Economics
Working Papers

2018-9

Life Skills Development of Teenagers through Spare-Time Jobs

Rune V. Lesner, Anna Piil Damm, Preben Bertelsen and Mads Uffe Pedersen

Abstract:
We set up an on-the-job learning model to explain how spare-time on-the-job training affects life skills formation of adolescents. We obtain causal estimates by exploiting variation between employed twins and estimation of a value-added model using full population Danish administrative data. We find that spare-time work experience has no effect on school absenteeism, reduces crime, increases school grades and the speed of enrollment into upper secondary education. We interpret our findings as evidence that the positive effect from on-the-job learning in spare-time jobs on life skill formation more than outweigh the potential negative consumption and time-use externalities of spare-time work.

AARHUS BSS
DEPARTMENT OF ECONOMICS AND BUSINESS ECONOMICS
AARHUS UNIVERSITY

Life Skills Development of Teenagers through Spare-Time Jobs[*]

Rune V. Lesner[†], Anna Piil Damm[‡], Preben Bertelsen[§], and Mads Uffe Pedersen[**]

ARTICLE INFO

JEL classifications: J24, J22, I21

Keywords: Student employment, Spare-time jobs, Teenagers, Youth, Character skills, Life skills, Human capital, Crime, Juvenile Delinquency, Risky behavior, Educational attainment

ABSTRACT

We set up an on-the-job learning model to explain how spare-time on-the-job training affects life skills formation of adolescents. We obtain causal estimates by exploiting variation between employed twins and estimation of a value-added model using full population Danish administrative data. We find that spare-time work experience has no effect on school absenteeism, reduces crime, increases school grades and the speed of enrollment into upper secondary education.

We interpret our findings as evidence that the positive effect from on-the-job learning in spare-time jobs on life skill formation more than outweigh the potential negative consumption and time-use externalities of spare-time work.

[*] Funding from TrygFonden and data support from the Centre for Integrated Register-based Research at Aarhus University are greatly appreciated. We express our thanks for useful comments on this paper and earlier drafts from James Heckman, Stephen Raudenbush, Jon Guryan, Mari Rege, Bernt Bratsberg and participants at the Rockwool Foundation Research Unit Seminar in Dec. 2016, 12th Nordic Summer Institute in Labour Economics in June 2017, Annual meeting of the Danish Economic Society 2018, Society of the Economics of the Household Annual Meeting 2018, the 32nd Annual ESPE Conference 2018, and the 30th EALE Conference 2018. We thank Casper Hofmann Larsen and Villiam Vellev for research assistance. The usual disclaimer applies.

[†] Department of Economics and Business Economics, Aarhus University, Fuglesangs Allé 4, 8210 Aarhus V, Denmark. Email: rlesner@econ.au.dk (corresponding author).

[‡] Department of Economics and Business Economics, Aarhus University, Fuglesangs Allé 4, 8210 Aarhus V, Denmark. Email: apd@econ.au.dk

[§] Department of Psychology and Behavioural Sciences, Aarhus University, Bartholins Allé 11, 8000 Aarhus C, Denmark. Email: pb@psy.au.dk

[**] Department of Psychology and Behavioural Sciences, Centre for Alcohol and Drug Research, Aarhus University, Bartholins Allé 10, 8000 Aarhus C, Denmark. Email: mup.crf@psy.au.dk

1. Introduction

A large body of empirical research in economics provides support for the theory of human capital, inaugurated by Becker (1964).[1] The theory builds on the hypothesis that formal education and work experience is an investment that will produce earnings in the future; education and work experience produce an accumulation of competences called "human capital" which makes workers more productive. A growing body of empirical research in personality psychology and economics shows that a multiplicity of competences or skills are required for successful functioning in life and that character skills (like conscientiousness, perseverance, sociability and curiosity) rivals IQ in predicting successful outcomes in different domains of life, like education, work, health and criminality.[2] Performance on any task, like a reading or math test in school, spare-time work or regular work, depends on incentives, effort[3], cognitive[4] and character[5] skills (Heckman and Kautz 2013).

Besides families[6] and early childhood programs[7], schools and social environments shape both cognitive and character skills. Narrowly focused policies on skill development fail to capture the synergies in the development of different skills (Heckman and Kautz 2013).

Character skills can be fostered by participation in extracurricular activities, e.g. 10th grade, participation in sports, academic clubs and fine arts activities.[8] Participation in these activities predicts educational attainment 10 years later, even after controlling for cognitive ability as

[1] See e.g. Mincer (1974), Angrist and Krueger (1991), Ashenfelter and Rouse (1998), Oreopoulos and Salvanes (2011).
[2] See Heckman and Kautz (2012), Almlund, Duckworth, Heckman and Kautz (2011), Borghans et al. (2008), and Roberts, Kuncel, Shiner, Caspi and Goldberg (2007) for reviews.
[3] Del Boca et al. (2015) models the cognitive production function of adolescents and shows that the time investment of the child matters more than the time investment of the mother during adolescents.
[4] Cognitive ability has multiple facets; psychologists distinguish between fluid intelligence (the rate at which people learn) and crystallized intelligence (acquired knowledge) (see e.g. Nisbett, Aronson, Blair, Dickens, Flynn, Halpern, and Turkheimer 2012). Achievement tests are designed to capture crystallized intelligence (Roberts, Goff, Ajnoul, Kyllonen, Pallier and Stankov 2000), whereas IQ tests like Raven's progressive matrices (1962) are designed to capture fluid intelligence (Raven, Raven and Court 1988). This new understanding of cognition is not widely appreciated.
[5] Character skills are personality traits not thought to be measured by IQ tests or achievement tests; such attributes are related to behaviors and attitudes and go by many names in the literature, including soft skills, personality traits, non-cognitive abilities, character, socio-emotional skills and life-skills.
[6] Cunha and Heckman (2007; 2008; 2009); Cunha, Heckman and Schennach (2010); Carneiro and Heckman (2003), Cunha, Heckman, Lochner, and Masterov (2006); Moon (2012).
[7] See Heckman and Kautz (2013) for a review.
[8] Ralph Tyler, a pioneer of achievement testing, recognized its limitations. He suggested using behavior such as performance, participation in student activities and other observations by teachers and school administrators to complement achievement tests (Heckman and Kautz 2013).

measured by achievement tests (Lleras 2008). A related literature in psychology suggests that participation in sports can foster life-skills such as "the abilities to perform under pressure, solve problems, meet deadlines or challenges, set goals, communicate, handle both success and failure, work with a team and within a system, and receive feedback and benefit from it" (Danish 1996; p. 373).

Our study concerns another common type of extracurricular activities which we argue may also foster character and life skills: spare-time work of pupils in lower-secondary school. Apel et al. (2008) use the National Longitudinal Survey of Youth 1997 to show that the share of youth with a formal spare-time job in the U.S. is around 11% for 14-year olds, 19% for 15-year olds and jumps to 41% for 16-year olds because of the easing of child labor restrictions at age 16.[9] As in the U.S., formal spare-time employment in Denmark increases steadily with age, but having a formal spare-time job is more common at all ages, in particular for pupils in lower-secondary school. The shares of Danish youth with formal spare-time work jumps from 18% at age 13 to 33% at age 14 and increases steadily thereafter to reach 61% at age 16. Similarly, the average annual hours of work increases from 48 hours at age 13 to 207 hours at age 16.[10]

The immediate pecuniary benefit of a spare-time job, the salary, is likely to be the main motivation for adolescents to work in their spare-time, in accordance with neoclassical economic theory; the income from leisure-time work increases their consumption possibilities at the expense of leisure time. However, employment has been found to affect beliefs, values, work ethics and self-esteem[11] and we know that behavioral skills, such as self-control, perseverance, and discipline are important predictors of educational attainment, crime and employment.[12] Therefore, in this study we argue that – similar to regular employment - a spare-time job may have non-pecuniary and cumulative benefits in the form of skill formation, especially behavioral or character skills that

[9] Evaluated at the mid of each age, i.e. age 14.5, 15.5 etc., using Figure 1 in Apel et al. (2008).

[10] A vast literature has found that the first years of an individual's career has a considerable effect on both short- and long-run opportunities in the labor market (see e.g. Ellwood, 1982; Gregg 2001; Mroz and Savage 2006). This literature, however, neglects that most individuals have contact with the labor market at a much earlier stage. The very first contact with the labor market often happens already during the teenage years. We choose to use the label teenage labor as opposed to youth labor to emphasize that we look at all individuals ages 13 to 16. The common definition of youth labor is the age group above the minimum school-leave age and less than 25 (Bell and Blanchflower 2011).

[11] Jahoda (1981), Warr (1987), Gottschalk (2005).

[12] Farrington (1988), Roberts et al. (2007), Borghans et al. (2008), Farrington, Coid and West (2009), Jolliffe and Farrington (2009), Almlund et al. (2011), Farrington, Loeber and Van Kammen (1990), Diamond (2012), Moffitt (2012), Heckman and Kautz (2012).

can be transferred for use in other domains of life, including schooling and education, i.e. life-skills. Of the Big Five (the relatively well-accepted taxonomy of character skills developed by psychologists), Conscientiousness – the tendency to be organized, responsible and hardworking – is the most widely predictive across a variety of outcomes.[13] Like schools, a (spare-time) job requires completing work on schedule and involve intelligence to varying degrees (Heckman and Kautz 2013). While the importance of IQ increases with job complexity, the importance of Conscientiousness does not vary with job complexity (Barrick and Mount 1991).

A spare-time job may foster character skills in the same way as workplace-based programs teach character skills, e.g. career academies in the U.S. (Kemple and Willner 2008) and European apprenticeship programs.[14] Programs that combine work and education motivate acquisition of work-relevant skills and provide discipline and guidance for disadvantaged youth that is often missing in their homes and/or schools (Heckman and Kautz, 2013). We argue that spare-time work experience improves the pupil's grip on education by fostering not only character and work-relevant skills but also life-skills, i.e. skills that can be facilitated or developed through one activity and transferred for use in other settings.

The aim of our study is to estimate how spare-time work during lower-secondary school years causally affects skill formation. Potential non-pecuniary and cumulative benefits in terms of development of life skills through spare-time work are difficult to measure due to lack of theory, data limitations, measurement problems and the inherent simultaneity between work and skills. Our study addresses all of these challenges. We first set up a theoretical model which combines human capital formation theory from economics with the life skill theory of Life Psychology.[15] Our theoretical model leads to the predictions that accumulated hours of spare-time job, i.e. spare-time job *experience* foster life-skills formation, but potentially involve consumption and time-use externalities. Our main empirical model for estimation of the net effect of spare-time job *experience* on life-skills is derived as the reduced form of our theoretical model. Our study is the first to estimate the effect of spare-time work *experience* rather than the effect of current hours of spare-time work.

[13] Almlund et al. (2011), Borghans et al. (2008), Heckman and Kautz (2012), Roberts et al. (2007).
[14] See e.g. Adda, Dustmann, Meghir and Robin (2013); for reviews, see Lerman (2013) and Heckman and Kautz (2013).
[15] Life Psychology is a theory developed at the Center for Life Psychology at the Department of Psychology and Behavioral Sciences, Aarhus University.

Empirical investigation of the effect of spare-time work experience also requires measures of character skills. Reliable measures of character skills exist. Psychologists primarily measure character skills by using self-reported surveys or observer reports, e.g. the Big Five, the Big Three, the MPQ and the Big Nine (Heckman and Kautz 2013). Such information is expensive to collect. Alternatively, one can use behavior like risky behavior and school absences to measure character. [16] Such information on behavior is commonly available in administrative records of schools. We follow the latter approach and use behavior available from Danish administrative records of schools and central police to measure character. Assessing the effect of spare-time work on skills is difficult because of the possibility of reverse causality or simultaneity. Just as employment might affect skills, skills might affect employment. In other words, adolescents are likely to self-select into leisure-time work in terms of individual characteristics that are unobserved to the researcher. For instance, pupils with a strong work ethic are more likely to find and keep a spare-time job. Our empirical analysis identifies the effect of spare-time job experience. For identification, we exploit within twin-pair variation in the spare-time work experience of employed lower-secondary school pupils using a value-added model. Our identifying assumption is that the variation in spare-time work experience within the pair of employed twins is independent of the individual skill level once we account for the lagged skill level. The variation is expected to be caused by variation in labor demand.

Consistent with our theoretical predictions, our empirical findings show that spare-time work experience of lower-secondary school pupils (aged 15-16) improves performance in school and reduces juvenile delinquency. We argue that these results are evidence of the return to on-the-job learning outweigh any potential consumption and time-use externalities of spare-time work.

We find that a one standard deviation increase around the sample mean of spare-time work experience increases the 9th grade GPA score by 6.3 percent of a standard deviation and decreases the probability of being registered for a non-traffic related crime by 0.6 percentage points (with a sample mean of 0.6 percent). Additionally, we find that spare-time work experience increases the speed of transition into upper secondary education. We find that a one standard deviation increase around the sample mean of spare-time work experience increases the enrollment into any upper secondary education the same year as finishing compulsory school by 3.1 percentage points of a

[16] Tyler (1973), Rothstein, Jacobsen and Wilder (2008), Llearas (2008), Heckman, Humphries, Urzúa and Veramendi (2011), Heckman, Pinto and Savelyev (2013), Jackson (2013).

standard deviation. Viewed together, our results suggest that spare-time work experience improves life-skills.

The first wave of empirical research on the effects of spare-time employment focuses on estimation of the current hours of spare-time work (registered in surveys) rather than the effects of spare-time job experience. Such studies find small adverse or no effects of (the weekly hours of) spare-time work on behavioral outcomes of teenagers. Ruhm (1997) provides a survey of this early literature.[17]

More recent studies exploit information on average working hours during the entire school year, and are thereby able to capture both the effect of current time-use, but also the potential positive benefits from learning on the job. Apel et al. (2008) demonstrate that more hours of formal employment for high-school students increase high school dropout but decrease delinquency for students above the age of 16. Oettinger (1999), Rothstein (2007), and Buscha et al. (2012) find little to no effects on educational performance measured by the test scores on pupils in the 10^{th}, 11^{th}, and 12^{th} grade.[18] However, Oettinger (1999) finds that for Black and Hispanic youth, working more than 20 hours per week on average during the school year has significant negative effects on educational performance.

Neyt et al. (2017) survey the literature. They find 19 studies on the effect for students in tertiary education and 29 studies on students in upper-secondary education. 79 percent of the studies on students in tertiary education finds negative effects of student employment on educational performance, but in the case of upper-secondary education the results are much more mixed with only 55 percent of the studies finding a negative effect of student employment. In the light of our model this difference can be understood even if the learning on the jobs is similar. This can be the case if the crowding out of other spare-time activities is more problematic for students in tertiary education then in upper-secondary education.[19] This emphasizes that the institutional context is important for the effect of student employment. A clear limitation in the literature up until now is

[17] See e.g. Steinberg and Dornbush (1991), Steinberg, Fegley and Dornbush (1993), Barling, Rogers and Kelloway (1995), Schoenhals, Tienda and Schneider (1998), Mortimer, Hartley and Staff (2002), Warren (2002), Staff and Uggen (2003), Bachman, Safron, Sy and Schulenberg (2003; 2010), Bachman, Staff, O'Malley and Freedman-Doan (2013).

[18] Oettinger (1999) studies 11^{th} and 12^{th} grade GPA, Rothstein (2007) studies 10^{th}, 11^{th}, and 12^{th} grade GPA, and Buscha et al. (2012) studies math and reading test scores in the 12^{th} grade.

[19] E.g. Zero-Sum Theory by Becker (1965).

that mainly cohorts who start high school in the 80s are studied[20] and that there are no studies on the effects of spare-time work for pupils in lower-secondary school.

Our study distinguishes itself from the rest of the literature by estimating the net effects of spare-time work experience on individual outcomes in line with our theoretical model and to avoid the confounding element in the previous literature of measuring work intensity and outcomes simultaneously, studying the effects for lower-secondary pupils, using reliable detailed full population tax registers of exact working hours for current school cohorts (2010-2014).

The positive impacts on outcomes in school and crime found in our study are related to the randomized control trial evaluations of summer job programs for disadvantaged youth in Heller (2014), Leos-Urbel (2014) and Gelber, Isen, and Kessler (2016). Heller (2014) finds that having a summer job can decrease criminal behavior among disadvantaged youth in tough neighborhoods in Chicago. Leos-Urbel (2014) and Gelber et al. (2016) study the summer job program in New York City (the SYEP). Leos-Urbel (2014) reports a small increase in school attendance the following school year, with large increases for students above the age of 16 who had low initial attendance rates. Gelber et al. (2016) find that the program decreased the probability of incarceration and mortality for males, but that it had no impact on college enrollment.[21]

The paper proceeds as follows. In the next section we propose a theoretical model for how the amount of spare-time work experience may foster character and life-skills, derive the reduced form model for empirical estimation of the return to spare-time work experience by the end of the 9th grade and explain our empirical approach. Section 3 gives an overview of the regulations in the teenage labor market in Denmark. We then describe the data sources and sample selection criteria and provide descriptive statistics on the teenage labor market in Section 4. In Section 5 we present our results on the return to spare-time work experience on the average grade point in 9th grade, school absenteeism, criminal behavior and enrollment into upper secondary education, including subgroup analyses. Finally, in Section 6 we discuss our findings and draw conclusions.

[20] A notable exception is Rothstein (2007) that studies cohorts from the mid-1990s to the mid-2000s.
[21] Sum, Trubskyy, and McHugh (2013) finds similar positive results on risky behaviour for the summer job program in Boston (the Youth Violence Prevention Funder Learning Collaborative) through an RCT evaluation. See also the evaluation of the summer job program in the City of Los Angeles (Moore, Rubino Bedi, Blake, and Coveney 2015) and Mixon and Stephenson (2016) for trends in youth summer employment in the U.S.

2. Theoretical model

Employment has been found to affect beliefs, values, work ethics and self-esteem,[22] and we know that behavioral skills, such as self-control, perseverance, and discipline are important predictors of education attainment, crime and employment.[23] Similar to regular work, spare-time work during lower-secondary school may also have non-pecuniary and cumulative benefits in terms of character skill formation. And similar to programs for adolescents which combine work and education, a spare-time job may motivate acquisition of work-relevant skills, either by changing their tastes or by changing their perceptions of what is possible, and provide discipline and guidance, notably for disadvantaged youth.[24] In fact, a spare-time work may foster not only character and work-relevant skills, but life-skills.

We define life skills as skills that can be facilitated or developed through a spare-time job and are transferred for use in other settings. Life skills are skills such as being able to build social relations, structuring daily life, goal setting and making plans, performing social-cognitive perspective taking, normative attunement as well as understanding rules and requirements.[25] [26] Improvements of such life skills will increase the teenager's grip of life, including school. Steve Danish and his colleagues at the former Life Skills Center at Virginia Commonwealth University have defined life skills as "those skills that enable individuals to succeed in the different environments in which they live, such as schools, home and their neighborhoods. Life skills can

[22] Jahoda (1981), Warr (1987), Gottschalk (2005).

