Adult employment probabilities of socially maladjusted children

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Abstract: This study investigates the relationship between childhood social maladjustment and adult employment probabilities. Using data from the British National Child Development Study and random effects probit models, we find that being socially maladjusted at age 11 has a negative effect on adult employment probabilities. The impact is stronger for males with relatively severe levels of social maladjustment.
Accounting for state dependence in employment nearly doubles the negative effect of social maladjustment. Moreover, socially maladjusted individuals exhibit stronger state dependence than do socially adjusted individuals, suggesting that the former experience greater difficulties in finding a job when not employed. This is possibly due to the persistence of antisocial behavior and/or subsequent disadvantageous characteristics associated with childhood social maladjustment. We also find that social maladjustment at age 11 is less detrimental for adult employment probabilities if cohort-members exhibit reduced antisocial behavioral aspects during adolescence. The estimation results are robust to exogeneity tests and the introduction of additional covariates controlling for the role of school/living environment. Our findings possibly suggest that policies aimed at improving social skills during adolescence and favoring insertion in the labor market may be effective both to improve employment prospects and to favor the social inclusion of affected individuals.

Highlights

1. Social maladjustment during childhood decreases adult employment probabilities.
2. The employment effects of social maladjustment diverge between males and females.
3. Socially maladjusted individuals experience stronger employment state dependence.
4. Social maladjustment is less detrimental for later employment if individuals improve their interaction abilities during adolescence.
5. Employment policies may be effective in increasing the employability of socially maladjusted individuals.

Introduction

The formation, development and subsequent effects of cognitive and non-cognitive skills on socio-economic outcomes have become an important issue in economic research. An improved understanding of these skills is important to understand the origins of inequality and excellence among individuals and to adopt effective child-investment strategies (Cunha and Heckman, 2009). Nevertheless, whereas the role of cognitive abilities in affecting subsequent outcomes is well established, the role of non-cognitive skills has only recently attracted economists' interest (ter Weel, 2008).

Non-cognitive skills refer to a variety of personal attitudes and behaviors, including personality traits, locus of control, self-esteem, motivation, interpersonal styles, and behavioral disorders. Related literature has demonstrated the relevance of these factors in explaining several socio-economic outcomes, including education, employment and earnings (e.g., Bowles, et al. 2001, Kuhn and Weinberg 2005, Heckman et al. 2006, Waddel 2006, Borghans, ter Weel and Weinberg. 2008, Almlund et al. 2011, Drago 2011 and Mohanty 2012). Recently, some contributions have focused on the role of personality traits, as defined by the taxonomy known as the Big Five, on subsequent labor market outcomes (e.g., Uysal and Pohlmeier 2011, Cobb-Clark and Tan 2011, Viinikainen and Kokko 2012, Fletcher 2013). Other papers studied the impact of behavioral problems on later outcomes. These studies consider composite categories of inappropriate behavior and feelings that hinder the individual's attempts to interact with the external environment[1], including social maladjustment. Socially maladjusted children exhibit antisocial behaviors and present a persistent pattern of violating social norms, difficulties in interacting with other people and an inability to cope with social situations. Because of its nature, social maladjustment (and,

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[1] Behavioral disorder and personality are possibly correlated, as the latter could be a driver of misbehavior. For example, neuroticism would be positively correlated with aggressive behaviors, while conscientiousness tends to reduce them (e.g., Torrente and Vazsonyi, 2012).

generally speaking, behavioral disorder) may affect employment prospects through several mechanisms. First, the persistence of misbehavior during adulthood may have a direct detrimental effect on employment probabilities, as employers may be reluctant to hire socially maladjusted individuals, due to both their own and co-workers preferences. In addition, social maladjustment could be associated, both directly and indirectly, with lower search intensity because of underlying personality traits (e.g., Uysal and Pohlmeier, 2011). Second, individuals that experience difficulty conforming to social norms are less likely to develop stable friendships and social networks, which are both relevant for improving employment prospects (e.g., Calvò-Armengol and Jackson 2004). In addition, both mechanisms could be reinforced if a behavioral disorder were accompanied by criminal and violent behaviors (see Healey, Knapp and Farrington, 2004, Carneiro et al. 2011, Webbink et al. 2012). Third, socially maladjusted children may accumulate less human capital (e.g., Le et al. 2005, Robst and Weinberg 2010, Carneiro et al. 2011, Webbink et al. 2012) and poor cognitive skills (e.g., Silles 2010), both of which are relevant for increasing adult employment probabilities. Finally, social maladjustment worsens health and is associated with subsequent psychological problems (Done et al. 1994), both of which are typically associated with lower employment probabilities.

