment [^]	Maternal unemployment ^{^^}	Health-related quality of life (KIDSCREEN- 10)	Adverse mental health symptoms (CES-DC)	2011- 2013 period ^{^^^} [^]
Paternal unemployment [^]	1				
Maternal unemployment ^{^^}	0.120 (0.000)***	1			
Health-related quality of life (KIDSCREEN-10)	-0.415 (0.000)***	-0.458 (0.000)***	1		
Adverse mental health symptoms (CES-DC)	0.441 (0.000)***	0.500 (0.000)***	-0.654 (0.000)***	1	
2011-2013 period ^{^^^}	0.105 (0.000)***	0.111 (0.000)***	-0.155 (0.000)***	0.239 (0.000)***	1

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. P-values are in parentheses. (^^^) The reference category is 2017-2019 period. (***) Statistically significant at the 1 percent.

Table 3. Random effects estimates. Health-related quality of life and adverse mental health symptoms

	Model I	Model II	Model III	Model IV
	Health-related quality of life (KIDSCREEN-10)	Health-related quality of life (KIDSCREEN-10)	Adverse mental health symptoms (CES-DC)	Adverse mental health symptoms (CES-DC)
Paternal unemployment [^]	-8.443 (0.621)***	-6.464 (0.946)***	5.657 (0.386)***	4.626 (0.589)***
Maternal unemployment ^{^^}	-7.802 (0.596)***	-6.637 (0.915)***	5.939 (0.374)***	5.620 (0.531)***
2011-2013 period ^{^^^}	-1.335 (0.505)***	-0.220 (0.590)	1.735 (0.264)***	1.289 (0.285)***
Adolescents' age	-0.502 (0.152)***	-0.498 (0.151)***	0.425 (0.099)***	0.424 (0.099)***
Adolescents' gender: Male	1.897 (0.531)***	1.992 (0.541)***	-0.511 (0.276)*	-0.554 (0.278)**
Adolescents' ethnicity: Non-Greek	-0.200 (1.129)	-0.337 (1.186)	0.080 (0.557)	0.134 (0.576)
Adolescents with disability or long-term health conditions	-10.466 (1.756)***	-10.543 (1.781)***	6.026 (0.825)***	6.053 (0.832)***
Fathers with higher education	-0.162 (0.553)	-0.093 (0.558)	-0.077 (0.288)	-0.103 (0.289)
Mothers with higher education	1.487 (0.556)***	1.461 (0.556)***	-0.829 (0.286)***	-0.819 (0.285)***
Children-parent relationship	0.352 (0.248)	0.371 (0.244)	-0.121 (0.147)	-0.129 (0.146)
Homeownership	1.693 (0.655)**	1.611 (0.667)**	-0.402 (0.395)	-0.364 (0.397)
Paternal unemployment × 2011-2013 period	-	-3.670 (1.188)***	-	1.846 (0.763)**
Maternal unemployment × 2011-2013 period	-	-2.184 (1.103)***	-	0.618 (0.682)
School controls	Yes	Yes	Yes	Yes
Wald χ^2	734.91	752.35	1095.38	1097.86
Prob> χ^2	0.000	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. ([^]) The reference category is paternal employment. (^{^^}) The reference category is maternal employment. (^{^^^}) The reference category is 2017-2019 period. Robust standard-errors are in parentheses. (***) Statistically significant at the 1 percent. (**) Statistically significant at the 5 percent. (*) Statistically significant at the 10 percent.

Table 4. Robustness tests: Random effects estimates. Health-related quality of life and adverse mental health symptoms.