[23] Farrington (1988), Farrington, Loeber and Van Kammen (1990), Roberts et al. (2007), Borghans et al. (2008), Farrington, Coid and West (2009), Jolliffe and Farrington (2009), Almlund et al. (2011), Diamond (2012), Moffitt (2012), Heckman and Kautz (2012).

[24] The psychological literature on the causes of low achievement argues that "individuals may not seek opportunities because (1) they do not value the rewards that come from work (that is, they are not motivated) or (2) because they do not believe that a realization of the outcome is under their control (for a review, see Skinner, Zimmer-Gembeck and Connell 1998). Individuals have to believe that they have control over the outcome in order for them to achieve a goal. If either of these is lacking the individual does not undertake the task." As explained by Gottschalk 2005, the psychologists' concept of motivation and control can be translated into terms more familiar to economists. Motivation can be viewed as reflecting tastes (what people want) and control can be regarded as the ability to choose the desired outcome. Achievement can be increased either by motivating people (that is, changing their tastes) or by changing their perceptions of what is possible (changing their beliefs about the constraints they face). The latter can include skill acquisition (increasing human capital) or changes in perceptions of how these skills are evaluated (changes in prior beliefs).

[25] See e.g. Klinger and Cox (2004); Locke and Latham (2006); Little and Gee (2007); Bertelsen (2013, 2018).

[26] Similarly, in the context of life skills development through sports, Gould and Carson (2008a) define life skills as "those internal personal assets, characteristics and skills such as goal setting, emotional control, self-esteem, and hard work ethic that can be facilitated or developed in sport and are transferred for use in non-sport settings". They also note that while all life skills focus on positive youth development, not all youth development efforts focus on the development of life skills. In other words, the related concept of positive youth development (see e.g. Larson 2000; Larson et al. 2004; Larson and Hansen 2005) is a broader concept than life skills (Gould and Carson 2008b).

be behavioral (communicating effectively with peers and adults) or cognitive (making effective decisions); interpersonal (being assertive) or intrapersonal (setting goals)" (Danish et al. 2004, p. 40). An implicit assumption in this definition is that life skills help a young person not only to succeed in e.g. the spare-time job but also help the individual once he or she transfers the skills to settings in which they are used successfully, e.g. the school setting. For something to qualify as a life skill, efforts need to be made to have the competency transfer to other life situations. Youth can build much of this skill building on their own (e.g. through observations of modelled behavior or by interpreting an interpersonal interaction on the job). In addition, transfer of such skills might occur when the boss, colleagues or parents emphasize the importance of transferring skills developed or enhanced through a spare-time job to other life situations.[27] We will now formulate a conceptual model to describe how on-the-job learning in spare-time job affects character and life-skill formation of pupils, allowing for potential side-effects stemming from consumption and time-use externalities.

2.1 On-the-job learning model

We set up an on-the-job learning model to describe the time use decisions of the individual (Becker 1964; Ben-Porath 1967). We will assume that the choices of the individual can be characterized by the allocation of time use across activities. If the individual decides to invest time in skill developing activities, it will affect his/her skill level in the next period.

For tractability we assume no frictions and free entry of new firms. This implies that firms and workers can only contract on current allocations as long-term contracts are not binding. Firms and workers can always find a new match in the market.

If a worker and a firm form a match they produce a value of R per working hour T. These young individuals perform simple tasks where the value of the output is independent of the ability and spare-time work experience of the workers. Having a worker carries a cost C to the firm as training is necessary (instruction, mentoring, monitoring, etc.). This cost is expected to be decreasing and concave in the spare-time work experience of the worker H and increasing in current working hours. Training becomes less necessary as the workers becomes more acquainted with being on the labor market and develop skills useful in the labor market.

[27] Besides fostering life skills, a spare-time job might also improve specifically generated concrete life skills directly. E.g. working in the tourist industry can improve linguistic comprehension (on-the-job training).

The worker receives pocket money *P* in each period where the individual is employed. The level of pocket money is a function of the hourly wage *w* and the number of working hours *T*. In addition, the worker will accumulate spare-time work experience *H* while employed such that the spare-time work experience in period *t* is given by:$H_t = H_{t-1} + T_t$. The value for the firm of a match in period *t* with a worker with spare-time work experience of H_{t-1} working T_t hours is $\pi(H_{t-1}, T_t) = RT_t - w_t T_t - C(H_{t-1}, T_t)$.

We will allow for return to spare-time work experience outside the labor market. One source of these returns can be spare-time work experience affecting the formation of life skills. The worker values these returns by the investment function $J(H)$. These returns are assumed to be increasing and concave in spare-time work experience. Buscha et al. (2012), Rothstein (2007), and Staff and Mortimer (2007) also argue, based on Human Capital Theory, that student employment enable the acquisition of general and transferable skills.

The choice of the individual simplifies to the bundle of time use in the labor market in all periods for the initial period *t=0* to the final period *t=M*, $\{T_j\}_{j=0}^{M}$. If the individual chooses to commit time in the labor market she will face a cost in terms of reduced time for activities outside the labor market *L*. The argument here is that time spend on spare-time work will crowd out other activities, following the Zero-Sum Theory in Becker (1965). The Zero-Sum Theory is the leading theory in explaining the impacts of student employment on educational attainment. See the review in Neyt et al. (2017). These costs are assumed to be convex in the number of working hours. Activities outside the labor market can be split in terms of life skill formation into a productive part l_p (homework, sports, etc.) and an unproductive part l_{up} (TV, computer games, etc.). η describes the preference for productive activities outside the labor market. This distinction between productive and unproductive leisure time activities is inspired by Schoenhals et al. (1998), Warren (2002), Triventi (2014), Kalenkoski and Pabilonia (2009; 2012) All four studies report that time spent working does not reduce school related activities in a one-to-one relationship.

Based on these considerations the optimization problem of the young individual becomes the following:

$$\max_{T_t \geq 0 \forall t \in [0,M]} V_t = \sum_{k=0}^{M-t} \frac{1}{(1+r)^k} [P_{t+k}(T_{t+k}) - L(T_{t+k}) + J(H_{t-1+k})] \quad (1)$$

s.t.

$$RT_t - w_t T_t - C(H_{t-1}, T_t) = 0 \quad (2)$$

$$P_t(T_t) = w_t T_t \quad (3)$$

$$H_t = H_{t-1} + T_t \quad (4)$$

$$L(T_t) = \eta l_p(T_t) + (1-\eta) l_{up}(T_t), \quad (5)$$

where V is the value function and r is the discount rate.

Equation (1) proposes that the young individual will choose working hours in all future periods $\{T_j\}_{j=0}^{M}$ such that the sum of the present values of the difference between the valuation of monetary returns and skill development and the costs of reduced leisure time in all future periods is maximized. Equation (2) states that the firm transfers the training costs to the worker by deducting these from the offered wage. Profits are driven to zero in equilibrium due to the assumption of free entry for firms and the assumption of no labor market frictions. Equation (3) states that the pocket money of the worker in period *t* is given by the hourly wage and the number of working hours. Equation (4) pins down the accumulation process of spare-time work experience and equation (5) describes the costs of working T_t hours in terms of foregone activities outside the labor market.

The first order condition in any given period *t* is given by:

$$\frac{\partial V_t}{\partial T_t} = \underbrace{R - \frac{\partial C(H_{t-1}, T_t)}{\partial \partial T_t} - \frac{\partial L(T_t)}{\partial T_t}}_{(I)} + \underbrace{\sum_{k=1}^{M-t} \frac{1}{(1+r)^k} \left[\frac{\partial J(H_{t-1+k})}{\partial H_{t-1+k}} \frac{\partial H_{t-1+k}}{\partial T_t} - \frac{\partial C(H_{t-1+k}, T_{t+k})}{\partial H_{t-1+k}} \frac{\partial H_{t-1+k}}{\partial T_t} \right]}_{(II)} = 0 \quad (6)$$

Equation (6) states that the worker will choose a level of working hours taking into account the current marginal labor market returns of the match taking out costs of training and costs of time use for other activities (term I). In addition, the worker takes into account that the accumulated spare-time work experience will carry a value in all future periods in terms of reduced training costs, leading to higher wages (cf. Eq. 2), and increased skill levels (term II). Preferences of the worker enter in preference for time use on activities outside the labor market, in the preference of productive activities outside the labor market and in the discounting of future values.[28]

2.2 Skill development

[28] Oettinger (1999) and Rothstein (2007) argue that student employment may induce career goals which will increase future-orientedness of the student. In terms of the model, this argument can be rationalized by the discount rate being a function of the spare-time work experience of the worker.

We assume that even young children perform activity and behavior based on general human life skills θ_0. These basic building blocks evolve as the individual grows older and can be both culturally and genetically determined. Life skills are used in all aspects of life when interacting with the environment and are e.g. essential in the acquisition of specifically generated life skills such as linguistic comprehension and mathematical understanding (Klinger and Cox 2004; Locke and Latham 2006; Little and Gee 2007; Bertelsen 2013, 2018).

Skill investment *I* at time *t* for the individual is given by:

$$I_t(T_t, H_{t-1}) = g\big(J(H_{t-1}), l_p(T_t), P_t(T_t), \zeta_t\big). \quad (7)$$

$J(H_{t-1}), l_p(T_t),$ and $P_t(T_t)$ are derived from the optimization problem described above and ζ includes all factors affecting the investment in skill development of the individual of which the individual has no say – the environment (parents, school, neighborhood, etc.). This equation states that the individual's skill development is determined by skill investments by the environment as well as the individual's own investments through on-the-job-training, productive activities outside the labor market, and consumption from the use of pocket money.[29] Bachman et al. (2014) study how teenagers in the U.S. use their earnings and find that they primarily spend their earnings on clothing, music, hobbies, and leisure activities. Among males cars come in second.

To explain how a spare-time job may affect life skill formation, we set up a conceptual model inspired by the prototypical skill formation Cunha and Heckman (2007; 2008) and Cunha, Heckman, and Schennach (2010).

Life skill formation occurs according to the following technology:

$$\theta_{t+1} = f\big(\theta_t, I_t(T_t, H_{t-1})\big), \quad (8)$$

where the child's life skills in period *t*+1 depend on her past life skills at time *t*, θ_t and the investment in developing the life skills of the child $I_t(T_t, H_{t-1})$. Equation (8) implies that the level of skills in period *t+1* is a function of the initial skill level and the investment in skills in all periods. Thus, Equation (8) can be rewritten as:

$$\theta_{t+1} = h\big(\theta_0, I_0(T_0, 0), I_1(T_1, H_0), \dots, I_t(T_t, H_{t-1})\big). \quad (9)$$

2.3 Estimation procedure

[29] Eckstein and Wolpin (1999) also have a model of student employment on educational attainment, but their model only includes the mechanism of crowding out of other spare-time activities (Zero-Sum Theory).

Given a set of functional form assumptions on the technologies in the model one could in principle structurally estimate the Equation (9) above. However, in this case such functional form assumptions would be hard to justify as information on the investment technology and the life skill formation technology are unobserved in the data.[30]Instead we choose a reduced form approach recognizing that both T_t and H_{t-1} are observed in the data for all t.

Our main objective is to obtain an estimate of the return to spare-time work experience in observed measures of life skills. However, if teenagers self-select into hours of spare-time work, then an OLS estimate of the return to spare-time work experience can be biased.

Our approach to account for the potential selection on life skills is to condition on lagged measures of skills in the estimations. Todd and Wolpin (2007) find support for a value-added model of the cognitive production function including lagged outcomes using cross-validation methods. Del Boca et al. (2015) uses a value-added model with lagged outcomes to model the cognitive production function of adolescents. Following this strategy one might be worried that variation in the environment can confound the results. In order to account for this, we choose to only use variation within twin pairs. It is reasonable to assume that twins have been exposed to similar environments (family, school, child care, and neighborhood). If the selection into spare-time work experience, which is correlated with the life skills, is given by environment factors, then only relying on the within twin-pair variation will give a causal estimate on the return to spare-time work experience. The close genetic relation between twins will also take care of some of the potential selection bias.

These considerations lead us to set up the following reduced form equation and estimate it on the cross section of pupils in the 9th grade separately for each of our three skill measures: GPA, school absenteeism, or criminal behavior:[31]

$$M_s(\theta_{i,9th}) = \alpha_s(\Delta H_{i,9th}) + \beta_s M_s(\theta_{i,8th}) + \delta_s X_i + \gamma_{fs} + \varepsilon_{ifs}, \quad (10)$$

where $M_s(\theta_{i,t})$ is the observed measure s of skills for individual *i* at the end of grade *t*. $\Delta H_{i,9th}$ is the amount of spare-time work experience accumulation during the 9th grade up until three months prior to the end of 9th grade; the school year lasts from August to June. The estimate of a_s is the average return to spare-time work experience accumulated during 9th grade. a_s is a composite

[30] Eckstein and Wolpin (1999) and Montmarquette et al. (2007) estimate discrete choice models of student employment and educational attainment.
[31] See Section 4 for a description of the data.

measure capturing the accumulated return to on-the-job learning, $J(H_{i,k-1})$ for all past periods $k \in [0,t]$, but also takes into account the series of potential impact on previous productive activities outside the labor market as well as impacts of consumption from previous pocket money ($l_p(T_{i,k}), P_k(T_{i,k})$ for all periods $k \in [0, t-1]$). γ_f is a twin-pair (f) fixed effect, X_i is a gender indicator, and ε is an error term.

The main objective of the empirical part of the paper is to obtain a reliable estimate of the return to spare-time work experience (a_s). We identify the return to spare-time work experience by differences in spare-time work experience during 9th grade between twins who *both* had a job during 9th grade, accounting for our measures of skills (crime, school absenteeism, and GPA) at the end of 8th grade. The identifying assumption here is that the variation in experience between the twins is not caused by individual differences once we account for lagged skill levels, but by demand from the employers. If this residual variation is driven by demand , then we can argue that the estimate of a_s is a causal estimate of the return to spare-time work experience within the sample of twins.

If the assumption is violated due to inability to capture skills such that more capable teenagers work more hours, then the estimates will be upward biased. It is thus important to take a closer look at the selection into spare-time work experience.[32] Results from regression of individual spare-time work experience obtained during the 9th grade on individual and parental characteristics reported in Table 1. The results disclose that pupils who work many hours during 9th grade are negatively selected in terms of parental earnings, while the selection in terms of highest level of education attained by the parent is inverse U-shaped: pupils whose father has attained upper-secondary education are significantly more likely to have high levels of spare-time work experience than pupils whose father has attained only basic/lower-secondary education and pupils whose father have attained tertiary education. Conditional on the parental characteristics, the pupils who work many hours are positively selected in terms of skills (GPA and school absenteeism in the 8th grade). Overall, Table 1 provides suggestive evidence of positive selection into accumulated experience of teenagers in terms of individual characteristics, but negative selection in terms of parental characteristics. However, observed individual and parental characteristics explain only 3.6% of the variation in hours of spare-time work in 9th grade

[32] Rothstein (2007) and Buscha et al. (2012) reports negative selection into student employment in the U.S.

according to the adjusted R^2. Moreover, our estimations using the sample of twins who *both* had a job during the 9th grade take account of selection into spare-time work experience in terms of individual characteristics by controlling for lagged skill levels and in terms of parental characteristics by inclusion of twin-pair fixed effects.

***Table 1**. OLS regression of total hours of spare-time work in the 9th grade on individual and parental background characteristics.*

***Table 2**. Summary statistics of cross-sectional samples used in baseline analysis.*

A limitation of our identification strategy based on twin comparisons is that twins are not a random sample of the full population. Results based on the sample of twins cannot necessarily be extrapolated to the full population. Twins tend to have inferior endowments at birth. Rosenzweig and Zhang (2009) show that the average birth weight is 30 percent larger among non-twins than among twins both in the U.S. and in China. Almond et al. (2005), Behrman and Rosenzweig (2004), Black et al. (2005), and Lesner (2016) show that endowments at birth can have significant effects on adult outcomes. On the other hand Baker, Treloar, Reynolds, Heath, and Martin (1996), Kohler, Knudsen, Skytthe, and Christensen (2002), Calvin, Fernandes, Smith, Visscher, and Deary (2009), and Webbink, Postuma, Boomsma, de Geus, and Visscher (2008) find samples of twins to be representative to the population at large in terms of outcomes such as educational attainment, IQ, psychiatric symptoms, and personality traits.

In Table 2 we present descriptive statistics for the subsample of twins (extracted from the full sample, see col. 7-8) and the full sample of employed 9th grade pupils (col. 3-4). These statistics show that our sample of twins is slightly positively selected in terms of skills (GPA in 6th and 8th grade, criminal charges during 8th, and school absenteeism during the last three months of 8th) and parental characteristics. Individuals in the twin sample have mother (father) who are approximately 1.8 (1.1) years older and correspondingly higher labor market experience and the mother tends to have slightly higher earnings. See Section 4.2 for a detailed comparison of summary statistics of the full population, the sample of employed 9th graders and the subsamples of siblings and twins.

In Section 5 we will present results on the full sample, the sibling sample together with the main results using the twin sample in order to get a sense of the external validity of the results

from our main specification. The regressions using the full sample include a large set of individual and parental controls. These controls include earnings, level of education, marital status, fraction of year unemployed, labor market experience, and age of both parents and gender, immigrant status, age, age squared of the individual. The regressions using the sibling sample include sibling fixed effects, birth order, and gender.

An alternative strategy commonly used in the literature is to follow an instrumental variable approach. A common instrument for working hours in spare-time jobs of students is local labor market conditions (Rothstein 2007; Dustmann and Van Soest 2007; Lee and Orazem 2010) and state laws (Apel et al. 2008; Lee and Orazem 2010; Taylor 2003). This instrument, however, is hard to justify as local labor market conditions may affect the educational aspiration and attainment of the students, as noted in Stinebrickner and Stinebrickner (2003) and in the review by Neyt et al. (2017). Furthermore, using the instrumental variable approach only allows for estimation of the effect on those students who change behavior due to the instrument (LATE). This severely limits the policy relevance of the results.

3. Institutional setting

In Denmark the legal working age for spare-time job is 13. The labor market of individuals younger that the age of 18 is, in many ways, different from the regular labor market. For individuals above the age of 18, the Danish labor market is flexible and the regulations are mostly based on agreements between the trade unions and the employer organizations (Andersen and Svarer 2007). This is to a much lesser extent the case for individuals below the age of 18. For these individuals the regulations on working hours and on the task an individual is allowed to perform are set by law. However, it is still the case that the wage rate is part of the collective agreements. This also means that there is no nation-wide minimum wage, but minimum wages are industry specific and depend on collective agreements.

In general, the legislation for individuals below the age of 18 distinguishes between individuals aged 13-14 and individuals aged 15-17, where the regulations are much stricter in terms of working hours and job tasks for the younger group.[33] A second distinction is made for individuals above

[33] See the relevant law (in Danish): BEK nr 239 af 06/04/2005.

age 15 if the individual is exempt of his/her otherwise mandatory school participation.[34] For this group the regulations are less strict.