The present study analyzes the impact of childhood social maladjustment on adult employment probabilities, using information from the National Child Development Study (NCDS). Social maladjustment is measured through the Bristol Social Adjustment Guide (BSAG) [2], a standardized psychometric test that helps to diagnose the extent of social maladjustment among schoolchildren.

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[2] Following Shepherd (2013), the BSAG contains descriptions of behavior, and the teacher is asked to underline which of these descriptions best fit the child. Items of behavior deviating from the norm or behavior that may be symptomatic of emotional disturbance or social maladjustment are subsequently identified via a system of coding. Summing the number of coded items allows the researcher to obtain a quantitative assessment of the child's adjustment to school: the higher the score, the more indications there are of problem behavior.

Empirical evidence suggests that poor non-cognitive skills are typically associated with lower employment probabilities. Specifically, Healey, Knapp and Farrington (2004) focused on the role of antisocial behavior, Le et al. (2005) on childhood conduct disorder, and Mohanty (2012) on positive attitude and optimism. Uysal and Pohlmeier (2011) and Viinikainen and Kokko (2012) reported comparable findings when separately focusing on the role of personality traits in determining unemployment duration, cumulative unemployment duration and the number of unemployment spells. Specifically, conscientiousness and extroversion had a positive effect on employment performance, neuroticism had a negative effect, and the impact of openness was mixed[3]. Fronstin et al. (2005) and Carneiro, Crawford and Goodman (2011), using NCDS information, found evidence of a negative impact of social maladjustment on adult employment probabilities when cohort members were 33 and 42, respectively.

When estimating the impact of childhood social maladjustment on adult employment probabilities, we stress the relevance of past employment status[4], exploiting the longitudinal nature of the NCDS. Uysal and Pohlmeier (2011) and Viinikainen and Kokko (2012) indirectly addressed this issue, and their findings indicated that the persistence in unemployment may diverge because of different personality traits. Similarly, different levels of social maladjustment could be associated with different employment propensities, for example, because socially maladjusted children may experience persistent problems in interacting with others (affecting both the probability of remaining employed and/or reemployment probabilities) or because of more adverse labor market histories. Empirically, we address this issue by estimating an employment equation that accounts for state dependence. In addition, we allow for endogenous initial conditions (Heckman, 1981) to disentangle the contribution of an individual's past employment status (true state dependence)

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[3] Fletcher (2013) suggested that those effects are less significant when controlling for family fixed effects.
[4] This extends studies by Fronstin et al. (2005) and Carneiro, Crawford and Goodman (2011).

and unobserved (and observed) characteristics to his/her current employment status. This would be helpful to avoid spurious estimates of state dependence. In addition, the relevance of accounting for (true) state dependence is twofold. First, it may contribute to improving estimates of social maladjustment parameters, which would be important when promoting policies intended to aid socially maladjusted individuals. Second, it makes it possible to directly account for the mediating role of past employment history on adult employment probabilities and returns a measure of employment persistence.

To better assess the differences in state dependence parameters between socially adjusted and severely maladjusted individuals, we estimate auxiliary employment equations by separating individuals according to their levels of social maladjustment. This would allow us to know the relevance of employment state dependence for both groups, information that is potentially important when promoting targeted employment policies for socially maladjusted individuals.

The literature has emphasized gender differences when analyzing non-cognitive skills and their impact on subsequent outcomes (e.g., Le et al. 2005, Cobb-Clark and Tan 2011, Uysal Pohlmeier 2011, Mohanty 2012. Fletcher 2013), as both the distribution of non-cognitive skills and patterns in the labor market may differ by gender (e.g., Knights et al. 2002). We explore these circumstances by separately analyzing men and women.

The recent debate has also stressed the issue of the malleability of non-cognitive skills over the lifecycle (e.g., Borghans et al. 2008, Cunha and Heckman 2009, Uysal and Pohlmeyer 2011). Investigating personality traits, McCrae and Costa (1994) argued that these traits tend to be malleable during adolescence and become stable after age twenty, whereas Borghans et al. (2008) suggested that malleability persists into adulthood.