	Health-related quality of life (KIDSCREEN-10)				Adverse mental health symptoms (CES-DC)			
	Excludes adolescents with disability or long-term health conditions	Includes lagged variables	Focuses on the 2011-2013 period	Focuses on the 2017-2019 period	Excludes adolescents with disability or long-term health conditions	Includes lagged variables	Focuses on the 2011-2013 period	Focuses on the 2017-2019 period
	Model I	Model II	Model III	Model IV	Model V	Model VI	Model VII	Model VIII
Paternal unemployment [^]	-8.728 (0.637)***	-5.715 (0.839)***	-10.137 (0.664)***	-5.681 (0.943)***	5.717 (0.394)***	5.240 (0.447)***	6.638 (0.482)***	4.437 (0.613)***
Maternal unemployment ^{^^}	-8.192 (0.595)***	-6.441 (0.649)***	-9.587 (0.649)***	-5.626 (0.969)***	6.047 (0.388)***	4.034 (0.566)***	6.384 (0.494)***	5.532 (0.553)***
2011-2013 period ^{^^^}	-1.651 (0.503)***	-1.665 (0.528)***	-	-	1.833 (0.267)***	1.831 (0.289)***	-	-
Lagged health-related quality of life (KIDSCREEN-10)	-	-3.351 (0.892)***	-	-	-	-	-	-
Lagged adverse mental health symptoms (CES-DC)	-	-	-	-	-	1.503 (0.566)***	-	-
Wald χ^2	745.23	573.98	543.73	266.53	969.28	648.71	698.11	529.41
Prob> χ^2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Observations	2,126	1,385	1,119	1,083	2,126	1,385	1,119	1,083

Notes: The sample consists of information from adolescents whose parents were in the labor force. Models I and V controls for adolescents' age, gender, ethnicity, parents' higher education, children-parent relationship, homeownership and school heterogeneity. Models II-III-IV and VI-VII-VIII control for adolescents' age, gender, ethnicity, disability or long-term health conditions, parents' higher education, children-parent relationship, homeownership and school heterogeneity. (^) 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 percent.

Table 5. Robustness tests: Pooled OLS and Fixed Effects estimates. Health-related quality of life and adverse mental health symptoms

	Health-related quality of life (KIDSCREEN-10)		Adverse mental health symptoms (CES-DC)	
	Pooled OLS Model I	Fixed Effects Model II	Pooled OLS Model III	Fixed Effects Model IV
Paternal unemployment [^]	-9.700 (0.468)***	-6.092 (1.059)***	5.978 (0.317)***	4.774 (0.727)***
Maternal unemployment ^{^^}	-8.458 (0.449)***	-6.493 (1.053)***	5.963 (0.294)***	6.141 (0.727)***
2011-2013 period ^{^^^}	-1.256 (0.356)***	c	1.750 (0.198)***	c
F	69.77	23.36	76.97	34.45
Prob>F	0.000	0.000	0.000	0.000
Observations	2,202	2,202	2,202	2,202

*Notes: The sample consists of information from adolescents where their parents are in the labor force. Pooled OLS models control for adolescents' age, gender, ethnicity, disability or long-term health conditions, parents' higher education, children-parent relationship, homeownership and school heterogeneity. (^) The reference category is paternal employment. (^^) The reference category is maternal employment. (^^^) The reference category is the 2017-2019 period. (c) Dropped because of collinearity. Robust standard-errors are in parenthesis. (***) Statistically significant at the 1 percent.*

Appendix

Table Appendix A1. Poverty and unemployment rates. EU-28 and Greece		
	2011-2013 period	2017-2019 period
Panel I.		
Real GDP growth rate (percent) [^]		
EU-28	0.5	2.1
Greece	-6.5	1.5
Panel II.		
At-risk of poverty rate (percent) ^{^^}		
EU-28	16.8	17
Greece	22.5	18.6
Panel III.		
Unemployment rate (percent) ^{^^^}		
EU-28	10.3	7.3
Greece	23.3	19.3
Panel IV.		
Children (less than 18 years) at risk of poverty or social exclusion (percent) [#]		
EU-28	34.6	32.2
Greece	47.6	47

Notes: Eurostat dataset.

([^]) The real GDP growth rate measures economic growth, as expressed by gross domestic product (GDP), from one period to another, adjusted for inflation or deflation.

(^{^^}) The at-risk-of-poverty rate is the share of people with an equivalised disposable income (after social transfer) below the at-risk-of-poverty threshold, which is set at 60 percent of the national median equivalised disposable income after social transfers.

(^{^^^}) The unemployment rate is the number of people unemployed as a percentage of the labour force.

([#]) Being at risk of poverty or social exclusion means to be in at least one of the following three conditions: at risk of poverty after social transfers (income poverty), severely materially deprived or living in households with very low work intensity.