The rules on working hours are as follows.[35] All individuals aged 13-14 as well as individuals aged 15-17, who are required to go to school, are allowed to work for up to 2 hours on school days and a maximum of 12 hours per school week. During weeks where school is off the individualsaged 13-14 are allowed to work for up to 7 hours per day and a max of 35 hours per week. For individuals aged 15-17 with school obligations the corresponding figures are up to 8 hours per day and max 40 hours per week. Individuals aged 15-17 exempt for the mandatory school participation are allowed to work for up to 8 hours per day with a max of 40 hours per week. Individuals aged 13-14 are required to have at least 14 hours of rest between shifts and individuals above age 14 are required to at least 12 hours of rest between shifts. In addition, all individuals below age 18 are required to have at least 2 days of rest for every 7 day period and not allowed to work between 8 in the evening and 6 in the morning.[36]

There are rather strict regulations on the tasks individuals below the age of 18 are allowed to perform. The law include a set of tasks (deemed 'light' tasks) which are allowed for individuals below the age of 18. The main restrictions are on heavy lifting, chemicals, large machines and jobs where robbery is a possibility.[37]

As previously mentioned, the wages are negotiated on a collective level between the unions and the employer organizations. But, in general, the salary is high due to favorable tax regulations. For individuals below the age of 18 the first DKK 34,500 (corresponding to approx. 5,300 US dollars) are non-taxable income.[38] They are still required to pay an 8% tax (Arbejdsmarkedsbidrag), but on the other hand the employers are required to set aside an additional 12.5% as holiday payment on top of the collective agreed wage level. The holiday payments are to be paid after the 1st of May the following year. [39]

[34] 10 years of compulsory schooling. In general school starts in the year in which the child turns 6.
[35] Table A1 in the appendix displays an overview of the regulations.
[36] Exceptions from this law exists for individuals above the age of 15 exempt from the mandatory school participation who work in hotels, restaurants and the farming sector.
[37] Individuals below the age of 18 are not allowed to lift more than 12 kg or push more than 250 kg on the job. At workplaces where robberies may occur (e.g. in bakeries, kiosks and fast-food restaurants), individuals below the age of 18 are not allowed to work alone after 6 in the evenings on weekdays and after 2 pm on weekends.
[38] The 2018 level.
[39] BEK nr 499 af 27/03/2015, LBK nr 117 af 29/01/2016 , BEK nr 549 af 24/04/2015, and BEK nr 1385 af 25/11/2015.

In general, the job security is low in the Danish labor market. This is especially the case for individuals below the age of 18 as most are hired and paid by the hour. The rules on job security are covered by the collective agreements. However, a small group of individuals is covered by the law 'Funktionærloven'. These individuals have better conditions and have the right to be paid sick days and a term of notice. However, the group of individuals below the age of 18 who meets the requirements to be covered by the law is small.[40]

For individuals aged 13-15, employers are required to inform the parents about working hours and tasks including information about potential risks of accidents and health risks in connection with the job. In addition, the employer is required to appoint a contact person above the age of 18 who can answer potential questions and has to make sure that the individual is informed about what he/she is allowed to do at the workplace.

4. Data, sample selection and descriptive statistics

For our empirical analyses we combine information from eight administrative registers for the Danish population. The registers are linked using a unique person identifier. Below we describe each of the registers.

The school grade register contains school grades for all pupils in 9th grade (compulsory) and the voluntary 10th grade. Data is available from school year 2006/2007 to school year 2015/2016. The register contains all grades given to pupils during this period. This consists of both exam grades and teacher assessments. Grades are registers by the type of course and the assessed skill. E.g. exam grade in spelling in the subject Danish.

The school absenteeism register contains monthly information on number of days the individual is absent from school in a given month and number of days an individual is supposed to be in school in that month. Our measure of school absenteeism is then the ratio of these two numbers. The nominator of our measure of school absenteeism is in fact the number of days with any school absenteeism. The limitation of using this measure is that we cannot distinguish between an hour of absenteeism and an entire day of absenteeism. When teachers register absenteeism they have to categorize it into legal, illegal, or sickness absenteeism. The absenteeism is registered as illegal if the child is not ill, the school was not notified, and the parents cannot explain the

[40] The requirements are that this individual works a minimum of 8 hours a week and a minimum of 74 hours during the last 8 weeks. Only certain office, store, and shop jobs are covered.

absenteeism. We expect this categorization to be noisy as the information at hand for the school teacher is limited when he/she has to register the absenteeism.[41] Data is available from school year 2010/2011 to school year 2013/2014 for all public school pupils.

The Central Police Register records individual charges (date of charge, date of committing the offense, and type of offense) and convictions (date of conviction, verdict, and sentence) for the full Danish population as well as all contacts of individuals and firms with the police.[42] Charges are usually a predecessor of a conviction; i.e. court rulings that the individual is guilty as charged.[43] If an individual below the minimum age of criminal responsibility commits a crime, the police will record the offense as an "as if charge" in the register on contacts with the police, which means that the person would have been charged with the offense, had the person reached the minimum age of criminal responsibility. For offenders below the minimum age of criminal responsibility, the Danish police is required by law to register violations of the Penal Code Act, Weapons Act and Drugs Act.[44] This unique feature of the register allows us to analyze non-traffic related crimes as measured by an (as-if) charge for all ages. We have information available on all contacts, charges and convictions for the period 2007-2015.[45]

The employment register contains all job spells in the Danish labor market with exact beginning and end dates. The register includes individual identifier, workplace identifier, occupation, industry, earnings, and working hours. This register is our main source of information on spare-time jobs. We have information available for the period 2008-2014.

[41] See Krægpøth (2016) for a through discussion of the measurement of school absenteeism in Denmark.
[42] The minimum age of criminal responsibility was at 15 until the 1th of July 2010 after which it was changed to age 14. However, it was changed back to 15 on the 1st of March 2012. Damm, Larsen, Nielsen and Simonsen (2017) find no general or individual deterrence effects of the reform, but evidence of labelling effects.
[43] For a random 10 percent sample of Danes born in 1980 followed until age 21, 28% of charges led to a conviction (Damm and Dustmann 2014). US studies on crime tend to measure individual crime by arrests. But arrests are uncommon in Denmark. According to the Danish "Law on Administration of Justice" (Retsplejeloven. Article 755, part 1), the police can arrest a person whom they have reason to suspect guilty of a criminal offence subject to public prosecution, but only if an arrest is regarded as necessary in order to prevent further criminal offenses, ensure the subject's presence for the time being or to prevent his communication with other people. Further, an arrest should not be made if imprisonment would be a disproportionate measure in regard of the nature of the offence or other circumstances.
[44] BEK nr. 881 af 04/07/2014.
[45] Our measure of criminal behavior is not a perfect measure of criminal behavior. Some individuals might commit crime and go undetected, while other individuals may be charged with an offense but be found not guilty. We address the latter concern by checking whether our results are robust to using convictions (only available since the individual reached the minimum age of criminal responsibility). With these potential caveats in mind, we will still argue for (as-if) charges to be useful as a measure of criminal behavior among teens and much more reliable that the alternative of self-reported crime.

The population register contains yearly information on demographic characteristics, e.g. identifiers for legal parents, household composition, immigrant status, and municipality of residence for all Danes for the years 2007-2014.

The tax register. We use that tax register to obtain a measure of real annual earnings of the parents. The measure of earnings we use include taxable earnings, non-taxable income, fringe benefits, bonus payments, and stock payouts. Available for all Danes for the years 2007-2014.

The Danish National Tests register contains test scores from 8th grade on the subjects language comprehension, decoding, and reading comprehension and from 6th grade on language comprehension, decoding, reading comprehension, numbers and algebra, geometry, and applied mathematics. The National Tests are IT-based, adaptive, and self-scoring tests.[46] Points are distributed from −7 to 7 on a logit scale. The tests are compulsory for all public school pupils, but headmasters may exempt pupils from the test. Data is available for the years 2010-2014.

The school register keeps track of the date of enrollment and completion of an education, the type of education, and the current education affiliation status. Data is available for all Danes for the years 2008-2015.

4.1 Sample selection criteria

We wish to apply a value added model to estimate the effect of spare-time work experience accumulated during 9th grade on GPA, school absenteeism and criminal behavior. This requires access to information on the individual labor market experience and GPA, school absenteeism and criminal behavior measured before and after 9th grade. The main data limitation is that we only have information on school absenteeism and 8th grade GPA from National Tests for public school pupils during the years 2010-2014.

We apply the following four selection criteria in order to obtain a relevant and representative sample. *i)* We include individuals who take 9th grade exam during the year 2011-2014 (cohorts born between 1995 and 1999). This baseline sample has 230,447 individuals. *ii)* We only keep individuals who turn 16 in the year in which they take the 9th grade exam. This decreases the sample by 19 percent to 187,122 individuals. *iii)* We include public school pupils who participated in the 8th grade National Tests. This decreases the sample by 23 percent to 144,288 individuals.

[46] See Beuchert-Pedersen and Nandrup (2014) and Nandrup and Beuchert-Pedersen (2018) for a description of the Danish National Tests.

iv) We delete individuals without any spare-time work during 9th grade. These individuals are potentially very different from the rest either in terms of preferences for employment or in terms of employability. This decreases the sample by 30 percent to 101,047 individuals. That is, our full sample (of 9th graders in a public school with spare-time work during the 9th grade) has information for 101,047 individuals. In the empirical analysis we also use subsamples of siblings and twin-pairs extracted from the full sample. The sample of siblings include 15,903 pupils and the sample of twins include 2,414 pupils.

We construct a cross sectional data set where each individual is represented by one observation including the outcome measures; 9th grade GPA, fraction of the last three months of 9th grade with school absenteeism, and an indicator of whether the individual is in the police register for a non-traffic related crime during the year after the end of 9th grade. Spare-time work experience is measured as the number of working hours during 9th grade prior to the last three months of 9th grade. Lagged skills measures are: 8th grade GPA from the national test, fraction of the last three months of 8th grade with school absenteeism, and an indicator of whether the individual is in the police register for a non-traffic related crime during 8th grade.

To facilitate the interpretation of our results, we standardize the 9th grade GPA, the fraction of the last three months of 9th grade with school absenteeism, the spare-time work experience, 8th grade GPA, and the fraction of the last three months of 8th grade with school absenteeism to have mean zero and standard deviation of one within the twin sample.

4.2 Descriptive Statistics

In this subsection, we describe what constitutes the main features of the teenage labor market in Denmark by presenting facts on both the jobs and the teenagers who participate in the labor market. In addition, we compare our full sample of public school pupils who at some point during the 9th grade had a job with the full population of 9th graders for the years 2010-2014.

4.2.1 Basic statistics on the teenage labor market in Denmark

Figures 1 and 2, respectively, show the fraction of teenagers who had at least one hour of work during the year and average number of working hours by age of the individual for the years 2010-2014. The figures illustrate two important points. First, spare-time jobs are very common among teenagers in Denmark; the fraction who at some point during a school year has worked in a spare-

time job increases steadily with age, from 18% at age 13 to 61% at age 16. Second, the average number of working hours during the school year also increases gradually with age, from an average of around 48 hours per year at age 13 to around 207 hours at age 16.

Figures A1 and A2 in the appendix present the same statistics by gender for the years 2010-2014. From these numbers we see that the labor market attachment of boys and girls in our sample is very similar; at age 16, 58% of the boys and 65% of the girls have had at least one hour of spare-time work during the year; at that age boys (girls) work on average 210 (203) hours in a spare-time job during the year.

Table A2 in the appendix shows lists of the most common occupations in the teenage labor market by age. The most common jobs among the younger age groups are courier and delivery jobs, whereas jobs in stores and warehouses are the most common among the older age groups of lower-secondary pupils.[47] Boys are overrepresented in delivery, courier, and warehouse jobs, while girls are overrepresented in shop, office, and cleaning jobs.

The variation in working hours and job types across ages is worth keeping in mind in the later sections when the results are presented. In general, we will treat the teenage labor market as a single market, although heterogeneous results conditional on gender and parental characteristics will also be presented.

Figure 1*: Fraction of individuals who at some point during the year worked for at least one hour by age and gender, years 2008-2014.*

Figure 2*: Average working hours of employed individuals by age and gender, years 2008-2014.*

4.2.2 Sample comparison

Table 2 displays summary statistics (mean and standard deviation) for the full population of 9th graders (col. 1-2), the sample of public school pupils who at some point during 9th grade had a job (col. 3-4), the subsample of siblings (col. 5-6), and the subsample of twins (col. 7-8). Panel A reports summary statistics of outcomes variables, while Panel B reports summary statistics of background characteristics.

Table 2, Panel A, reports 9th grade GPA. In the table, GPA is standardized within the twin sample with mean zero and standard deviation of one. We observe that the mean in the full population of 9th graders (col. 1-2) is 7.4 percentage points lower than in the twin sample (col. 7-

[47] For around half of the jobs the occupation code is missing (see Table A1 in the appendix).

8), but the standard deviation is similar in the two samples. Table 2, Panel A, also shows that only 1.2 percent of all pupils in the full population of 9th graders have at least one non-traffic related charge during the 9th grade (col. 1-2) and the fraction is even lower in the other samples. In other words, a very minor fraction of individuals in the full population and our subsamples are registered for criminal offenses by the police. The Central Police Registers allow for splitting the non-traffic related charges into four categories; violence and sex offences, offence against the drug act, offence against property, and other charges. By doing this, we see that offence against property is by far the most common type of charge. Panel A also report summary statistics for school absenteeism. Our measure of school absenteeism is the fraction of the last three months of the 9th grade where the pupil is reported not to have been at school on a school day. We only have school absenteeism data for pupils in public schools, so we are not able to provide statistics on this measure for the full population of 9th graders. Table 2 document that the average rate of school absenteeism in the last three months of 9th grade in our twin sample is 1.5 percent and 1.7 percent in the full sample. The most common type of school absenteeism is sickness absenteeism. This is true for all three samples.

The statistics in Table 2, Panel B, columns 1-4, document that the sample of employed public school pupils is very similar to the full population in terms of measures of individual background characteristics (GPA, crime, school absenteeism, gender, and immigrant status) and in terms of parental characteristics. The most notable difference between these two samples is that pupils with parents whose parents have attained upper secondary education are overrepresented in the sample of employed public school pupils compared to the full cohort. In other words, we find the same inverse U-shaped relationship between spare-time work and parental education at the extensive margin as we documented earlier at the intensive margin.

The statistics in Table 2, Panel B, columns 3-8, illustrates that the subsamples of twins and siblings are slightly positively selected in terms of parental and individual characteristics compared to the full sample (col. 3-4). Furthermore, the sample of twins is more positively selected than the sibling sample. Pupils in the subsample of twins have on average higher GPA and a lower level of school absenteeism and lower probability of being charged with a criminal offence before the 9th grade than the full sample of employed 9th graders. The individuals in the twin sample are also slightly positively selected in terms of especially mother's education, labor market experience and

earnings which can be explained by mothers (fathers) in the twin sample being on average 1.8 (1.1) years older than in full sample of employed 9th graders.

See Table A3 in the Appendix for details on definitions of variables and data sources.

5. Results

5.1 Does spare-time work experience affect GPA, school absenteeism, and criminal behavior?

Based on the model in Section 2, we expect to find gains through life skill development from on-the-job learning. In order for the returns to spare-time work experience to be positive, the return to life skill development needs to be larger than the potential negative side effects from changes in consumption and time-use. We expect that all three effects are increasing in hours of spare-time work.

Table 3 presents our empirical estimates of the return to spare-time work experience on GPA (Panel A), the level of school absenteeism (Panel B), and indicator for criminal charges (Panel C).[48] Columns (1) and (2) show results using the full sample of employed public school pupils. The results in Column (1) are only conditional on measures of life skills measured in the 8th grade (GPA from national test, school absenteeism, and criminal charges). The results in Column (2) are additionally conditional on gender, age, year, and parental characteristics. Parental characteristics are measured in the year in which the child turns 12 (prior to the legal working age). They include log real annual earnings, level of education, marital status, fraction of year employed, labor market experience, and age of both parents. Column (3) shows results for the subsample of siblings, where the results are conditional on measures of life skills in the 8th grade, gender, age, and family fixed effects. The results in Column (4) are obtained using the subsample of twins and the estimates are conditional on measures of life skills from the 8th grade, gender, and twin-pair fixed effects.[49]

[48] As shown by Angrist (2001) estimation of a linear probability model yields the same coefficient estimates as probit or logit estimation if the model is saturated (see also Angrist and Pischke 2008). Since we are only interested in knowing the sign and magnitude of the effects of spare-time work experience on the probability of having been charged by the end of grade 9 and are not going to use the estimated model for predictions, we estimate a linear probability model; our model is nearly saturated since most control variables are dummy variables rather than continuous.

[49] Figures A3, A4, and A5 in the appendix show results from regressions on the twin subsample where spare-time work experience is included as dummies for each 20 hours interval, with the interval from 0 to 20 is used as reference group. The figures plot estimates for individuals with less than 360 hours of spare-time work experience during the 9th grade, but the regressions also include individuals with more than 360 hours of spare-time work experience.

The estimate on the effect of spare-time work experience on the outcomes GPA presented in Column (4), Panel A shows that a one standard deviation increase around the sample mean of spare-time work experience increases the GPA score by 6.3 percent of a standard deviation. From Column (4), Panel B we see that there is no significant effect of spare-time work experience on school absenteeism within the twin sample. However, the result in Column (4), Panel C, shows that a one standard deviation increase in spare-time work experience around the sample mean decreases the probability of a criminal charge during the year after the 9th grade by 0.6 percentage points. This might, at first glance, seem like a small effect, but as the average probability of a criminal charge during the year after the 9th grade is 0.6 percent in the subsample of twins (1.2 in the full sample) it amounts to a substantial reduction in criminal activities.

Overall, these results illustrate that spare-time work experience have significant and sizable effects on school grades and criminal behavior and little effect on school absence. Based on the model in Section 2 we interpret these results as evidence of the positive gains from life skill development in spare-time job being sufficiently large to outweigh any potential negative side effects from change in behavior due to changes in consumption and time use.

If we compare the results in Table 3 across columns, we see that the estimates increase when we start to control for differences in characteristics. This could suggest that individuals with more spare-time work experience in the 9th grade are negatively selected in terms of unobservable characteristics. The results in Table 2 show that teenagers who have parents with high educations or high incomes are less likely to work many hours. One, however, has to be cautious when comparing results based on different samples as the difference in the estimates might be an artifact of the differences in the samples.

Table 4 presents the results in Table 3 by school topic (Danish, Mathematics, Physics, and English), type of school absenteeism (legal, illegal, and sickness), and type of crime (violence and sex offenses, offenses against property, and drug-related crime).