The importance of accounting for the issue of malleability is twofold in our study. First, in the event that the stability assumption does not hold, reverse causality problems may arise because socio-economic outcomes may produce a reverse effect on non-cognitive skills (e.g.,

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Borghans et al. 2008). This would be particularly important when measures of non-cognitive skills are self-reported, as personal feelings concerning one's own non-cognitive skills would be influenced by current socio-economic outcomes (e.g., Uysal and Pohlmeier 2011, Mohanty 2012). In this context, a potential advantage of measuring social maladjustment using the BSAG is that it avoids self-reporting because it is based on reports by teachers, counselors and school psychologists[5]. Nevertheless, because we cannot discard the possibility that confounding factors drive both social maladjustment and adult employment probabilities, we refine our identification strategy and assess the potential for endogeneity between those variables. Second, we directly account for the issue of malleability by introducing additional controls that measure behavioral change during adolescence. If individuals improve their social skills during adolescence, the impact of childhood social maladjustment on adult employment probabilities should be smaller, as the negative effects on adult employment deriving from social maladjustment would be mitigated over the lifecycle. In addition, if this were empirically confirmed, it would indicate that the negative impact of social maladjustment also operates through one's ability to interact with others. In this case, policies aimed at improving social skills during childhood/adolescence would be effective in attenuating the negative impact of childhood social maladjustment on subsequent employment outcomes.

The remainder of the paper is organized as follows. Section 2 describes the data and provides a descriptive analysis. Section 3 focuses on econometric methods, and Section 4 provides the estimation results and robustness checks. Finally, Section 5 concludes.

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[5] Because the results could be driven by environmental factors that affect the evaluators' measures of social maladjustment, we also estimate auxiliary specifications that include controls accounting for these circumstances.

2. Data and descriptive analysis

2.1 The National Child Development Study

The National Child Development Study (NCDS) collects information on individuals born from March 3-9, 1958, in England, Wales and Scotland, selecting data from the Perinatal Mortality Survey. Information on cohort members was gathered at different points in time and from a variety of sources: self-reports, parents, medical examinations and ability and behavioral tests at school. In addition to information from 1958, NCDS sweeps were performed in 1965, 1969, 1974, 1981, 1991, 1999-2000, 2004-2005 and 2008-2009. The NCDS also collects information on specific issues concerning cohort members, including their employment histories during the period 1974-2000. The study gathers information on cohort members' health, education, behavior, parental background, economic conditions and social and labor-market outcomes. Finally, the NCDS provides test score information concerning cognitive and non-cognitive skills during childhood and adolescence.

The NCDS is particularly well suited to our goals. It allows us to measure children's social maladjustment through the BSAG total score and provides information on employment status during adulthood; it also provides substantial information to control for heterogeneity among cohort members. Specifically, we use the subjects' BSAG scores at age 11 (sweep 2)[6] to study the impact of social maladjustment on adult employment dynamics. Adult employment status refers to sweeps 6, 7 and 8, when the cohort member was 41-42, 46-47 and 50-51 years old, respectively. We control for state dependence by including lagged employment in the estimated equation. Because the time span between the 5th and 6th sweeps is 8-9 years, we use information from members' employment histories during the period 1974-2000 to reconstruct employment status in 1995 and use this information as lagged employment for the 1999-2000

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[6] The NCDS also provides the BSAG score when the cohort members are 7 years old. However, because non-cognitive skills are likely to be less stable at that age because of their malleability during early childhood, we rely on maladaptive behavior measured at age 11.

employment status. That period also represents time period 1 in our dynamic analysis. The employment history information from the period 1974-2000 also allowed us to reconstruct previous working experiences: cumulated working experience (in months) during youth (1974-1981) and cumulated working experience (in months) during young adulthood (1982-1994). We use this information to control for past work histories. We also control for other sources of cohort-member heterogeneity. Explanatory variables, including those possibly affecting the development of social maladjustment[7], have been drawn from NCDS sweeps 0 and 1. Specifically, among childhood control variables, we include the following information: a dummy variable controlling for low birth weight (below 2500 grams), father's social class at age 7 and results from math and reading (standardized) tests at age 7 to control for the cohort members' cognitive abilities. Adult control variables are drawn from the 6th, 7th and 8th NCDS sweeps. They include the cohort member's marital status, the presence of children aged 0-16, disability status, health status, educational level, partner's employment status, the local unemployment rate (measured at the regional level) and year dummies. Finally, because males and females typically exhibit different patterns and performances in the labor market, we analyze them separately. Descriptive statistics are reported in Table 1. We provide information on the full male and female sub-samples and on sub-samples constructed according to the level of the BSAG score.

The original NCDS dataset contains approximately 17,000 individuals; however, the number of cohort members interviewed in adulthood declines over time to approximately 11,400 in the 6th sweep and to 9,790 in the 8th sweep. Moreover, because we require a balanced panel and because of missing data and attrition, our econometric analysis is based on approximately 5,100 cohort members, 2,400 of whom are males, for each wave. Dearden, Machin and Read

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[7] An increasing number of studies have focused on the determinants of poor non-cognitive skills. See, for example, Dooley and Stewart (2007), Paxson and Schady (2007) and Carneiro, Meghir and Parey (2013).