The results on school grades are similar across topics. Observing improvement across topics suggest an improvement of a set of skills which can be transferred across settings. Had we instead found that only grades in a topic like English were improving, we would be reluctant to attribute the effect to life skill accumulation as a specific generic skill such as English could have been caused by direct learning on the job. We find that the effects on crime is mainly driven by a decrease in offenses against property. We find no significant estimates on type of absenteeism.

The lack of significant results on type of school absenteeism is to be expected given the results in Table 3.

***Table 3**. Baseline regression results. Coefficient estimates (standard errors).*
***Table 4**. Regression results for sub outcomes. Coefficient estimates (standard errors)*

5.2 Effects on enrollment into upper secondary education

The results in Section 5.1 show that spare-time work experience obtained during the 9th grade increases the GPA and reduces the probability of criminal charges, while it has no effect on the level of school absenteeism. In this section, we present results on the likelihood of enrolling into an upper secondary education, in order to understand the implications of the improved performance in school in the long run. In addition we will distinguish between academic high school, vocational high school, and traditional vocational educations.

Tables 4-6 present results on enrollment into upper secondary education the same year as finishing compulsory school, within the first two years after finishing compulsory school, and within the first three years after finishing compulsory school, respectively. The tables are structured as Table 3. We will focus on the results using the twin-pair specification in col. 4. From Panel A in Table 5 we see that a one standard deviation increase around the sample mean of spare-time work experience increases the enrollment into any upper secondary education the same year as finishing compulsory school by 3.1 percentage points of a standard deviation. The results in Panel B, C, and D reveal that the increase in enrollment into any upper secondary education is driven by an increase in the enrollment into vocational high school education.

The results in Tables 6 and 7 show that there is no effect on enrollment within two and three years after the 9th grade. Thus, more spare-time work experience decreases the time until enrollment into an upper secondary education by increasing the probability of enrollment in the same year of graduating from 9th grade instead of one or two years later. If this translates into a labor market entry at a younger age, it will have significant implications for life-time earnings of the individual and government budgets.

***Table 5**. Effect of spare-time job experience on enrollment in upper secondary education in the year of the 9th grade exam*

***Table 6**. Effect of spare-time job experience on enrollment in upper secondary education within two years of the 9th grade exam*

***Table 7**. Effect of spare-time job experience on enrollment in upper secondary education within three years of the 9th grade exam*

5.3 Heterogeneous effects

The model in Section 2 assumes that investments in skill development of the child can be from the job or from the environment where the environment nests all other investment channels. For tractability proposes, the model does not include heterogeneity across individuals in terms of the environments. However, it is important to know whether the return to spare-time work increases or decreases with investments from the environment. In this subsection, we shed light on this question by comparing the return to spare-time work experience of children with different parental background characteristics.[50]

In Table 8 we report estimates of the return to spare-time work experience accumulated during the 9th grade using the twin-pair specification on the three outcome measures GPA, school absenteeism, and an indicator for criminal charges, for subsamples based on gender and labor market earnings of each parent.[51] Recall that the main results are available in Table 3. Clearly, comparisons across subsamples have to be interpreted with some caution as selection into occupations are not accounted for in the regression.

The results in Table 8, Columns (1) and Columns (2) show results by gender. These results rely on variation in spare-time work experience accumulated during 9th grade within single gender twin pairs. Results are similar across gender except that the effect on the indicator for criminal charges is significantly larger for boys than for girls, possibly because youth crime is primarily committed by boys.[52] Our finding that spare-time work reduces the charge probability contrasts

[50] Parental characteristics are measured at the year where the individual turn 12.
[51] We choose to split the sample based on labor market earnings of the father and of the mother. However, similar conclusions can be drawn if we instead split the sample based the level of education of the parents. Results are available upon request.
[52] For a 10 percent random sample of the Danish population born in 1980, we find that 17 percent of men and 5 percent of women have been charged by age 21.

the findings in Dustmann and van Soest (2007) and Montmarquette et al. (2007) who find that, for boys, only school performance is affected (negatively).

More importantly, the estimates in Table 8, col. 3-6, suggest a social gradient in the returns to spare-time work experience for teenagers. However, the slope of the social gradient varies by outcome. While children of high income parents have larger returns to spare-time work experience on GPA than other children, they have lower returns to spare-time work experience on delinquency. Based on these results we cannot conclude on whether this social gradient is due to a complementarity in the investments in life skill from the parents and the spare-time job or it is due to selection into particularly types of jobs.

Table 8*. Regression results for subgroups (standard errors).*

5.4 Robustness analysis

Recall that the results of regressing spare-time work experience on observable individual and parental characteristics (Table 2) show that observable characteristics only explain a very minor fraction of the individual variation in accumulation of spare-time work experience. Still, selection on unobservable characteristics might be present. This selection needs to be accounted for in order to obtain a causal estimate of the return to spare-time work experience on the three outcomes GPA, school absenteeism, and charge probability.

We attempt to overcome this potential issue in our baseline analysis in Section 5.1 (Table 3) by only using variation in 9th grade spare-time work experience within twin pairs where both are employed during 9th grade. In addition, we account for differences in skills between the twins prior to 9th grade through estimation of a value-added model, i.e. inclusion of controls for having been charged during the 8th grade, school absenteeism the last three months of the 8th grade, and the GPA from the national test at the end of the 8th grade.

However, one might still be concerned that these three lagged skill measures are not sufficient to account for differences in skill levels between the twins. A particular concern is that the 8th grade GPA from the National Tests only includes tests for the subjects language comprehension, decoding, and reading comprehension. Nandrup and Beuchert-Pedersen (2018) show that the national tests are highly correlated with 9th grade GPA, but it is still the case that 8th grade test only

include tests of language mastering skills. In order to account for this limitation we include the GPA from 6th grade National Tests. The 6th grade national test includes tests of both language and mathematical skills. The subjects are language comprehension, decoding, reading comprehension, numbers and algebra, geometry, and applied mathematics. The limitation from using this test as a control in the regressions is that the National Tests are only available from 2010 to 2014. This imply that we are restricted to only use the youngest half of our sample for whom we observe 6th grade National Tests scores.

We redo the results in Table 3, but include the control for the GPA of the National Tests in the 6th grade. The results are available in Table 9. From the table we see that our finding of a significant positive and sizable effect of spare-time work experience on 9th grade GPA is robust to controlling for the GPA from 6th grade National Tests. By contrast, the result on criminal charges in the twin sample becomes insignificant. However, separate estimation of the effects by gender, after inclusion of control for the GPA of the National Tests in 6th grade shows the same coefficient estimate on the charge probability for boys as the estimate for boys reported in Table 8, Panel C, col. 1 and slightly larger than the baseline estimate reported in Table 3. This provides empirical support for our baseline finding that spare-time job experience reduces the charge probability.

Table 9. *Regression results conditioning in addition on life skills in the 6th grade.*

6. Discussion and conclusions

According to our theoretical on-the-job learning model, the lower-secondary school pupil will choose a level of hours of spare-time work taking into account the current marginal labor market returns of the match taking out costs of training and costs of time used for other activities. In addition, the pupil takes into account that the accumulated spare-time work experience will carry a value in all future periods in terms of reduced training costs and increased skill levels.

Our empirical approach is to estimate the effect of spare-time work experience accumulated during 9th grade on 9th grade GPA, school absenteeism and criminal charges using a value-added model and only relying on variation with in pairs of employed twins.

We find that a one standard deviation increase around the sample mean of spare-time work experience increases the GPA score by 6.3 percent of a standard deviation, decreases the

probability of being registered for a non-traffic related crime by 0.6 percentage points (with a sample mean of 0.6 percent), and increases the enrollment into any upper secondary education the same year as finishing compulsory school by 3.1 percentage points. Contrary, no effect is found on school absenteeism.

These results suggest that in the Danish teenage labor market the positive effect of spare-time work on life skill formation more than outweigh the potential negative consumption and time-use externalities of spare-time work.

Similar to the adult labor market, a non-observable share of jobs are not reported to the tax authorities. Working hours for pupils working in these types of jobs (e.g. babysitting, lawn mowing, etc.) will be underestimated. Our study does not provide any evidence about the non-pecuniary returns from spare-time work in the Black economy.

The results in this paper can be viewed as suggesting that employed pupils should work more hours as this is beneficial. One, however, has to remember that the legislation on maximum working hours only allows for less than 12 hours of work during a school week in Denmark. The literature suggests that there might be a breaking point around 15-20 hours per week above which working more hours have large negative impacts on educational attainment (Greenberger et al. 1980, Marsh 1991, Eckstein and Wolpin 1999, Stinebrickner and Stinebrickner 2003, and Tyler 2003). From a policy perspective, one also has to bear in mind that teenage work potentially crowd out regular jobs for adults. As spare-time work experience has diminishing marginal returns legislation on maximum working hours can still be justified.[53]

The model and the result presented in this paper can be used to inform future research on spare-time employment. Future research may be able to identify the effects of spare-time work experience under weaker identifying assumptions than this study, perhaps exploiting (quasi-) experimental variation in spare-time work experience and shed light on the external validity of our empirical findings through estimation of the effects for representative samples of lower-secondary school pupils in other developed countries. Our study lends support to programs which help disadvantaged youth find and keep a spare-time job; such programs are likely to contribute to narrowing the education gap between children from high and low SES families.

[53] See Figure A3, A4, and A5.

References

Adda, J., C. Dustmann, C. Meghir, and J.-M. Robin. 2013. "Career progression, economic downturns, and skills." NBER WP 18832.

Almlund, M., A. Duckworth, J. J. Heckman and T. Kautz. 2011. "Personality psychology and economics." In E. A. Hanushek, S. Machin, and L. Wößmann (Eds.), *Handbook of the Economics of Education*, Volume 4, pp. 1-181. Amsterdam: Elsevier.

Almond, D., Chay, K. Y., & Lee, D. S. (2005). The costs of low birth weight. *The Quarterly Journal of Economics*, *120*(3), 1031-1083.

Andersen, T. M., and M. Svarer. 2007. "Flexicurity labour market performance in Denmark." *CESifo Economic Studies* 53(3), 389–429.

Angrist, J. 2001. "Estimation of Limited Dependent Variable Models with Dummy Endogenous Regressors." *Journal of Business and Economic Statistics* 19(1), 2-28.

Angrist, J. and D. Krueger. 1991. "Does compulsory school attendance affect schooling and earnings?" *Quarterly Journal of Economics* 106, 976-1014.

Angrist, J. and J. Pischke. 2008. "*Mostly Harmless Econometrics: An Empiricist's Companion*." New Jersey: Princeton University Press.

Ashenfelter, O. and A. Rouse. 1998. "Income, schooling and ability: Evidence from a new sample of identical twins." *Quarterly Journal of Economics* 113, 253-284.

Apel, Robert, Shawn D. Bushmay, Raymond Paternoster, Robert Brame and Gary Sweeten. 2008. "Using state child labor laws to identify the causal effect of youth employment on deviant behavior and academic achievement." *Journal of Quantitative Criminology* 24(4), 337-362.

Bachman, Jerald G., Deborah J. Safron, Susan R. Sy and John E. Schulenberg. 2003. "Wishing to work: New perspectives on how adolescents' part-time work intensity is linked to educational disengagement, substance use, and other problem behaviours." *International Journal of Behavioral Development* 27(4), 301-315.

Bachman, Jerald G., Deborah J. Safron, Susan R. Sy and John E. Schulenberg. 2010. "Adolescent Work Intensity, School Performance, and Academic Engagement." *Sociology of Education* 83(3), 183-200.

Bachman, J. G., Staff, J., O'Malley, P. M., & Freedman-Doan, P. 2013. "Adolescent work intensity, school performance, and substance use: links vary by race/ethnicity and socioeconomic status." *Developmental psychology* 49(11), 2125-2134.

Bachman, J.G., Staff, J., O'Malley, P.M. and Freedman-Doan, P., 2014. "What do teenagers do with their earnings, and does it matter for their academic achievement and development?" *monitoring the future occasional paper series*.

Baker L., Treloar S., Reynolds C., Heath A., Martin N., 1996. "Genetics of educational attainment in Australian Twins: sex differences and secular changes." Behav Genet 26(2):89–102

Barling, J., Kimberley-Ann Rogers, and E. Kevin Kelloway. 1995. "Some effects of teenagers' part-time employment: The quantity and quality of work make the difference." *Journal of Organizational Behavior* 16(2), 143-154.

Barrick, M. R. and M. K. Mount. 1991. "The Big Five personality dimensions and job performance: A meta-analysis." *Personnel Psychology* 44 (1), 1-26.

Becker. G. 1964. "*Human capital"*. New York, NY: National Bureau of Economic Research.

Becker, G. S. 1965. "A theory of the allocation of time." *Economic Journal, 75*(299), 493–517.

Becker, A., T. Deckers, T. Dohmen, A. Falk, and F. Kosse. 2012. "The relationship between economic preferences and psychological personality measures." *Annual Review of Economics* 4, 453-478.

Behrman, J. R., and Rosenzweig, M. R. 2004. "Returns to birthweight." *Review of Economics and statistics, 86*(2), 586-601.

Bell, D. N., and D. G. Blanchflower. 2011. "Young people and the Great Recession." *Oxford Review of Economic Policy* 27(2), 241–267.

Ben-Porath, Y. 1967. "The production of human capital and the life cycle of earnings." *Journal of Political Economy*, 75, 352-365.

Bertelsen, P., 2013. "*Tilværelsespsykologi. Et godt nok greb om tilværelsen*." København. Frydenlund.

Bertelsen, P., 2018: "*Mentoring in Anti-radicalisation. LGT: A Systematic Assessment, Intervention and Supervision Tool in Mentoring."* In: Overland, G, Andersen, A., Førde, K. E., Grødum, K. and J. Salomonsen (eds.): *Violent Extremism in the 21st Century. International Perspectives.* Cambridge Scholars Publishing: Newcastle

Beuchert-Pedersen, L. V. and A. B. Nandrup. 2014. "The Danish National Tests practical Guide." working paper No. 2014-25, Aarhus University.

Black, S. E., Devereux, P. J., & Salvanes, K. G., 2007. "From the cradle to the labor market? The effect of birth weight on adult outcomes." *The Quarterly Journal of Economics, 122*(1), 409-439.

Borghans, L., A. L. Duckworth, J. J. Heckman and B. ter Weel, 2008. "The economics and psychology of personality traits." *Journal of Human Resources* 43(4), 972-1059.

Buscha, F., Maurel, A., Page, L., & Speckesser, S., 2012. "The effect of employment while in high school on educational attainment: A conditional difference-in-differences approach." *Oxford Bulletin of Economics and Statistics, 74*(3), 380–396

Calvin C., Fernandes C., Smith P, Visscher P., Deary I., 2009. "Is there still a cognitive cost of being a twin in the UK?" Intelligence 37:243–248

Carneiro, P. and J. J. Heckman, 2003. "Human capital policy." In J. J. Heckman, A. B. Krueger, and B. M. Friedman (Eds.), *Inequality in America: What Role for Human Capital Policies?* pp. 77-239. Cambridge, MA: MIT Press.

Caspi Avshalom, Terrie E. Moffitt, Phil A. Silva, Magda Stouthamer-Loeber, Robert F. Krueger, and Pamela S. Schmutte. 1994. "Are Some People Crime-Prone: Replications of the Personality-Crime Relationship across Countries, Genders, Races, and Methods." *Criminology* 32, 163–195.

Cunha, F. and J. J. Heckman 2007. "The technology of skill formation." *American Economic Review* 97(2), 31-47.

Cunha, F. and J. J. Heckman 2008. “Formulating, identifying and estimating the technology of cognitive and noncognitive skill formation.” *Journal of Human Resources* 43(4), 738-782.

Cunha, F. and J. J. Heckman 2009. “The economics and psychology of inequality and human development.” *Journal of the European Economic Association* 7(2-3), 320-364.

Cunha, F., J. J. Heckman, L. J. Lochner, and D. V. Masterov. 2006. Interpreting the evidence on life cycle skill formation. In E. A. Hanushek and F. Welch (Eds.), *Handbook of the Economics of Education*, Chapter 12, pp. 697-812. Amsterdam: North-Holland.

Cunha, F., J. J. Heckman, and S. M. Schennach. 2010. “Estimating the technology of cognitive and noncognitive skill formation.” *Econometrica* 78(3), 883-931.

Damm, A. P. and C. Dustmann. 2014. “Does growing up in a high crime neighborhood affect youth criminal behavior?” *The American Economic Review* 104(6), 1806-1832.

Damm, A. P., B. Ø. Larsen, H. S. Nielsen and M. Simonsen. 2017. “Lowering the minimum age of criminal responsibility: Consequences for juvenile crime and education.” Aarhus BSS, Department of Economics and Business Economics, Economics Working Papers 2017-10.

Danish, S. 1996. “Interventions for Enhancing Adolescents’ Life Skills.” *Humanistic Psychologist* 24(3), 365-381.

Danish, Steve, Taylor, T., Hodge, K. and I. Hecke. 2004. “Enhancing youth development through sport.” *World Leisure Journal* 46(3), 38-49.

Deary, I. J., Spinath, F. M., and Bates, T. C. 2006. Genetics of intelligence. *European Journal of Human Genetics*, *14*(6), 690.

Del Boca, D., C. Monfardini, amd C. Nicoletti. 2017. Parental and child time investments and the cognitive development of adolescents. *Journal of Labor Economics*, *35*(2), 565-608.

Diamond, A. 2012. “Activities and Programs That Improve Children’s Executive Functions.” *Current Directions In Psychological Science* 21(5), 355-341.

Diamond, Peter and Hannu Vartiainen. 2012. *Behavioral economics and its applications*. Princeton University Press.

Dustmann C., & van Soest, A., 2007. “Part-time work, school success and school leaving.” *Empirical Economics*, *32*(2–3), 277–299.

Eckstein, Z., and Wolpin, K. I., 1999. “Why youths drop out of high school: The impact of preferences, opportunities, and abilities.” *Econometrica*, *67*(6), 1295-1339.

Ehlert, Christoph, Jochen Kluve and Sandra Schaffner. 2012 “Temporary Work as an Active Labor Market Policy: Evaluating an Innovative Program for Disadvantaged Youths.” IZA DP No. 6670.

Ellwood, D. T. 1982 “Teenage unemployment: Permanent scars or temporary blemishes?” in Freeman, R.B. and D.A. Wise (Eds.). *The youth labor market problem: Its nature, causes, and consequences*, University of Chicago Press, pp. 349–390.

Farrington, David P. 1988. “Studying Changes within Individuals: The Causes of Offending.” In: Rutter, Michael (Ed.). *Studies of Psychosocial Risk*, pp. 158–183. Cambridge: Cambridge University Press.

Farrington, David P., Jeremy W. Coid, and Donald J. West. 2009. “The Development of Offending from Age 8 to Age 50: Recent Results from the Cambridge Study in Delinquent Development.” *Monatsschrift fur Kriminologie und Strafrechtsreform* 92: 160–173.