(1997) demonstrated that attrition in NCDS primarily occurs among individuals with lower ability and lower educational qualifications. Hawkes and Plewis (2006) found that attrition and non-response can only be associated with few significant predictors, supporting the view that the data remain reasonably representative of this population. However, below, we discuss the implications of attrition and non-response for our estimation results.

[Table 1 about here]

2.2 The Bristol Social Adjustment Guide

The Bristol Social Adjustment Guide (BSAG, Scott 1974) is a standardized psychometric test of social maladjustment that helps to diagnose the extent and nature of social maladjustment among children at school. It consists of 110 verbal items, covering a wide variety of disturbed-child behaviors, to be scored by teachers, counselors and school psychologists. The resulting score allows us to evaluate the level of the global or more specific aspects of social maladjustment. In the 1st and 2nd sweeps of the NCDS, teachers were asked to complete the BSAG. It consists of 12 (internalizing and externalizing) behavioral domains, including: hostility toward children and adults, anxiety, withdrawal, writing off adults, unforthcomingness, depression, restlessness, acceptance by adults, inconsequential behavior and miscellaneous psychological and nervous symptoms (Stott, 1987). By summing scores from specific behavioral domains, it is possible to determine the BSAG total score, allowing us to measure the global level of social maladjustment of cohort members.

Our analysis uses the BSAG total score from the 2nd NCDS sweep. According to the BSAG measure, the level of social maladjustment differs by gender: it is higher for males than for females. Table 2 and Figure 1 provide information on the distribution of the BSAG scores. Standardization is a typical approach in the literature focusing on non-cognitive skills (e.g., Uysal and Pohlmeier 2011 and Carneiro et al. 2011), as it allows the researcher to compare

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variables measured using different metrics and their related impact on outcome variables. However, when interpreting standardized variables, one has to be more cautious, as we explain in greater detail in the Results section.

[Table 2 about here]

[Figure 1 about here]

From an empirical perspective, the advantage of using the BSAG score to identify social maladjustment is twofold. First, because the score is based on responses provided by teachers, counselors and school psychologists, it should be exogenous to each cohort member, thereby reducing the risk of bias from subjective evaluation. Second, by focusing on observable behaviors and avoiding descriptions of personality traits, the score should minimize the bias in the subjective reports of teachers, counselors and school psychologists. In both cases, this approach should reduce the risk of endogeneity caused by omitted variables and measurement error. Nevertheless, the possibility that unobservable factors drive both children's behaviors registered by the BSAG score and adult employment probabilities cannot be discarded. This would result in endogeneity bias because of omitted variables, and as a result, we perform exogeneity tests intended to demonstrate the robustness of the exogeneity assumption (see section 4.1).

2.3 Adult employment probability and the BSAG score

The adult employment probability varies according to the BSAG score. This is represented in Figure 2, which plots the smoothed values obtained from a kernel-weighted local polynomial regression. The advantage of using a kernel regression lies in its nonparametric nature, allowing us to understand the relationship between adult employment and social maladjustment at age 11 without imposing parametric assumptions. Regarding Figure 2, the adult employment probability is higher for males than for females. Nevertheless, as the BSAG

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score increases, the employment probability for males declines more rapidly than it does for females. For standardized BSAG values greater than 3.3 (approximately 30 points on the BSAG scale), the employment probability of females exceeds that of males. In addition, for scores of up to 1 on the standardized scale (approximately 15 points on the BSAG scale), the negative effect of increased social maladjustment on adult employment is relatively small. This is especially true for males. Moreover, for standardized BSAG scores greater than 4 for males and 6 for females (approximately 38 and 50 points on the BSAG scale, respectively), the pattern is not monotonic. Nevertheless, because of the limited number of observations in the right tail of the BSAG distribution, this finding exhibits low statistical significance.

In summary, the preliminary evidence suggests that a relevant decline in adult employment probabilities is observed for individuals who score at least 10 (for females) – 15 (for males) points on the BSAG. This corresponds to approximately 18%-20% of sample individuals. Dramatic declines in adult employment probabilities (-20% or -30% relative to socially adjusted individuals) may occur for high values on the BSAG scale and involve a minority of sampled individuals (approximately 3%).