Farrington, David P., Rolf Loeber, and Welmoet B. Van Kammen. 1990. “Long-Term Criminal Outcomes of Hyperactivity-Impulsivity-Attention Defi cit and Conduct Problems in Childhood.” In Robins, Lee N. and Michael Rutter (Eds.). *Straight and Devious Pathways from Childhood to Adulthood*, pp. 62–81. Cambridge: Cambridge University Press.

Gelber, A., A. Isen, and J. B. Kessler. 2016. “The Effects of Youth Employment: Evidence from New York City Lotteries.” *The Quarterly Journal of Economics* 131(1), 423-460.

Gottschalk, P. 2005. “Can work alter welfare recipients' beliefs?” *Journal of Policy Analysis and Management* 24 (3), 485-498.

Gould, Daniel and Sarah Carson. 2008a. “Personal development through sport.” In O. Bar-Or & H. Hebestreit (Eds.) *The encyclopedia of sports medicine – the child and adolescent athlete*. Oxford Blackwell Science, pp. 287-301.

Gould, Daniel and Sarah Carson. 2008b. “Life skills development through sport: current status and future directions.” *International Review of Sport and Exercise Psychology* 1(1), 58-78.

Greenberger, E., Steinberg, L. D., Vaux, A. and McAuliffe, S., 1980. ‘Adolescents who work: effects of parttime employment on family and peer relations’, *Journal of Youth and Adolescence*, Vol. 9, pp. 189–202.

Gregg, P. 2001. “The impact of youth unemployment on adult unemployment in the NCDS.” *The Economic Journal* 111(475), 626–653.

Heckman, James. 2000. “Policies to foster human capital.” *Research in Economics* 54, 3-56.

Heckman, J. J., J. E. Humphries, S. Urzúa, and G. Veramendi. 2011. “The effects of educational choices on labor market, health, and social outcomes.” University of Chicago, Human Capital and Economic Opportunity: A Global Working Group, WP 2011-002.

Heckman, J. J. and T. Kautz. 2012. “Hard evidence on soft skills.” *Labour Economics* 19(4), 451-464.

Heckman, J. J. and T. Kautz. 2013. “Fostering and Measuring Skills: Interventions That Improve Character and Cognition.” IZA DP 7750.

Heckman, J. J., R. Pinto, and P. A. Savelyev. 2013. “Understanding the mechanisms through which an inuential early childhood program boosted adult outcomes.” *American Economic Review* 103(6), 1-35.

Heller, S. B. 2014. “Summer jobs reduce violence among disadvantaged youth.” *Science* 346(6214), 1219–1223.

Jackson, C. K. 2013. “Non-cognitive ability, test scores, and teacher quality: Evidence from 9th grade teachers in North Carolina.” NBER WP 18624.

Jahoda, Marie. 1981. "Work, employment, and unemployment: Values, theories, and approaches in social research." *American psychologist* 36(2), 184.

Jolliffe, Darrick, and David P. Farrington. 2009. “A Systematic Review of the Relationship between Childhood Impulsiveness and Later Violence.” In: McMurran, Mary and Richard C. Howard

(Eds.). *Personality, Personality Disorder, and Violence*, pp. 41–61. New York: John Wiley and Sons.

Kalenkoski, C. M., & Pabilonia, S. W. 2009. "Does working while in high school reduce US study time?" *Social Indicators Research, 93*(1), 117–121.

Kalenkoski, C. M., & Pabilonia, S. W. 2012. "Time to work or time to play: the effect of student employment on homework, sleep, and screen time." *Labour Economics, 19*(2), 211–221.

Kemple, J. and C. Willner. 2008. "Career Academies: long-term impacts on labor market outcomes, educational attainment, and transitions to adulthood." MDRC Report 06/2008.

Klinger, E. and W. Cox, W. M. 2004. "Motivation and the theory of Current Concerns." In: Cox, W.M. & Klinger, E. (eds.): *Handbook of Motivational counseling. Concepts, approaches, and assessments*. John Willey & Sons, New York.

Kohler, H. P., Knudsen, L. B., Skytthe, A., & Christensen, K. 2002. "The fertility pattern of twins and the general population compared: Evidence from Danish cohorts 1945-64." *Demographic research, 6*, 383-408.

Lee, C., & Orazem, P. F. 2010. "High school employment, school performance, and college entry." *Economics of Education Review, 29*(1), 29–39.

Lerman, R. I. 2013. "Are employability skills learned in U.S. youth education and training programs?" *IZA Journal of Labor Policy* 2(6), 1-20.

Leos-Urbel, J. 2014. "What is a summer job worth? The impact of summer youth employment on academic outcomes." *Journal of Policy Analysis and Management* 33(4), 891–911.

Lillard, Lee A. and Hong W. Tan. 1992. "Private Sector Training: Who Gets it and What are its Effects?" *Research in Labor Economics* 13, 1-62.

Little, B. R. & Gee, T. L. 2007. "The methodology of personal projects analysis: Four modules and a funnel." In: Little, B. R., Salmela-Aro, K. & Phillips, S. D. (eds): *Personal project pursuit. Goals, actions, and human flourishing.* London, Lawrence Erlbaum Associates Publishers.

Lleras, C. 2008. "Do skills and behaviors in high school matter? The contribution of noncognitive factors in explaining differences in educational attainment and earnings." *Social Science Research* 37 (3), 888-902.

Locke, E. A. & Latham, G. P. 2006. "New directions in goal-setting theory." *Current Directions in Psychological Science* 15(5), 265 – 268.

Lynch, Lisa M. 1992. "Private-Sector Training and the Earnings of Young Workers." *American Economic Review* 82(1), 299-312.

Maibom, Jonas, Michael Rosholm and Michael Svarer. 2014. "Can Active Labour Market Policies Combat Youth Unemployment?" IZA DP 7912.

Marsh, H.W. 1991. "Employment during high school: character building or a subversion of academic goals?" *Sociology of Education*, Vol. 64, pp. 172–189.

Mincer, J. 1974. *Schooling, experience and earnings.* New York, NY: National Bureau of Economic Research.

Mixon, J. W., and E. F. Stephenson. 2016. “Young and out of work: An analysis of teenage summer employment, 1972-2012.” *Cato Journal* 36(1), 89-99.

Moffitt, T. 2012. “Self-Control, Then and Now.” In: Loeber, R. and B.C. Welsh (Eds.) *The Future of Criminology*. Oxford University.

Montmarquette, C., Viennot-Briot, N., & Dagenais, M. 2007. “Dropout, school performance, and working while in school.” *Review of Economics and Statistics, 89*(4), 752–760.

Moon, S. H. 2012. “Time to invest in disadvanted young children.” *Samsung Economic Research Institute Quarterly* 5(3), 50-59.

Moore, R. W., C. Rubino, A. Bedi, D. R. Blake, and J. Coveney. 2015. “Hire LA: Summer Youth Employment Program Evaluation Report: 2014.” Discussion paper, Northridge Consulting Group.

Mortimer, Jeylan T., and Jeremy Staff. 2004. "Early work as a source of developmental discontinuity during the transition to adulthood." *Development and Psychopathology* 16(4), 1047-1070.

Mroz, T. A., and T. H. Savage. 2006. “The long-term effects of youth unemployment.” *Journal of Human Resources* 41(2), 259–293.

Nandrup, A. B. and Beuchert-Pedersen, L. V. 2018. “The Danish national tests at a glance.” *Nationaloekonomisk Tidsskrift, 1*.

Neyt, B., Omey, E., Verhaest, D. and Baert, S., 2017. ”Does Student Work Really Affect Educational Outcomes?” A Review of the Literature. *GLO Discussion Paper*, No. 121, Global Labor Organisation (GLO), Maastricht

Nisbett, R. E., J. Aronson, C. Blair, W. Dickens, J. Flynn, D. F. Halpern, and E. Turkheimer. 2012. “Intelligence: New findings and theoretical developments.” *American Psychologist* 67(2), 130-159.

Oettinger, Gerald S. 1999. "Does high school employment affect high school academic performance?" *Industrial & Labor Relations Review* 53(1), 136-151.

Oreopoulos, P. and K. Salvanes. 2011. “Priceless: The nonpecuniary benefits of schooling.” *Journal of Economic Perspectives* 25(1), 159-184.

Raven, J., J. C. Raven, and J. Court. 1988. “Manual for Raven's Progressive Matrices and Vocabulary Scales.” San Antonio, TX: Harcourt Assessment.

Roberts, R. D., G. N. Goff, F. Anjoul, P. C. Kyllonen, G. Pallier, and L. Stankov. 2000. “The Armed Services Vocational Aptitude Battery (ASVAB): Little more than acculturated learning (Gc)!?” *Learning and Individual Differences* 12(1), 81-103.

Roberts, B. W., N. R. Kuncel, R. L. Shiner, A. Caspi, and L. R. Goldberg. 2007. “The power of personality: The comparative validity of personality traits, socioeconomic status, and cognitive ability for predicting important life outcomes.” *Perspectives in Psychological Science* 2(4), 313-345.

Rosenzweig, M. R., & Zhang, J. 2009. “Do population control policies induce more human capital investment? Twins, birth weight and China's “one-child” policy.” *The Review of Economic Studies, 76*(3), 1149-1174.

Rothstein, Donna S. 2007. "High school employment and youths' academic achievement." *Journal of Human Resources* 42(1), 194-213.

Rothstein, R., R. Jacobsen, and T. Wilder. 2008. “Grading Education: Getting Accountability Right.” New York: Economic Policy Institute and Teachers College Press.

Ruhm, C.J., 1997. “Is high school employment consumption or investment?” *Journal of labor economics*, *15*(4), pp.735-776.

Schoenhals, Mark, Marta Tienda, and Barbara Schneider. 1998. "The educational and personal consequences of adolescent employment." *Social Forces* 77(2), 723-761.

Staff, J., & Mortimer, J. T. 2007. “Educational and work strategies from adolescence to early adulthood: Consequences for educational attainment.” *Social Forces, 85*(3), 1169–1194.

Staff, Jeremy, John E. Schulenberg, and Jerald G. Bachman. 2010. "Adolescent work intensity, school performance, and academic engagement." *Sociology of Education* 83(3), 183-200.

Staff, Jeremy, and Christopher Uggen. 2003. "The fruits of good work: Early work experiences and adolescent deviance." *Journal of Research in Crime and Delinquency* 40(3), 263-290.

Steinberg, Laurence, Suzanne Fegley, and Sanford M. Dornbusch. 1993. "Negative impact of part-time work on adolescent adjustment: Evidence from a longitudinal study." *Developmental Psychology* 29(2), 171-180.

Steinberg, Laurence, and Sanford M. Dornbusch. 1991. "Negative correlates of part-time employment during adolescence: Replication and elaboration." *Developmental Psychology* 27(2), 304-313.

Sum, Andrew, M. Trubskyy, and W. McHugh. 2013. “The Summer Employment Experiences and the Personal/Social Behaviors of Youth Violence Prevention Employment Program Participants and Those of a Comparison Group.” Boston: Center for Labor Market Studies, Northeastern University.

Todd, P., and K. Wolpin. 2007. “The Production of Cognitive Achievement in Children: Home, School, and Racial Test Score Gaps.” *Journal of Human Capital, 1*(1), 91-136. doi:10.1086/526401

Triventi, M. 2014. “Does working during higher education affect students’ academic progression?“ *Economics of Education Review, 41*, 1–13.

Tyler, R. W. 1973. “Assessing educational achievement in the affective domain.” *Measurement in Education* 4(3), 1-8.

Tyler, John H. 2003. "Using State Child Labor Laws to Identify the Effect of School-Year Work on High School Achievement." *Journal of Labor Economics* 21(2), 381-408.

Warr, Peter. 1987. “Work, Unemployment, and Mental health.” Oxford University Press.

Warren, John Robert. 2002. "Reconsidering the relationship between student employment and academic outcomes a new theory and better data." *Youth & Society* 33(3), 366-393.

Webbink D., Postuma D., Boomsma D., de Geus E., Visscher P. 2008. “Do twins have lower cognitive ability than singletons?” Intelligence 36(6):539–547

White, Jennifer L., Terrie E. Moffitt, Avshalom Caspi, Dawn J. Bartusch, Douglas J. Needles, and Magda Stouthamer-Loeber. 1994. “Measuring Impulsivity and Examining its Relationship to Delinquency.” *Journal of Abnormal Psychology* 103: 192–205.

Appendix

Table A1. *Legislation on working hours and rest between shifts in Denmark for lower-secondary school pupils, ages 13-17*

Table A2*. Distribution of spare-time jobs across occupations, years 2010-2014. By age and gender*

Table A3*. Variable definitions and data sources*

Figure A1*. Fraction of individuals who at some point during the year worked for at least one hour by age and gender, years 2010-2014*

Figure A2*. Average working hours for employed individuals by age and gender, years 2010-2014*

Figure A3*. Coefficient estimates from OLS regression of 9th grade GPA on yearly hours of spare-time work*

Figure A4*. Coefficient estimates from OLS regression of school absenteeism on yearly hours of spare-time work*

Figure A5*. Coefficient estimates from OLS regression of criminal charges on yearly hours of spare-time work*

Table 1. OLS regression of spare-time work experience accumulated during the 9th grade on individual and parental background characteristics

Dependent variable: Spare-time work experience, 9th grade prior to the last 3 months, standardized (mean zero and standard deviation of one)

	Coef.	Std. err.
Age	0.3130**	(0.1260)
Age squared	-0.0008**	(0.0003)
Girl	0.0483***	(0.0063)
1. generation immigrants	0.0861***	(0.0256)
2. generation immigrants	0.1371***	(0.0158)
GPA from national test in 8th grade	0.0131***	(0.0034)
Any non-traffic charge, 8th grade	-0.0511	(0.0498)
School absenteeism, fraction of the last three months of 8th grade	-0.0426***	(0.0037)
Age of father	-0.0005	(0.0005)
Age of mother	-0.0083***	(0.0009)
Father married	0.0450***	(0.0110)
Mother married	0.0603***	(0.0106)
Father unknown education	-0.0316	(0.0240)
Father upper secondary education	0.0321***	(0.0091)
Father tertiary education	-0.0617***	(0.0107)
Mother unknown education	-0.0279	(0.0351)
Mother upper secondary education	-0.0077	(0.0097)
Mother tertiary education	-0.1008***	(0.0107)
Yearly log real annual earnings of father	-0.0033***	(0.0009)
Yearly log real annual earnings of mother	-0.0020**	(0.0010)
Unemployment father	-0.0001***	(0.0000)
Unemployment mother	-0.0001***	(0.0000)
Labor market experience father	0.0000**	(0.0000)
Labor market experience mother	0.0000***	(0.0000)
Constant	-32.6696***	(12.1587)
Observations	101,047	
R-squared	0.0360	

Note: Source: Danish register data for the period 2007-2014. Sample selection criteria: i) we include individuals who take the 9th grade exam during the year 2011-2014 (cohorts born between 1995 and 1999). ii) We only keep individuals who turn 16 in the year in which they take the 9th grade exam. iii) We include public school pupils who participated in the 8th grade national test. iv) we delete individuals without any spare-time work during the 9th grade. Parental information is measured in the year in which the individual turned 12. *** p<0.01, ** p<0.05, * p<0.1. Regression include municipal fixed effects and year dummies. Standard errors clustered on municipality. The reference group for parental education is basic/lower secondary education.

Table 2. Summary statistics of cross-sectional sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All		Full sample		Sibling sample		Twin sample	
	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
Panel A: Outcomes								
9th grade GPA	-0.074	1.006	-0.081	1.000	-0.006	0.983	0.000	1.000
Any non-traffic charge, 9th grade	0.012	0.108	0.012	0.108	0.011	0.102	0.006	0.076
Violence and sex offences, 9th grade	0.003	0.052	0.003	0.052	0.003	0.055	0.001	0.029
Offences against property, 9th grade	0.010	0.098	0.010	0.098	0.008	0.090	0.005	0.070
Drug related crime, 9th grade	0.003	0.050	0.003	0.052	0.002	0.043	0.002	0.041
School absenteeism, last 3 months of 9th grade			0.017	0.037	0.015	0.034	0.015	0.036
Illegal school absenteeism, last 3 months of 9th grade			0.004	0.020	0.004	0.018	0.004	0.019
Legal school absenteeism, last 3 months of 9th grade			0.003	0.016	0.003	0.014	0.004	0.017
Sickness school absenteeism, last 3 months of 9th grade			0.010	0.025	0.009	0.023	0.008	0.022
Enrollment in upper secondary education:								
Any upper secondary education, year of graduation	0.255	0.436	0.472	0.499	0.486	0.500	0.486	0.500
Academic high school, year of graduation	0.157	0.364	0.291	0.454	0.302	0.459	0.320	0.467
Vocational high school, year of graduation	0.065	0.247	0.065	0.247	0.061	0.239	0.053	0.223
Vocational education, year of graduation	0.116	0.320	0.116	0.320	0.124	0.329	0.113	0.316
Any upper secondary education, 2 years after graduation	0.937	0.243	0.937	0.243	0.944	0.230	0.947	0.225
Academic high school, 2 years after graduation	0.563	0.496	0.563	0.496	0.569	0.495	0.596	0.491
Vocational high school, 2 years after graduation	0.155	0.362	0.155	0.362	0.138	0.345	0.143	0.350
Vocational education, 2 years after graduation	0.239	0.427	0.239	0.427	0.258	0.437	0.224	0.417
Any upper secondary education, 3 years after graduation	0.972	0.164	0.972	0.164	0.978	0.146	0.980	0.140
Academic high school, 3 years after graduation	0.584	0.493	0.584	0.493	0.588	0.492	0.614	0.487
Vocational high school, 3 years after graduation	0.189	0.391	0.189	0.391	0.172	0.378	0.175	0.380
Vocational education, 3 years after graduation	0.248	0.432	0.248	0.432	0.266	0.442	0.232	0.422
Panel B: Background characteristics								
Fraction girls	0.529	0.499	0.540	0.498	0.527	0.499	0.534	0.499
Age	16.086	0.263	16.100	0.262	16.098	0.264	16.123	0.257
Native Danes	0.920	0.271	0.925	0.263	0.922	0.269	0.961	0.193
1. generation immigrants	0.018	0.133	0.018	0.132	0.015	0.121	0.006	0.076
2. generation immigrants	0.062	0.241	0.057	0.231	0.064	0.244	0.033	0.179
Spare-time work experience, 9th grade prior to the last 3 months	63.219	97.466	91.480	105.796	101.068	108.498	97.392	105.680
GPA from national test in 8th grade			-0.065	1.014	-0.032	0.992	0.000	1.000
GPA from national test in 6th grade*			-0.006	1.015	0.023	1.002	0.000	1.000
School absenteeism, last 3 months of 8th grade			0.035	0.061	0.028	0.054	0.028	0.048
Any non-traffic charge, 8th grade	0.003	0.059	0.004	0.062	0.002	0.049	0.002	0.050
Yearly log real annual earnings of father	10.172	5.150	10.368	4.998	10.535	4.845	10.362	5.039
Yearly log real annual earnings of mother	10.743	4.301	10.950	4.100	11.096	3.914	11.380	3.598
Age of father	40.894	12.914	41.031	12.244	41.435	10.760	42.135	12.941
Age of mother	40.982	6.942	40.934	6.424	40.938	5.409	42.702	5.888
Unemployment father**	1.996	9.578	1.931	9.178	1.835	9.060	1.776	9.432
Unemployment mother**	2.561	10.332	2.152	9.221	2.110	9.144	1.474	7.495
Father unknown education	0.090	0.286	0.081	0.273	0.063	0.243	0.085	0.279
Father basic/lower secondary education	0.158	0.365	0.163	0.369	0.151	0.358	0.158	0.365
Father upper secondary education	0.456	0.498	0.489	0.500	0.509	0.500	0.497	0.500
Father tertiary education	0.295	0.456	0.267	0.443	0.277	0.448	0.260	0.439
Mother unknown education	0.026	0.159	0.021	0.144	0.012	0.110	0.009	0.095
Mother basic/lower secondary education	0.146	0.353	0.146	0.353	0.129	0.335	0.123	0.328
Mother upper secondary education	0.454	0.498	0.487	0.500	0.502	0.500	0.523	0.500
Mother tertiary education	0.374	0.484	0.345	0.476	0.357	0.479	0.345	0.476
Married father	0.706	0.456	0.713	0.452	0.768	0.422	0.743	0.437
Married mother	0.728	0.445	0.734	0.442	0.785	0.411	0.756	0.430
Labor market experience father (years)	16,452	8,773	17,114	8,652	17,350	8,372	18,474	8,774
Labor market experience mother (years)	14,118	7,331	14,607	7,193	14,567	6,977	16,693	6,975
Number of individuals	187,122		101,047		15,903		2,414	

Note: Source: Danish register data for the period 2007-2014. Sample selection criteria: i) we include individuals who take the 9th grade exam during the year 2011-2014 (cohorts born between 1995 and 1999). ii) We only keep individuals who turn 16 in the year in which they take the 9th grade exam. iii) We include public school pupils who participated in the 8th grade national test. iv) we delete individuals without any spare-time work during the 9th grade. Statistics in column 1-2 are based on the sample where criterion i) and ii) are applied. Column 3-8 apply all four criteria. Parental information is measured in the year in which the individual turned 12. * Only available from 2010 to 2014. This imply that we are restricted to use only the youngest half of our sample when we include the 6th grade national tests. ** Unemployment is measured as percent of year unemployed when the child was 12 year old.

Table 3. Baseline regression results. Coefficient estimates (standard errors)

	(1)	(2)	(3)	(4)
Sample:	Full sample	Full sample	Sibling sample	Twin sample
Panel A: Dependent variable: Standardized GPA, 9th grade				
Spare-time work experience, 9th grade prior to the last 3 months, standardized	0.0198***	0.0307***	0.0320***	0.0629***
	(0.00220)	(0.00217)	(0.00781)	(0.0214)
Panel B: Dependent variable: Standardized School Absenteeism, last 3 month of 9th grade				
Spare-time work experience, 9th grade prior to the last 3 months, standardized	-0.0204***	-0.0153***	0.00689	0.0163
	(0.00283)	(0.00289)	(0.0119)	(0.0316)
Panel C: Dependent variable: Criminal Charge (0/1), the year after 9th grade				
Spare-time work experience, 9th grade prior to the last 3 months, standardized	-0.00121***	-0.000670**	0.00206	-0.00604**
	(0.000339)	(0.000333)	(0.0013)	(0.00296)
Life skill measures, 8th grade	YES	YES	YES	YES
Gender	NO	YES	YES	YES
Age in months	NO	YES	YES	NO
Year	NO	YES	YES	NO
Parental characteristics	NO	YES	NO	NO
Sibling birth order	NO	NO	YES	NO
Sibling FE	NO	NO	YES	NO
Twin FE	NO	NO	NO	YES
Number of individuals	101,047	101,047	15,903	2,414

Note: Source: Danish register data for the period 2007-2014. Sample selection criteria: i) we include individuals who take the 9th grade exam during the year 2011-2014 (cohorts born between 1995 and 1999). ii) We only keep individuals who turn 16 in the year in which they take the 9th grade exam. iii) We include public school pupils who participated in the 8th grade national test. iv) we delete individuals without any spare-time work during the 9th grade. *** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered on a family level. Life skill measures, 8th grade include national test score in 8th grade, school absenteeism last three month of 8th grade, and criminal charge during 8th grade. Parental characteristics at in the year where the child turns 12 (prior to the legal working age). They include log real annual earnings, level of education, marital status, fraction of year employed, labor market experience, and age of both parents and immigrant status. The outcomes GPA and school absenteeism are standadized with mean zero and standard deviation of one within each estimation sample.

Table 4. Regression results for suboutcomes. Coefficient estimates (standard errors)

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A:	GPA mathematics	GPA Danish	GPA English	GPA Physics/Chemistry	GPA oral exams	GPA written exams
Spare-time work experience, 9th grade prior to the last 3 months, standardized	0.0522**	0.0828***	0.0220	0.0704**	0.0675**	0.0691***
	(0.0259)	(0.0254)	(0.0292)	(0.0321)	(0.0268)	(0.0226)
Panel B:	Illegal school absenteeism	Legal school absenteeism	sickness school absenteeism	Violence and sex offences	Offences against property	Drug related crime
Spare-time work experience, 9th grade prior to the last 3 months, standardized	0.0158	-0.00746	0.0255	-0.000749	-0.00341*	-0.00147
	(0.0316)	(0.0242)	(0.0390)	(0.00104)	(0.00196)	(0.00114)
Life skill measures, 8th grade	YES	YES	YES	YES	YES	YES
Gender	YES	YES	YES	YES	YES	YES
Twin FE	YES	YES	YES	YES	YES	YES
Number of individuals	2,414	2,414	2,414	2,414	2,414	2,414

Note: Source: Danish register data for the period 2007-2014. Sample selection criteria: i) we include individuals who take the 9th grade exam during the year 2011-2014 (cohorts born between 1995 and 1999). ii) We only keep individuals who turn 16 in the year in which they take the 9th grade exam. iii) We include public school pupils who participated in the 8th grade national test. iv) we delete individuals without any spare-time work during the 9th grade. *** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered on a family level. Life skill measures, 8th grade include national test score in 8th grade, school absenteeism last three month of 8th grade, and criminal charge during 8th grade. The outcomes are standadized with mean zero and standard deviation of one within the estimation sample.

Table 5. Effect on enrollment in upper secondary education in the year of the 9th grade exam

	(1)	(2)	(3)	(4)
Sample:	Full sample	Full sample	Sibling sample	Twin sample
Panel A: Dependent variable: Enrollment in any upper secondary education (0/1)				
Spare-time work experience, 9th grade prior to	0.0134***	0.0164***	0.0162***	0.0314*
the last 3 months, standardized	(0.00153)	(0.00155)	(0.00560)	(0.0162)
Panel B: Dependent variable: Enrollment in academic high school (0/1)				
Spare-time work experience, 9th grade prior to	-0.00878***	-0.00138	-0.00161	0.00941
the last 3 months, standardized	(0.00137)	(0.00134)	(0.00477)	(0.0138)
Panel C: Dependent variable: Enrollment in vocational high school (0/1)				
Spare-time work experience, 9th grade prior to	0.0131***	0.0107***	0.00591	0.0257**
the last 3 months, standardized	(0.00100)	(0.00108)	(0.00402)	(0.0126)
Panel D: Dependent variable: Enrollment in vocational education (0/1)				
Spare-time work experience, 9th grade prior to	0.00911***	0.00710***	0.0119***	-0.00369
the last 3 months, standardized	(0.000765)	(0.000868)	(0.00320)	(0.00914)
Life skill measures, 8th grade	YES	YES	YES	YES
Gender	NO	YES	YES	YES
Age in months	NO	YES	YES	NO
Year	NO	YES	YES	NO
Parental characteristics	NO	YES	NO	NO
Sibling birth order	NO	NO	YES	NO
Sibling FE	NO	NO	YES	NO
Twin FE	NO	NO	NO	YES
Number of individuals	101,047	101,047	15,903	2,414

Note: Source: Danish register data for the period 2007-2014. Sample selection criteria: i) we include individuals who take the 9th grade exam during the year 2011-2014 (cohorts born between 1995 and 1999). ii) We only keep individuals who turn 16 in the year in which they take the 9th grade exam. iii) We include public school pupils who participated in the 8th grade national test. iv) we delete individuals without any spare-time work during the 9th grade. *** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered on a family level. Life skill measures, 8th grade include national test score in 8th grade, school absenteeism last three month of 8th grade, and criminal charge during 8th grade. Parental characteristics at in the year where the child turns 12 (prior to the legal working age) They include log real annual earnings, level of education, marital status, fraction of year employed, labor market experience, and age of both parents and immigrant status.

Table 6. Effect on enrollment in upper secondary education in the two years the 9th grade exam

	(1)	(2)	(3)	(4)
Sample:	Full sample	Full sample	Sibling sample	Twin sample
Panel A: Dependent variable: Enrollment in any upper secondary education (0/1)				
Spare-time work experience, 9th grade prior to	0.00809***	0.00849***	0.00231	0.000771
the last 3 months, standardized	(0.000751)	(0.000735)	(0.00298)	(0.00820)
Panel B: Dependent variable: Enrollment in academic high school (0/1)				
Spare-time work experience, 9th grade prior to	-0.0184***	-0.00919***	-0.00321	0.000856
the last 3 months, standardized	(0.00149)	(0.00143)	(0.00519)	(0.0161)
Panel C: Dependent variable: Enrollment in vocational high school (0/1)				
Spare-time work experience, 9th grade prior to	0.0203***	0.0146***	0.00559	-0.00438
the last 3 months, standardized	(0.00134)	(0.00138)	(0.00518)	(0.0162)
Panel D: Dependent variable: Enrollment in vocational education (0/1)				
Spare-time work experience, 9th grade prior to	0.00693***	0.00341***	0.00479	0.00145
the last 3 months, standardized	(0.00107)	(0.00112)	(0.00429)	(0.0137)
Life skill measures, 8th grade	YES	YES	YES	YES
Gender	NO	YES	YES	YES
Age in months	NO	YES	YES	NO
Year	NO	YES	YES	NO
Parental characteristics	NO	YES	NO	NO
Sibling birth order	NO	NO	YES	NO
Sibling FE	NO	NO	YES	NO
Twin FE	NO	NO	NO	YES
Number of individuals	101,047	101,047	15,903	2,414

Note: Source: Danish register data for the period 2007-2014. Sample selection criteria: i) we include individuals who take the 9th grade exam during the year 2011-2014 (cohorts born between 1995 and 1999). ii) We only keep individuals who turn 16 in the year in which they take the 9th grade exam. iii) We include public school pupils who participated in the 8th grade national test. iv) we delete individuals without any spare-time work during the 9th grade. *** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered on a family level. Life skill measures, 8th grade include national test score in 8th grade, school absenteeism last three month of 8th grade, and criminal charge during 8th grade. Parental characteristics at in the year where the child turns 12 (prior to the legal working age) They include log real annual earnings, level of education, marital status, fraction of year employed, labor market experience, and age of both parents and immigrant status.

Table 7. Effect on enrollment in upper secondary education in the three years the 9th grade exam

	(1)	(2)	(3)	(4)
Sample:	Full sample	Full sample	Sibling sample	Twin sample
Panel A: Dependent variable: Enrollment in any upper secondary education (0/1)				
Spare-time work experience, 9th grade prior to	0.00515***	0.00497***	0.00197	-0.00221
the last 3 months, standardized	(0.000512)	(0.000508)	(0.00187)	(0.00492)
Panel B: Dependent variable: Enrollment in academic high school (0/1)				
Spare-time work experience, 9th grade prior to	-0.0212***	-0.0117***	-0.00756	-0.00659
the last 3 months, standardized	(0.00149)	(0.00143)	(0.00519)	(0.0159)
Panel C: Dependent variable: Enrollment in vocational high school (0/1)				
Spare-time work experience, 9th grade prior to	0.0194***	0.0138***	0.00468	-0.0105
the last 3 months, standardized	(0.00136)	(0.00139)	(0.00524)	(0.0171)
Panel D: Dependent variable: Enrollment in vocational education (0/1)				
Spare-time work experience, 9th grade prior to	0.00509***	0.000624	0.00453	-0.00271
the last 3 months, standardized	(0.00114)	(0.00118)	(0.00454)	(0.0142)
Life skill measures, 8th grade	YES	YES	YES	YES
Gender and immigrant status	NO	YES	YES	YES
Age in months	NO	YES	YES	NO
Year	NO	YES	YES	NO
Parental characteristics	NO	YES	NO	NO
Sibling birth order	NO	NO	YES	NO
Sibling FE	NO	NO	YES	NO
Twin FE	NO	NO	NO	YES
Number of individuals	101,047	101,047	15,903	2,414

Note: Source: Danish register data for the period 2007-2014. Sample selection criteria: i) we include individuals who take the 9th grade exam during the year 2011-2014 (cohorts born between 1995 and 1999). ii) We only keep individuals who turn 16 in the year in which they take the 9th grade exam. iii) We include public school pupils who participated in the 8th grade national test. iv) we delete individuals without any spare-time work during the 9th grade. *** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered on a family level. Life skill measures, 8th grade include national test score in 8th grade, school absenteeism last three month of 8th grade, and criminal charge during 8th grade. Parental characteristics at in the year where the child turns 12 (prior to the legal working age) They include log real annual earnings, level of education, marital status, fraction of year employed, labor market experience, and age of both parents and immigrant status.

Table 8. Baseline regression results for subgroups. Coefficient estimates (standard errors)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Sample:	Boys	Girls	Labor market earnings of father			Labor market earnings of mother		
			Lowest third	Middel third	Highest third	Lowest third	Middel third	Highest third
Panel A: Dependent variable: Standardized GPA, 9th grade								
Spare-time work experience, 9th grade prior to	0.0529	0.0644	0.0263	0.0795**	0.0845*	0.0579	0.0597*	0.0801**
the last 3 months, standardized	(0.0441)	(0.0475)	(0.0374)	(0.0323)	(0.0447)	(0.0368)	(0.0356)	(0.0401)
Panel B: Dependent variable: Standardized School Absenteeism, last 3 month of 9th grade								
Spare-time work experience, 9th grade prior to	0.00971	-0.0238	-0.0253	0.0731	-0.0130	0.0453	-0.0208	0.0296
the last 3 months, standardized	(0.0550)	(0.0672)	(0.0508)	(0.0622)	(0.0444)	(0.0578)	(0.0343)	(0.0752)
Panel C: Dependent variable: Criminal Charge (0/1), the year after 9th grade								
Spare-time work experience, 9th grade prior to	-0.00837	-8.76e-05	-0.0112	-0.00607*	-0.000356	-0.00170	-0.00144	-0.0139
the last 3 months, standardized	(0.00548)	(0.000181)	(0.00823)	(0.00363)	(0.000394)	(0.00374)	(0.00296)	(0.00855)
Life skill measures, 8th grade	YES	YES	YES	YES	YES	YES	YES	YES
Gender	NO	NO	YES	YES	YES	YES	YES	YES
Twin FE	YES	YES	YES	YES	YES	YES	YES	YES
Number of individuals	684	846	798	797	819	798	796	820

Note: Source: Danish register data for the period 2007-2014. Sample selection criteria: i) we include individuals who take the 9th grade exam during the year 2011-2014 (cohorts born between 1995 and 1999). ii) We only keep individuals who turn 16 in the year in which they take the 9th grade exam. iii) We include public school pupils who participated in the 8th grade national test. iv) we delete individuals without any spare-time work during the 9th grade. *** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered on a family level. Life skill measures, 8th grade include national test score in 8th grade, school absenteeism last three month of 8th grade, and criminal charge during 8th grade.

Table 9. Regression results including life skill measure from the 6th grade

	(1)	(2)	(3)	(4)
Sample:	Full sample	Full sample	Sibling sample	Twin sample
Panel A: Dependent variable: Standardized GPA, 9th grade				
Spare-time work experience, 9th grade prior to the last 3 months, standardized	0.0184***	0.0291***	0.0470*	0.0506*
	(0.00293)	(0.00285)	-0.0247	(0.0302)
Panel B: Dependent variable: Standardized School Absenteeism, last 3 month of 9th grade				
Spare-time work experience, 9th grade prior to the last 3 months, standardized	-0.0156***	-0.0144***	0.0488	0.0532
	(0.00372)	(0.00381)	(0.0405)	(0.0407)
Panel C: Dependent variable: Criminal Charge (0/1), the year after 9th grade				
Spare-time work experience, 9th grade prior to the last 3 months, standardized	-0.000671	-0.000243	0.0027	-0.00279
	(0.000481)	(0.000502)	(0.00314)	(0.00334)
Life skill measures, 8th grade	YES	YES	YES	YES
Life skill measure, 6th grade	YES	YES	YES	YES
Gender	NO	YES	YES	YES
Age in months	NO	YES	YES	NO
Parental characteristics and year	NO	YES	NO	NO
Sibling birth order	NO	NO	YES	NO
Sibling FE	NO	NO	YES	NO
Twin FE	NO	NO	NO	YES
Number of individuals	45,193	45,193	7,378	1,158

Note: Source: Danish register data for the period 2007-2014. Sample selection criteria: i) we include individuals who take the 9th grade exam during the year 2011-2014 (cohorts born between 1995 and 1999). ii) We only keep individuals who turn 16 in the year in which they take the 9th grade exam. iii) We include public school pupils who participated in the 8th grade national test. iv) we delete individuals without any spare-time work during the 9th grade. *** p<0.01, ** p<0.05, * p<0.1. Standard errors clustered on a family level. Life skill measures, 8th grade include national test score in 8th grade, school absenteeism last three month of 8th grade, and criminal charge during 8th grade. Parental characteristics at in the year where the child turns 12 (prior to the legal working age) They include log real annual earnings, level of education, marital status, fraction of year employed, labor market experience, and age of both parents and immigrant status.

Figure 1. Fraction of individuals who at some point during the school year work for at least one hour by age, years 2010-2014.