Finally, regarding Figure 2 and based on predictions of locally weighted regressions (which, for the sake of brevity, we do not present), we observe that the relationship between adult employment probability and social maladjustment follows an inverted U-shape for males and a slight U-shape for females. This suggests that the standardized BSAG score should be included in a non-linear manner in the adopted econometric models.

[Figure 2 about here]

In Figure 3, we again propose a kernel-weighted local polynomial regression, accounting for state dependence. Specifically, we divide the male and female samples, conditioning current employment status on previous employment status. It emerges that individuals not employed in the previous period are less likely to be currently employed. The raw differential between

previously employed and not employed is approximately 45% for males and 50% for females. In addition, when focusing on previous employment, the negative effect of social maladjustment on current employment probabilities is quite small, especially for females; however, for highly socially maladjusted males, the current employment probability declines to approximately 80%.

Conversely, when analyzing previously unemployed individuals, the negative impact of social maladjustment on current employment probabilities appears to be stronger. Current employment probabilities for both males and females decline sharply as the standardized BSAG score increases relative to the finding for previously employed individuals. In addition, males' current employment probabilities decline below those of females long before that which is observed for previously employed individuals.

In summary, this preliminary analysis suggests that social maladjustment is more detrimental for males than for females. In addition, accounting for previous employment status appears to be essential. Among previously employed individuals, the effect of social maladjustment is relatively small, especially for females. Moreover, given a specific level of BSAG score, current employment probability is much lower if an individual was previously not employed. Importantly, the graphical analysis indicates that an increase in the standardized BSAG score reduces the current employment probability to a greater extent among previously unemployed than among previously employed individuals. These results may support the approach of accounting for state dependence and gender issues when analyzing the effect of social maladjustment on adult employment probabilities.

[Figure 3 about here]

3. The econometric models

The impact of childhood social maladjustment on adult employment probabilities was investigated by applying alternative versions of the random effects probit model[8].

The first version consists of a static random effects probit model in which the standardized BSAG score, introduced in a non-linear manner, measures the effect of social maladjustment at age 11 on adult employment probabilities. In addition, a set of control variables has been introduced to capture the variability of employment across individuals due to observable heterogeneity.

Studies focusing on employment from an individual perspective have emphasized the relevance of state dependence in determining current employment probability, i.e., the extent to which current employment status is affected by previous employment status. Because of the longitudinal nature of the NCDS, we are able to account for state dependence. This aspect appears particularly relevant in our case because social maladjustment may affect employment in multiple ways, including through indirect effects on individual working histories and employment dynamics. In addition, failing to control for state dependence may result in estimation bias for the standardized BSAG score parameters. From a technical perspective, accounting for state dependence in employment requires introducing a lagged employment indicator on the right-hand side of the employment equation.

In addition, both of the models presented herein control for unobserved heterogeneity by introducing an individual-specific random effect that is assumed to be normally distributed and independent of other covariates. The independence assumption has been relaxed by adopting the Mundlak's approach (Mundlak, 1978), in which the unobserved heterogeneity

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[8] Fixed effects models do not permit estimation of the social maladjustment parameters because the standardized BSAG score is a time-invariant explanatory variable.

term is decomposed in two parts: one part correlated with (time-variant) explanatory variables and one part uncorrelated.

Finally, the estimation of state dependence parameters could be biased (spurious state dependence) in the event of endogeneity between initial conditions and unobserved heterogeneity, i.e., the first employment status observed in the data is affected by underlying unobservable factors conditioning the distribution of employment at time 1 (see Heckman, 1981). We address the initial conditions problem following Wooldridge (2005), who proposed an alternative Conditional Maximum Likelihood (CML) estimator[9] that considers the distribution conditional on the value in the initial period. An advantage of Wooldridge's approach is that it includes Mundlak's specification, and thus, we estimate a correlated random effects probit model with endogenous initial conditions.

Wooldridge's model reads as follows:

$$e_{it}^{*} = \varphi e_{it-1} + \beta_1 sBSAG_i + \beta_2 sBSAG_i^2 + z_i'\delta + x_{it}'\gamma + \alpha_i + u_{it} \tag{1}$$

with $i = 1,\ldots,N$ indicating the cohort member and $t = 2\ldots T$ the time period. As noted above, social maladjustment is controlled for by introducing the standardized BSAG score measure at age 11. Because the relationship between employment probabilities and the standardized BSAG score is non-linear (Figure 2), the square of the standardized BSAG score has also been included among the explanatory variables. x_{it} is a vector of time-variant variables, whereas z_i is a vector of time-invariant control variables. β_1, β_2, δ and γ are a set of parameters to be estimated.