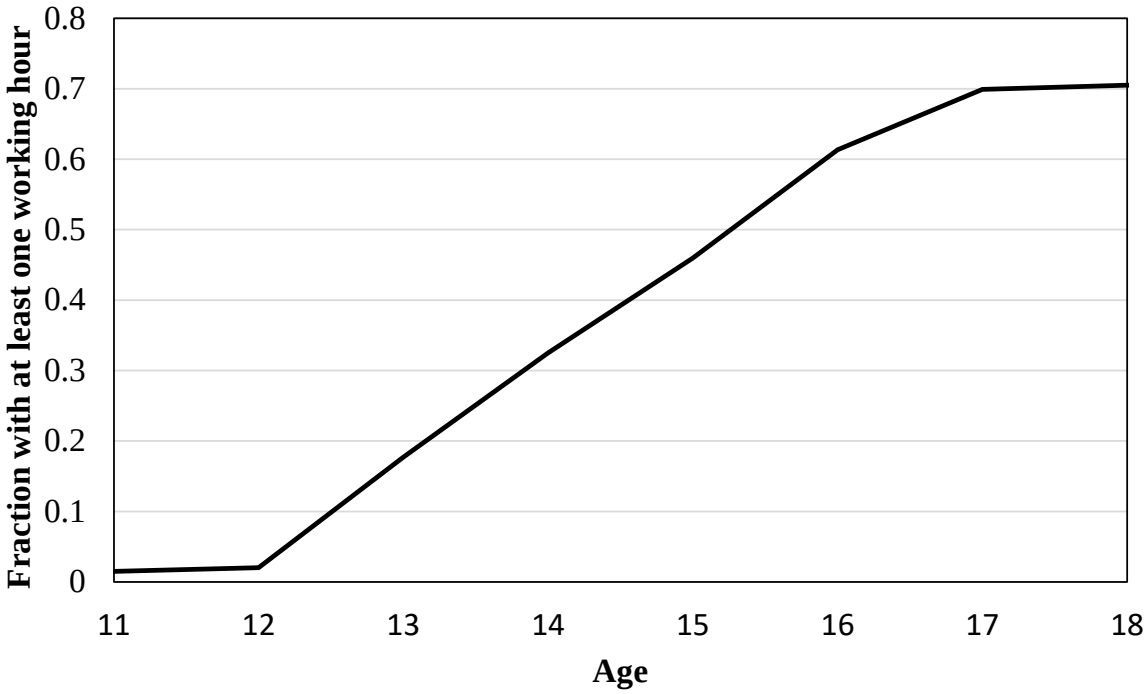


Figure 2. Average working hours for employed individuals by age, years 2010-2014.

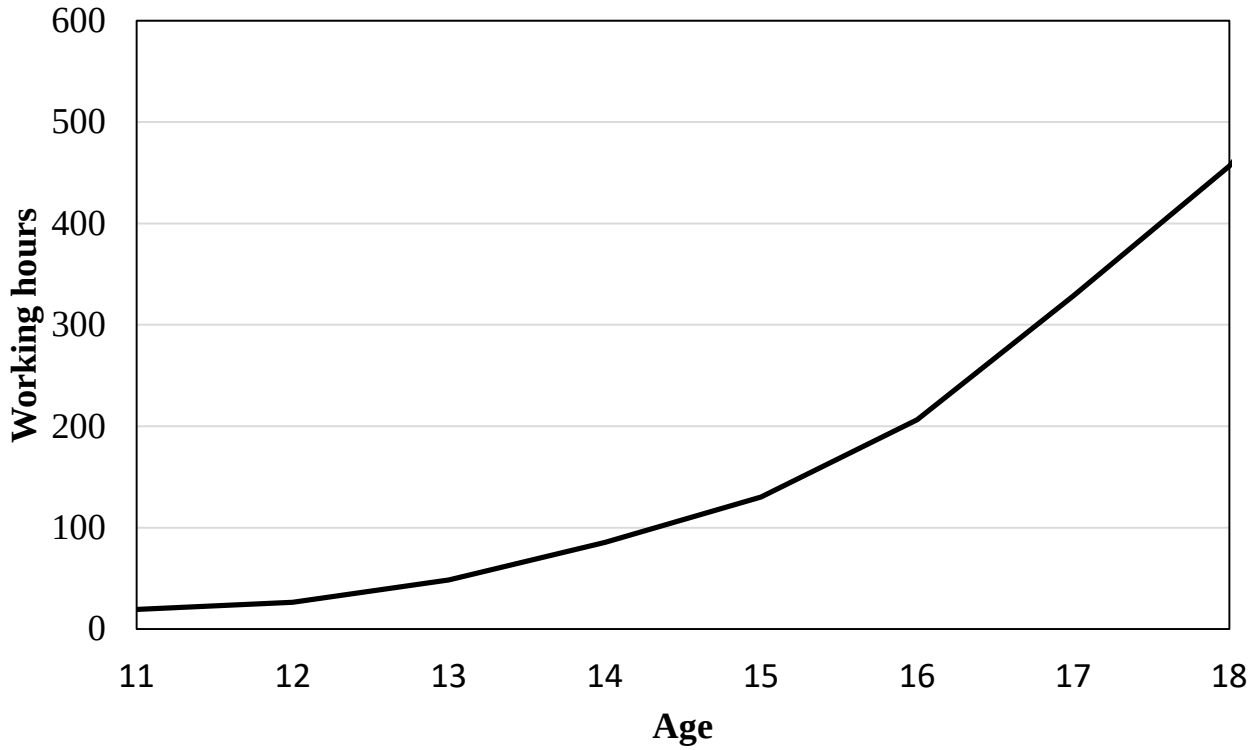


Table A1. Legislation on working hours and rest between shifts in Denmark for lower-secondary school pupils, ages 13-17

	Age 13-14	Age 15-17
Max. working hours per. day:		
School day	2	2
Non-school day	7	8
Max. working hours per. week:		
School week	12	12
Non-school week	35	40
Rest between shifts:		
Min. hours of rest between shifts	14	14
Min. days of rest per 7-days period	2	2
Legal working hours	6 am - 8 pm	6 am - 8 pm

Note: Authers own construction based on law: BEK nr 239 af 06/04/2005.

Table A2. Distribution of spare-time jobs across occupations, years 2010-2014. By age and gender.

Panel A: All

Age 13			Age 14			Age 15			Age 16	
DISCO code	Occupation	Percent	DISCO code	Occupation	Percent	DISCO code	Occupation	Percent	DISCO code	Occupation	Percent
962	Delivery	49.0	962	Delivery	40.7	962	Delivery	25.2	522	Sales assistence	19.1
411	Office	12.8	411	Office	13.9	933	Warehouse	12.3	933	Warehouse	18.2
933	Warehouse	4.7	933	Warehouse	6.7	522	Sales assistence	11.1	523	Sales with consumer contact	13.2
516	Unspecified service	4.2	911	Cleaning	5.4	411	Office	10.4	962	Delivery	12.7
441	Mail delivery	3.9	932	Manual labor	3.6	523	Sales with consumer contact	6.3	411	Office	5.7
911	Cleaning	3.5	441	Mail delivery	3.4	911	Cleaning	5.9	911	Cleaning	5.1

Panel B: Boys

Age 13			Age 14			Age 15			Age 16	
DISCO code	Occupation	Percent	DISCO code	Occupation	Percent	DISCO code	Occupation	Percent	DISCO code	Occupation	Percent
962	Delivery	58.5	962	Delivery	49.0	962	Delivery	30.9	933	Warehouse	19.5
411	Office	5.8	411	Office	7.8	933	Warehouse	13.0	522	Sales assistence	16.9
516	Unspecified service	5.5	933	Warehouse	7.1	522	Sales assistence	9.3	962	Delivery	15.3
933	Warehouse	4.8	911	Cleaning	5.1	411	Office	6.2	523	Sales with consumer contact	12.4
911	Cleaning	3.4	932	Manual labor	3.9	911	Cleaning	5.5	911	Cleaning	4.9
932	Manual labor	3.0	516	Unspecified service	3.8	523	Sales with consumer contact	5.4	411	Office	3.9

Panel C: Girls

Age 13			Age 14			Age 15			Age 16	
DISCO code	Occupation	Percent	DISCO code	Occupation	Percent	DISCO code	Occupation	Percent	DISCO code	Occupation	Percent
962	Delivery	39.4	962	Delivery	32.8	962	Delivery	20.1	522	Sales assistence	21.2
411	Office	19.9	411	Office	19.6	411	Office	14.2	933	Warehouse	17.1
441	Mail delivery	5.6	933	Warehouse	6.3	522	Sales assistence	12.7	523	Sales with consumer contact	14.0
933	Warehouse	4.6	911	Cleaning	5.7	933	Warehouse	11.6	962	Delivery	10.4
515	Cleaning	3.8	441	Mail delivery	4.6	523	Sales with consumer contact	7.0	411	Office	7.6
911	Cleaning	3.7	515	Cleaning	4.5	911	Cleaning	6.3	911	Cleaning	5.3

Note: Danish full population administrative register information. We include individuals during the year 2010-2014. For around half of the jobs the occupation code is missing. Percentage in the table are based on the sample of jobs where occupation codes are available.

Table A3: Variable definitions and primary data sources: Individual characteristics.

Variable	Definition	Primary data source	Label
Outcomes:			
GPA	GPA from the 9th grade	The school grade register	GPA
School absenteeism, 9th grade	Number of days of school absenteeism divided by no. of school days , last 3 month of 9th grade. The teacher register absenteeism for each student at a given day (0/1).	School Absenteeism Register	andelialtfra
Illegal school absenteeism, last 3 month of 9th grade	Number of days of illegal school absenteeism divided by no. of school days , last 3 month of 9th grade. The teacher register absenteeism for each student at a given day (0/1).	School Absenteeism Register	andelulovlig
Legal school absenteeism, last 3 month of 9th grade	Number of days of legal school absenteeism divided by no. of school days, last 3 month of 9th grade. The teacher register absenteeism for each student at a given day (0/1).	School Absenteeism Register	andellovlig
Sickness school absenteeism, 9th grade	Number of days of sickness school absenteeism divided by no. of school days, last 3 month of 9th grade. The teacher register absenteeism for each student at a given day (0/1).	School Absenteeism Register	andellovlig
Suspicion of nontraffic, the year after 9th grade exam	Indicator of registered suspicion in the year after 9th grade exam for non-traffic related crime.	Central Police Register	sig_crime_notrafic_9th
Suspicion of crime1, the year after 9th grade exam	Indicator of registered suspicion in the year after 9th grade exam for offences against property	Central Police Register	sig_crime1_9th
Suspicion of crime2, the year after 9th grade exam	Indicator of registered suspicion in the year after 9th grade exam for violence and sex offender	Central Police Register	sig_crime2_9th
Suspicion of crime3, the year after 9th grade exam	Indicator of registered suspicion in the year after 9th grade exam for offenses against the drug	Central Police Register	sig_crime3_9th
Academic high school, 2 years after graduation	Enrollment in academic high school, during the 2 years after graduation	The school register	gym2
Academic high school, 3 years after graduation	Enrollment in academic high school, during the 3 years after graduation	The school register	gym3
Academic high school, year of graduation	Enrollment in academic high school, year of graduation	The school register	gym
Any upper secondary education, 2 years after graduation	Enrollment in any upper secondary education, during the 2 years after graduation	The school register	any_edu2
Any upper secondary education, 3 years after graduation	Enrollment in any upper secondary education, during the 3 years after graduation	The school register	any_edu3
Any upper secondary education, year of graduation	Enrollment in any upper secondary education, year of graduation	The school register	any_edu
Vocational education, 2 years after graduation	Enrollment in vocational education, during the 2 years after graduation	The school register	vocational2
Vocational education, 3 years after graduation	Enrollment in vocational education, during the 3 years after graduation	The school register	vocational3
Vocational education, year of graduation	Enrollment in vocational education, year of graduation	The school register	vocational
Vocational high school, 2 years after graduation	Enrollment in vocational high school, during the 2 years after graduation	The school register	erh_gym2
Vocational high school, 3 years after graduation	Enrollment in vocational high school, during the 3 years after graduation	The school register	erh_gym3
Vocational high school, year of graduation	Enrollment in vocational high school, year of graduation	The school register	erh_gym
Individual:			
Pnr	Personal indentifier.	All registers	pnr1
Year	Calendar year.	All registers	Year
Age, months	Age in months.	The population register	Age_month
Age_years	Age in years.	The population register	Age_years
Birth order	Uses legal mother and date of birth to find the birth order within the family	The population register	birthorder
Date of Birth	Day, month, and year of birth	The population register	foed_dato
Women	Indicator for female.	The population register	koen
Immigrant status	Indicator of immigrant status. Native Dane, first generation immigrant, second generation imm	The population register	ie_type
Municipality	Municipality of residence.	The population register	kom
School_year	The school year lasts from August to June.	The school grade register	Year_start
Exam	Indicator equal to one if the grade is based on an exam and equal to zero if the grade is based on teacher assesment.	The school grade register	exam
Grade level	Grade level in school	The school grade register	school_year_start
Topic	Course topic.	The school grade register	fag
Spare-time work experience in hours	Accumulated number of working hours from labor market entry.	Employment register, DST.	exp
Spare-time work experience in hours, prior to last 3 month of 9th grade	Accumulated number of working hours from labor market entry, prior to last 3 month of 9th g	Employment register, DST.	exp_9th
Earnings	Monthly net earnings.	Employment register, DST.	ajo_smalt_loenbeloeb
Working hour	Working hours in a given month.	Employment register, DST.	arbejde
Workplace	Workplace identifier.	Employment register, DST.	ajo_arbnr_senr
Industry code	Industries are split into 10 subindustried based on pupil employment using a five digit industry classification based on NACE rev. 2.	Employment register, DST.	industry_code
Occupation code	The Danish version of ISCO.	Employment register, DST.	DISCO
Hourly wage	Hourly wage. Calculated using monthly net earnings and working hours.	Employment register, DST.	tlon_b
Spellid	Job spell identifier. Based on individual and workplace identifiers.	Employment register, DST.	spellid
Summer_working_hours	Working hours in summer employment.	Employment register, DST.	summer_timer
GPA, 6th grade	GPA, national tests in the 6th grade	National Test Register	natGPA6th
GPA, 8th grade	GPA, national tests in the 8th grade	National Test Register	natGPA8th
Danish P1, 6th grade	6th grade test score from the National Test in Danish (reading) - test score in the subfield of Language comprehension. Measured on a Logistic scale from -7 to 7	National Test Register	danish_p1
Danish P1, 8th grade	8th grade test score from the National Test in Danish (reading) - test score in the subfield of Language comprehension. Measured on a Logistic scale from -7 to 7	National Test Register	danish_p1
Danish P2, 6th grade	6th grade test score from the National Test in Danish (reading) - test score in the subfield of Decoding. Measured on a Logistic scale from -7 to 7	National Test Register	danish_p2
Danish P2, 8th grade	8th grade test score from the National Test in Danish (reading) - test score in the subfield of Decoding. Measured on a Logistic scale from -7 to 7	National Test Register	danish_p2
Danish P3, 6th grade	6th grade test score from the National Test in Danish (reading) - test score in the subfield of Reading comprehension. Measured on a Logistic scale from -7 to 7	National Test Register	danish_p3
Danish P3, 8th grade	8th grade test score from the National Test in Danish (reading) - test score in the subfield of Reading comprehension. Measured on a Logistic scale from -7 to 7	National Test Register	danish_p3
Mathematics P1, 6th grade	6th grade test score from the National Test in Geography - test score in the subfield of Natural geography. Measured on a Logistic scale from -7 to 7	National Test Register	geography_p1
Mathematics P2, 6th grade	6th grade test score from the National Test in Geography - test score in the subfield of Cultural geography. Measured on a Logistic scale from -7 to 7	National Test Register	geography_p2
Mathematics P3, 6th grade	6th grade test score from the National Test in Geography - test score in the subfield of Applied geography. Measured on a Logistic scale from -7 to 7	National Test Register	geography_p3
School absenteeism, 8th grade	Number of days of school absenteeism divided by no. of school days, last 3 month of 8th grade. The teacher register absenteeism for each student at a given day (0/1).	School Absenteeism Register	andelialtfra8th
Days of illegal school absenteeism, monthly	Number of days of illegal school absenteeism by monthly. The teacher register absenteeism for each student at a given day (0/1).	School Absenteeism Register	dageulovligfrav_monthly
Days of illegal school absenteeism, last 3 month of 9th grade	Number of days of illegal school absenteeism, last 3 month of 9th grade. The teacher register absenteeism for each student at a given day (0/1).	School Absenteeism Register	dageulovligfrav
Days of legal school absenteeism, last 3 month of 9th grade	Number of days of legal school absenteeism, last 3 month of 9th grade. The teacher register absenteeism for each student at a given day (0/1).	School Absenteeism Register	dagelovligfrav
Days of legal school absenteeism, monthly	Number of days of legal school absenteeism by monthly. The teacher register absenteeism for each student at a given day (0/1).	School Absenteeism Register	dagelovligfrav_monthly
Days of school absenteeism, last 3 month of 9th grade	Number of days of school absenteeism, last 3 month of 9th grade. The teacher register absenteeism for each student at a given day (0/1).	School Absenteeism Register	dageialtfrav
Days of school absenteeism, monthly	Number of days of school absenteeism. The teacher register absenteeism for each student at a given day (0/1).	School Absenteeism Register	dageialtfrav_monthly
Days of sickness school absenteeism, last 3 month of 9th grade	Number of days of sickness school absenteeism, last 3 month of 9th grade. The teacher register absenteeism for each student at a given day (0/1).	School Absenteeism Register	dagesyg

Days of sickness school absenteeism, monthly	Number of days of sickness school absenteeism by monthly. The teacher register absenteeism for each student at a given day (0/1).	School Absenteeism Register	dagesyg_monthly
Illegal school absenteeism, monthly	Number of days of illegal school absenteeism divided by no. of school days by monthly. The teacher register absenteeism for each student at a given day (0/1).	School Absenteeism Register	andelulovlig_monthly
Legal school absenteeism, monthly	Number of days of legal school absenteeism divided by no. of school days by monthly. The teacher register absenteeism for each student at a given day (0/1).	School Absenteeism Register	andellovlig_monthly
Sickness school absenteeism, monthly	Number of days of sickness school absenteeism divided by no. of school days by monthly. The teacher register absenteeism for each student at a given day (0/1).	School Absenteeism Register	andellovlig_monthly
Suspicion of crime1, monthly	Indicator of registered suspicion in a given month for offences against property.	Central Police Register	sig_crime1_monthly
Suspicion of crime2, monthly	Indicator of registered suspicion in a given month for violence and sex offenders.	Central Police Register	sig_crime2 _monthly
Suspicion of crime3, monthly	Indicator of registered suspicion in a given month for offenses against the drug act.	Central Police Register	sig_crime3_monthly
Suspicion of nontraffic, monthly	Indicator of registered suspicion in a given month for non-traffic related crime.	Central Police Register	sig_crime_notrafic_monthly
Suspicion of nontraffic,during the 8th grade	Indicator of registered suspicion during the 8th grade for non-traffic related crime.	Central Police Register	sig_crime_notrafic_8th
Conviction of crime1	Indicator of registered conviction in a given month for offences against property.	Central Police Register	crime1
Conviction of crime2	Indicator of registered conviction in a given month for violence and sex offenders.	Central Police Register	crime2
Conviction of crime3	Indicator of registered conviction in a given month for offenses against the drug act.	Central Police Register	crime3
Conviction of nontraffic crime	Indicator of registered conviction in a given month for non-traffic related crime.	Central Police Register	crime_notrafic
Parents:			
Pnr father	Personal indentifier of the legal father.	The population register	pnrf
Pnr mother	Personal indentifier of the legal mother.	The population register	pnrm
Age, father	Age of the father when the child turn 12.	The population register	alder_f
Age, mother	Age of the mother when the child turn 12.	The population register	alder_m
Married father	Marital status of the father when the child turn 12.	The population register	mar_f
Married mother	Marital status of the mother when the child turn 12.	The population register	mar_m
Education father	Highest level of education of the father. The education is split into 4 subgroups: 1) Unknown 2) Basic/lower secondary 3) Upper secondary 4) Tertiary.	The school register	edu_group_f
Education mother	Highest level of education of the father. The education is split into 4 subgroups: 1) Unknown 2) Basic/lower secondary 3) Upper secondary 4) Tertiary.	The school register	edu_group_m
Employed father	Indicator of employemnt of the father when the child turn 12.	The tax register	employed_f
Employed mother	Indicator of employemnt of the mother when the child turn 12.	The tax register	employed_m
Unemployment rate, father	Percent of year unemployed when the child turn 12., father	The tax register	arledgr_f
Unemployment rate, mother	Percent of year unemployed when the child turn 12., mother	The tax register	arledgr_m
Experience father	Labor market experience of father when the child turn 12.	The tax register	exp_f
Experience mother	Labor market experience of mother when the child turn 12.	The tax register	exp_m
Real annual earnings father	Real annual labor market earnings of the father when the child turn 12.	The tax register	loenmv_f
Real annual earnings mother	Real annual labor market earnings of the father when the child turn 12.	The tax register	loenmv_m

Figure A1. Fraction of individuals who at some point during the year worked for at least one hour by age and gender, years 2010-2014.