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[9] The alternative Heckman estimator (1981) would be preferable for a short panel. However, because employment status at time 1 is reconstructed based on information on previous work history, we are unable to estimate the first-stage reduced-form equation required by Heckman's approach, and therefore we rely on Wooldridge's estimator, which only requires information on time 1 employment status.

e_{it}^* is the latent dependent variable, e_{it} is the observed binary outcome variable, e_{it-1} is the

lagged employment status and φ is the true state dependence parameter to be estimated. e_{it}

may be defined as follows:

$$(1) \quad e_{it} = \begin{cases} 1 & \text{if } e_{it}^* \geq 0 \\ 0 & \text{else} \end{cases} \tag{2}$$

Specifically, e takes value one if the cohort member is employed at time t and value 0 if the

cohort member is not employed (unemployed or out of the labor force).

Finally, α_i is individual-specific unobserved heterogeneity, and u_{it} is the idiosyncratic error

term. We assume both that α_i and u_{it} are normally distributed and that there is no serial

correlation in u_{it}. The individual-specific unobserved effect in Wooldridge's approach should

be written as follows:

$$\alpha_i = \theta_0 + \theta_1 y_{i1} + x_i'\eta + \varepsilon_i \tag{3}$$

where ε is another unobservable individual-specific heterogeneity term that is uncorrelated

with the initial employment status y_{i1} or the time-variant explanatory variables. Conversely,

correlation between α_i and the time-variant explanatory variables and initial employment

status is captured by parameters θ_1 and η, where the latter is the vector of parameters of time-

averaged time-variant explanatory variables calculated for periods 2 to T^{10}, as proposed by

Mundlak (1978).

In summary, according to Wooldridge's specification, the probability of employment for

cohort member i at time t is specified as follows:

$$\Pr[e_{it} = 1 | .] = \Phi\left(\varphi e_{it-1} + \beta_1 sBSAG_i + \beta_2 sBSAG_i^2 + z_i'\delta + x_{it}'\gamma + \theta_1 y_{i1} + x_i'\eta + \varepsilon_i\right) \tag{4}$$

where Φ is the cumulative distribution function of a standard normal.

The contribution to the likelihood function for cohort member i is given by the following:

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[10] The time span between subsequent periods is 4 or 5 years.

$$L_i = \int \left\{ \prod_{t=2}^{T} \Phi\left[\left(\varphi e_{it-1} + \beta_1 sBSAG_i + \beta_2 sBSAG_i^2 + z_i^{'}\delta + x_{it}^{'}\gamma + \theta_1 y_{i1} + x_i^{'}\eta + \varepsilon_i \right)(2y_{it} - 1)\right]\right\} g(\varepsilon_i) d\varepsilon_i$$

(5)

where $g(\varepsilon)$ is the normal probability density function of new, unobservable, individual-specific heterogeneity.

4. Results

4.1 Random effects probit model estimates

Table 3 reports the impact of the standardized social maladjustment variables and state dependence on adult employment probabilities. As noted above, we applied alternative random effects probit models: a static model (columns 1 and 2), a dynamic model with exogenous initial conditions (columns 3 and 4) and a dynamic model—our benchmark model—with endogenous initial conditions (columns 5 and 6). Table A1 reports estimation results related to the control variables, which were obtained by applying the benchmark model.

The negative impact of social maladjustment at age 11 on adult employment probabilities is statistically significant but, on average, relatively small in magnitude. The explanation for this finding is twofold. On the one hand, a relevant negative effect, namely a decline in employment probabilities, is observed at relatively high values of the BSAG score. This is possibly because severe social maladjustment may persist over the lifecycle, thereby negatively affecting social interaction ability, and/or because it is connected to other disadvantageous characteristics (e.g., psychological problems) that strongly affect adult employment probabilities. On the other hand, the employment effects of childhood social maladjustment are partly absorbed by a number of intermediating channels, such as educational attainment, labor market entry and labor market history, for which we controlled.

Our findings are consistent with previous evidence, according to which non-cognitive skills negatively affect subsequent labor market outcomes (e.g., Le et al. 2005, Fronstin et al. 2005, Carneiro et al. 2011, Mohanty 2012). Moreover, they indirectly agree with recent findings of studies focusing on personality traits (e.g., Uysal and Pohlmeier 2011, Viinikainen and Kokko 2012, Fletcher 2013). For example, these studies found that neuroticism worsened labor market performances, while conscientiousness or extroversion improved them, and simultaneously, these personality traits may increase and decrease social maladjustment, respectively. In any event, as we explain in greater detail below, the magnitude of the negative effect we found appears to be slightly smaller compared to previous findings.

In addition, we find that the effect of social maladjustment at age 11 on employment probabilities differs with respect to gender. Some previous studies reported that the negative impact is greater for females than for males on both employment (Le et al. 2005) and wages (Mohanty 2012), while mixed evidence was obtained by Uysal and Pohlmeier (2011) and Fletcher (2013).

Our study finds that the estimate of the standardized BSAG parameter is not significant for males (whereas the parameter for the square of the standardized BSAG is significant at the 1% level), indicating that adult employment probabilities are highly stable at relatively low values of the BSAG score and then decline. When comparing males and females, we find that the marginal effects are greater in magnitude for the latter group; nevertheless, because of the opposite signs of the parameters associated with the social maladjustment measures, the net effect is more detrimental for males than for females. These findings are consistent across the various models employed.

However, the negative impact on employment probabilities is relatively greater for females in the presence of relatively low levels of social maladjustment, while the negative effect for males is greater at relatively high levels of social maladjustment. This is represented by an

inverted U-shaped relationship for males and a U-shaped relationship for females. Accounting for non-linearity is then relevant to reveal the heterogeneous pattern of employment probabilities along the BSAG distribution[11]. The different patterns we observe with respect to gender suggest that males suffer more than females from higher levels of social maladjustment, possibly because of greater interaction problems or lower human capital accumulation. However, we cannot discard the hypothesis that the U-shaped relationship we find for females is somehow related to problems with attrition and non-response, as is discussed in depth in the Robustness checks sub-section. Analyzing the probability of exiting (or non-responding to) the NCDS during adulthood, we find that, for example, females with low education (which is associated with lower employment probabilities and higher BSAG scores) are more likely to be excluded from our analysis than males. This potentially entails that, among analyzed individuals with severe social maladjustment, females are relatively better educated and have higher abilities than males, possibly resulting in better labor market performance among females with severe social maladjustment.

Third, controlling for state dependence is an important issue when estimating the effect of social maladjustment at age 11 on adult employment probabilities. State dependence in employment (in addition to previous working experience) may proxy for the working history of individuals, which possibly diverges across individuals exhibiting different levels of social maladjustment. This is because socially maladjusted individuals may experience greater difficulties not only when entering the labor market but also during job-search activities. Our results show that state dependence exists and meaningfully contributes to determining current employment probabilities. In particular, being employed during the previous period increases the probability of current employment by 17.6% and 22.3% for males and females,

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[11] In a different manner, non-linearity is also a finding of studies examining personality traits using the Big Five. For example, Uysal and Pohlmeier (2011) and Viikainen and Kokko (2012) reported heterogeneous effects of various personality traits on subsequent outcomes.

respectively[12]. We also find evidence of endogenous initial conditions, meaning that the initial employment status observed in the data is associated with unobservable factors, suggesting the relevance of controlling for it to avoid spurious estimates of state dependence.

In addition, accounting for state dependence is relevant when estimating the impact of social maladjustment at age 11 on adult employment probabilities. When comparing the statistically significant parameters of the standardized BSAG score, we find that those parameters are greater when adopting the dynamic models than when adopting the static model. This suggests that state dependence diverges along the BSAG score distribution. In particular, the marginal effect related to the square of the standardized BSAG score increases from -0.0009 to -0.0026 (according to the estimate obtained using the dynamic model with endogenous initial conditions) for males. For females, the marginal effects increase from -0.0126 to -0.0181 and from 0.0029 to 0.0048 for the standardized BSAG score and the square of the standardized BSAG score, respectively.

When using standardized variables, one must be more cautious with the interpretation. A unitary increase in the standardized regressor corresponds, on average, to an increase in the unstandardized variable equal to its standard deviation[13]. This implies that because the standard deviation of BSAG of females is approximately 1/6 smaller than that of males (see Table 1), the negative impact on females would have been relatively greater than that on males if we used BSAG rather than the standardized BSAG.

However, using the standardized BSAG permits comparisons with the findings of previous studies. For example, our estimates are slightly smaller in magnitude than those emerging

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[12] We also used information from the 1991 sweep of NCDS, rather than the inferred employment for 1995, to have past employment for the 1999-2000 sweep, finding smaller state dependence parameters and slightly smaller parameters related to standardized BSAG variables.
[13] One can recover the standard metric by weighting the estimated standardized coefficient by the standard deviation of the unstandardized variable.