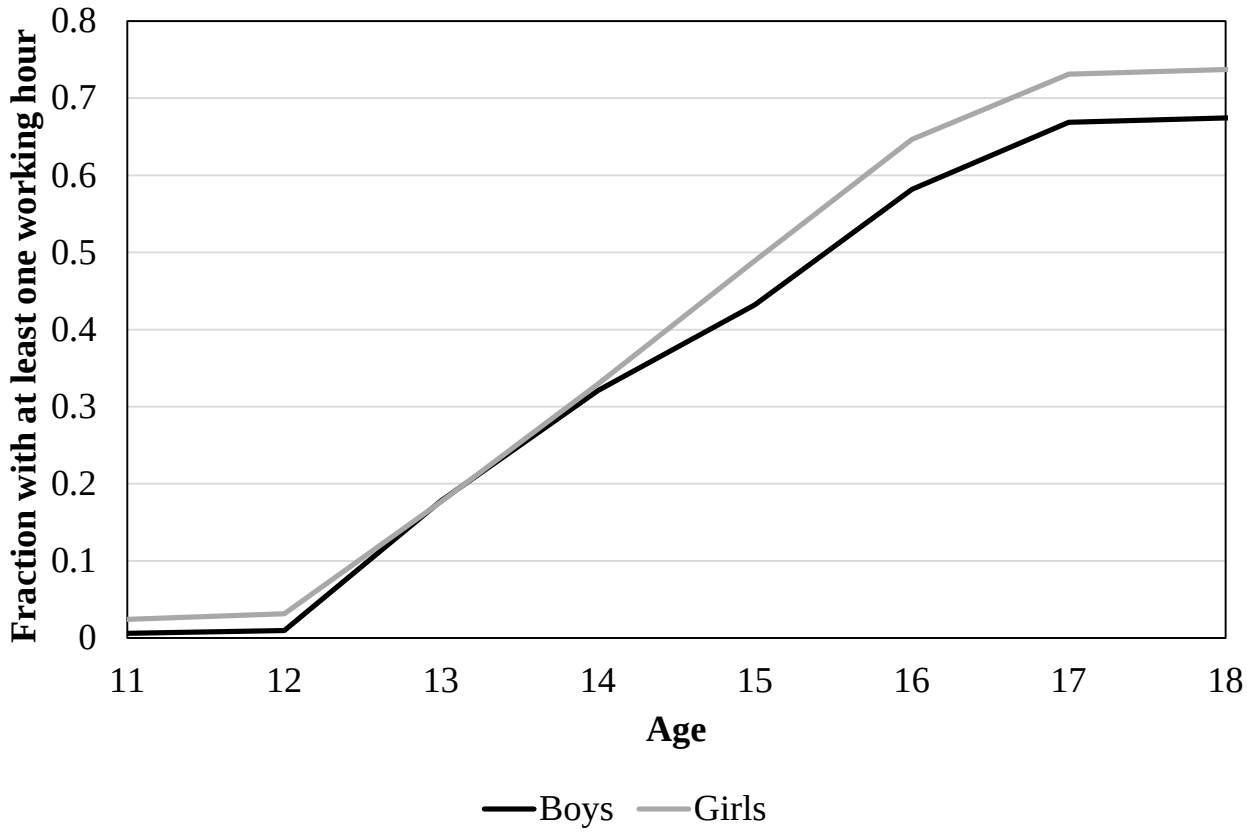


Figure A2. Average working hours for employed individuals by age and gender, years 2010-2014.

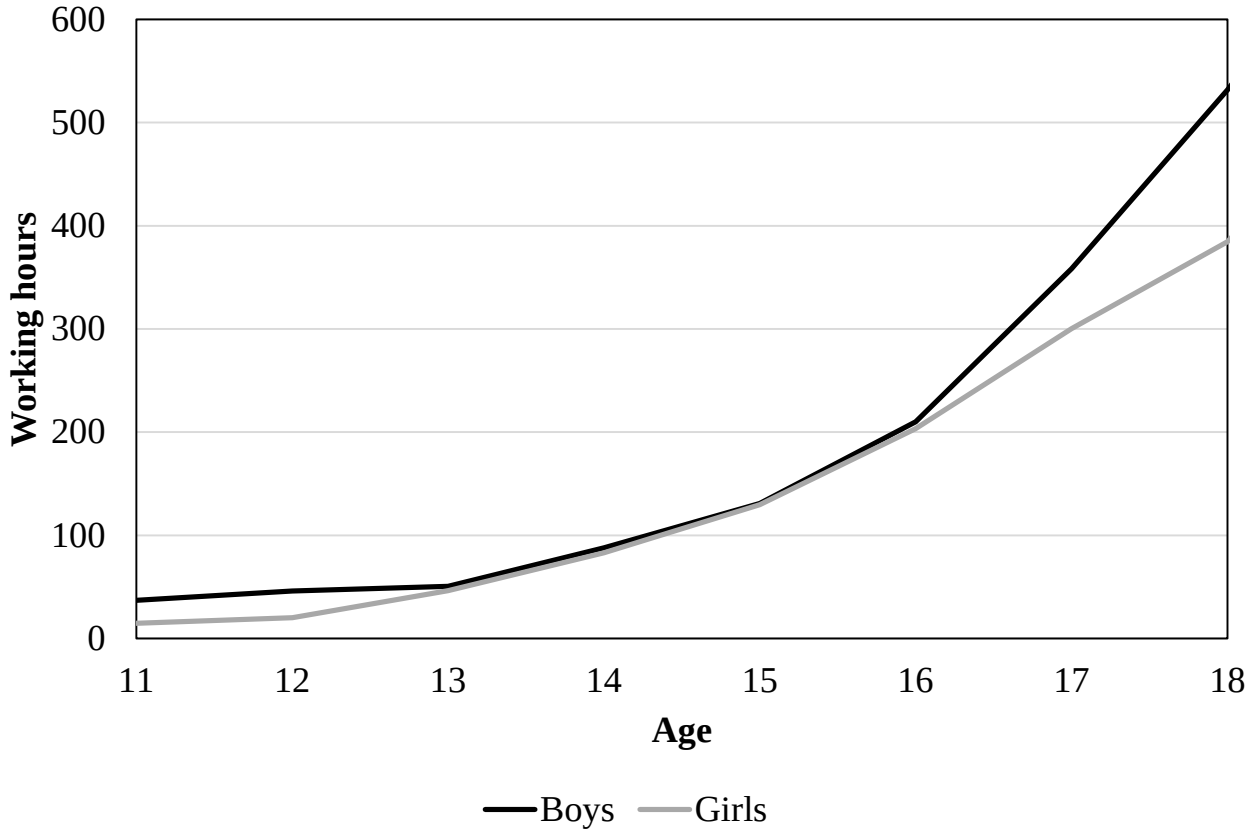


Figure A3. Coefficient estimates from OLS regression of 9th grade GPA on yearly hours of spare-time work.

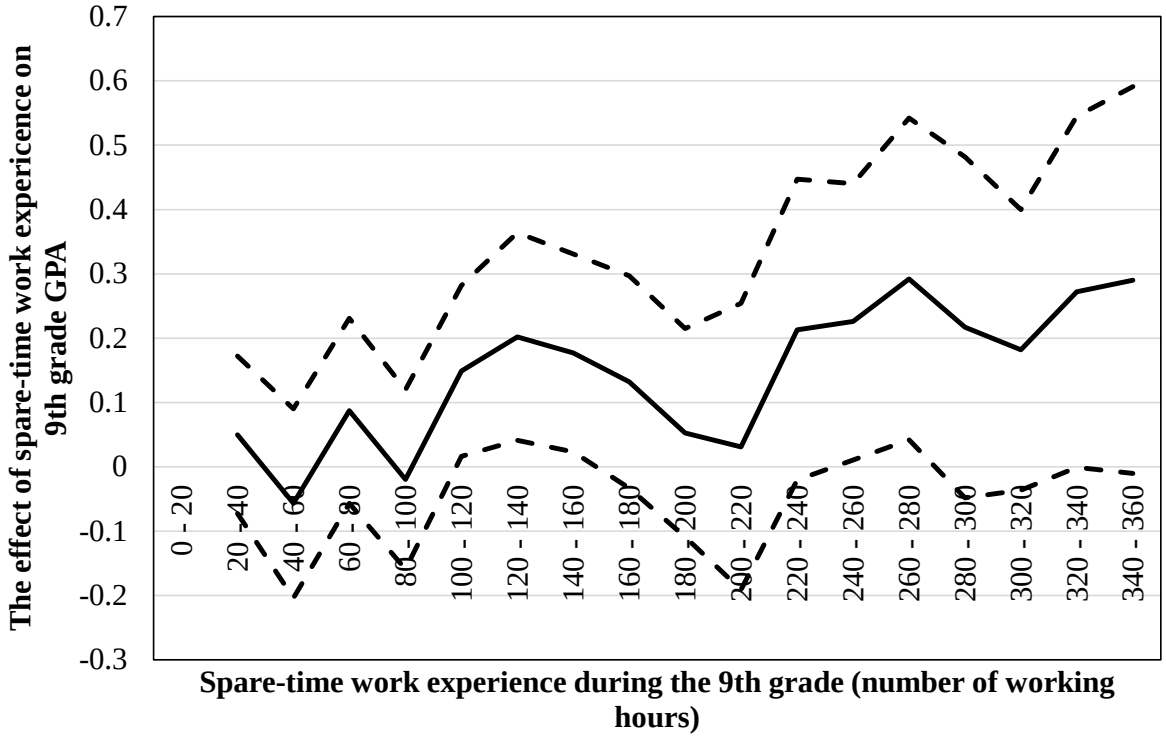


Figure A4. Coefficient estimates from OLS regression of school absenteeism on yearly hours of spare-time work.

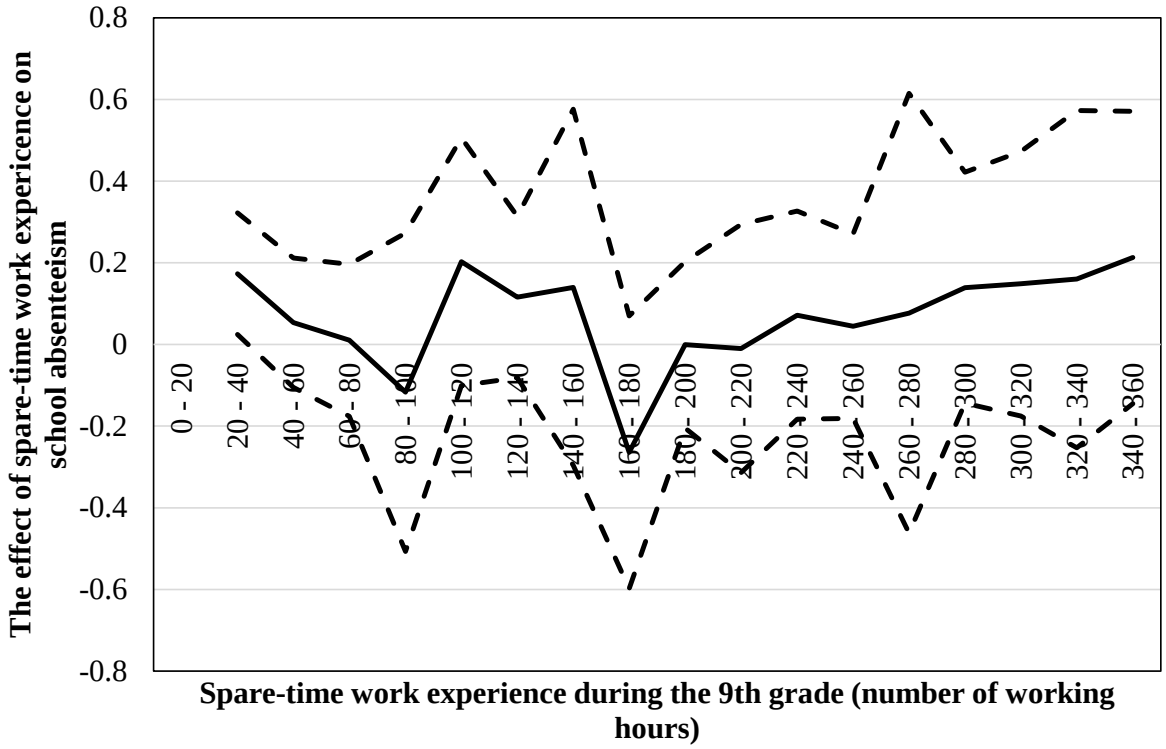
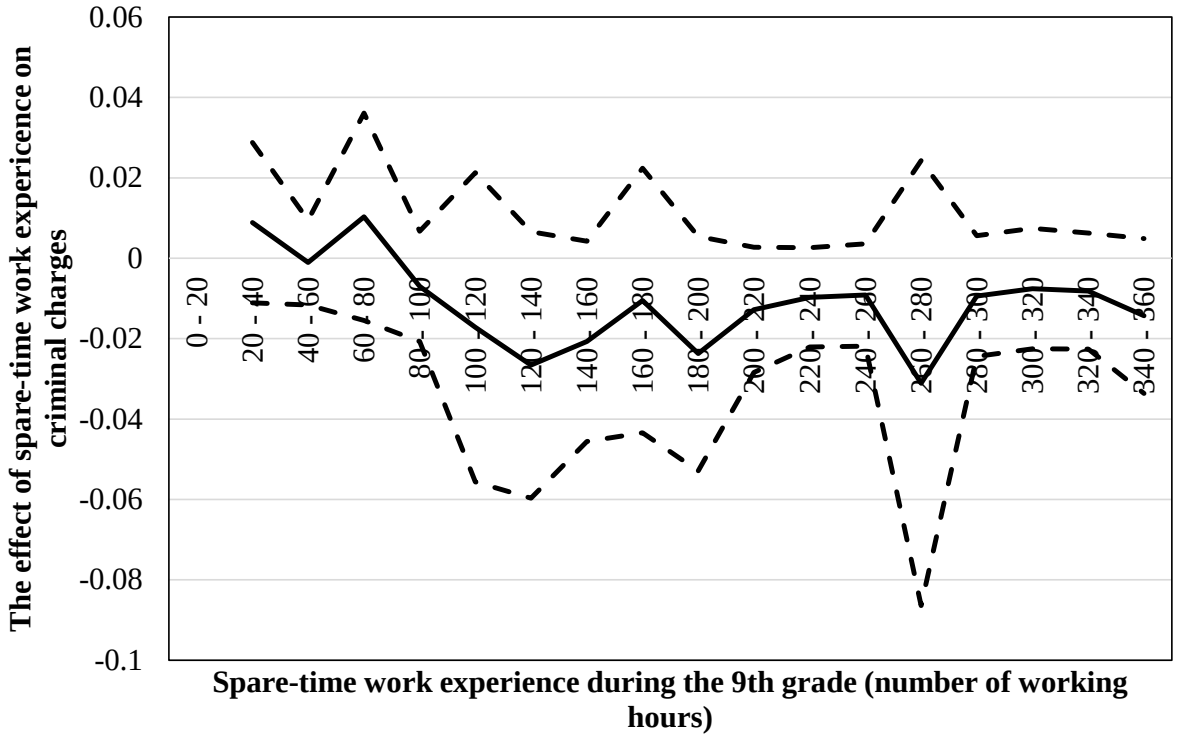


Figure A5. Coefficient estimates from OLS regression of criminal charges on yearly hours of spare-time work.



Economics Working Papers

2017-10: Anna Piil Damm, Britt Østergaard Larsen, Helena Skyt Nielsen and Marianne Simonsen: Lowering the minimum age of criminal responsibility: Consequences for juvenile crime and education

2017-11: Erik Strøjer Madsen: Branding and Performance in the Global Beer Market

2017-12: Yao Amber Li, Valerie Smeets and Frederic Warzynski: Processing Trade, Productivity and Prices: Evidence from a Chinese Production Survey

2017-13: Jesper Bagger, Espen R. Moen and Rune M. Vejlin: Optimal Taxation with On-the-Job Search

2018-01: Eva Rye Johansen, Helena Skyt Nielsen and Mette Verner: Long-term Consequences of Early Parenthood

2018-02: Ritwik Banerjee, Nabanita Datta Gupta and Marie Claire Villeval: Self Confidence Spillovers and Motivated Beliefs

2018-03: Emmanuele Bobbio and Henning Bunzel: The Danish Matched Employer-Employee Data

2018-04: Martin Paldam: The strategies of economic research - An empirical study

2018-05: Ingo Geishecker, Philipp J.H. Schröder, and Allan Sørensen: One-off Export Events

2018-06: Jesper Bagger, Mads Hejlesen, Kazuhiko Sumiya and Rune Vejlin: Income Taxation and the Equilibrium Allocation of Labor

2018-07: Tom Engsted: Frekvensbaserede versus bayesianske metoder i empirisk økonomi

2018-08: John Kennes, Daniel le Maire and Sebastian Roelsgaard: Equivalence of Canonical Matching Models

2018-09: Rune V. Lesner, Anna Piil Damm, Preben Bertelsen and Mads Uffe Pedersen: Life Skills Development of Teenagers through Spare-Time Jobs