[Table 3 about here]

The divergence in state dependence across different levels of social maladjustment at age 11 is supported by a novel second-level analysis, the results of which are reported in Table 4. We divide the male and female samples into subsamples defined according to the value of the standardized BSAG score. Specifically, we identify two subsamples for each gender group. The first subsample is composed of individuals who exhibited low levels of social maladjustment (socially adjusted), and the second is composed of individuals characterized by high levels of social maladjustment (socially maladjusted). Different levels of social maladjustment were defined according to the standardized BSAG score distribution. Individuals with low levels of social maladjustment are those included in the first quartile of the standardized BSAG distribution, whereas individuals with high levels of social maladjustment are those included in the fourth quartile of the standardized BSAG distribution.

For both males and females, state dependence appears to be more relevant for socially maladjusted than for socially adjusted individuals. Being employed during the previous period increases the probability of being employed during the current period by approximately 25% for both male and female socially maladjusted workers. The effect of previous employment on current employment probabilities decreases to 4.4% for socially adjusted males and to 15.2% for socially adjusted females. In economic terms, this suggests that for socially maladjusted individuals, the role of previous employment status (or labor market history in a broader sense) is more important than for socially adjusted individuals in increasing current employment probabilities. From another perspective, being currently employed is independent of previous employment, at least for socially adjusted males, and in any case, it is

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relatively less important for socially adjusted females relative to individuals located in the fourth quartile of the standardized BSAG distribution. It follows that if socially maladjusted individuals are currently not employed, on average, they encounter more difficulties finding a job in the future. This is possibly because of the persistence of problems associated with social maladjustment at age 11 (e.g., difficulties in interacting with others) and because of the association between social maladjustment at age 11 and subsequent disadvantageous characteristics (e.g., mental health problems, see Done et al. 1994 and Jones et al. 2010, and career development, see Silles 2010, and so forth). Finally, this conclusion possibly suggests that policies designed to facilitate the labor-market entry of socially maladjusted individuals should be implemented to promote their employment and possibly to prevent excluding/marginalizing phenomena.

[Table 4 about here]

The related literature has emphasized the malleability of non-cognitive skills during the lifecycle (McCrae and Costa 1994 and Borghans et al. 2008). In the context of our study, individuals who decrease their antisocial behaviors are likely to improve their interaction abilities and possibly increase their likelihood of obtaining successful outcomes during adulthood. In principle, we would be interested in controlling for the effect of a possible variation in the extent of social maladjustment during adolescence on adult employment probabilities. However, because the NCDS does not provide the BSAG score during adolescence, we approximate the changes in behavioral characteristics using information from variables identifying cohort members' personal and behavioral traits, collected by the NCDS at ages 11 and 16. Specifically, we construct an indicator (BC, behavioral change) based on 9 variables (v) indicating whether the cohort-member: 1) prefers to do things alone, 2) destroys his or her own things and/or things belonging to others, 3) is miserable/tearful, 4) is squirmy/fidgety, 5) is worried, 6) is irritable, 7) sucks his/her fingers, 8) has twitches and 9)

fights other children. Each variable is categorized into three digits corresponding to the responses—no, yes sometimes and yes frequently—which we associate with the values zero, one and two, respectively, in both 1969 and 1974. The final indicator BC reads as follows:

$$BC = \sum_{k=1}^{9} \left(v_{k1974} - v_{k1969} \right) \qquad (6)$$

where v is the value of the specific variable measured in 1969 and 1974[14].

We use the BC indicator in two ways. We compare the estimation results obtained from dynamic probit models with the endogenous initial conditions, accounting or not accounting, in turn, for the additional BC control variable (Table 5a). The estimated parameters of the standardized BSAG score and its square are (slightly) smaller when including the BC control. These results are confirmed when dividing the sample between individuals who improved their behavior (BC > 0) and those who did not (or whose behavior worsened, BC ≤ 0). The negative marginal effects related to the standardized BSAG score and its square are smaller in magnitude when considering individuals who improved their behavioral characteristics during adolescence (Table 5b).

This finding indicates that social maladjustment at age 11 is less detrimental for adult employment probabilities if cohort-members decrease their negative behavioral characteristics during adolescence. Among other indications, this suggests that the negative effect of social maladjustment operates through the individual's (reduced) ability to interact with others. Therefore, improving interaction skills would be effective in reducing the detrimental impact of childhood social maladjustment. This would be also suggestive that policies intended to improve the social skills of socially maladjusted children during adolescence would be effective in reducing the negative impact on their subsequent employment.

[Tables 5a and 5b about here]

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[14] Because of missing information on variables defining BC, our analysis is based on approximately 70% of the observations used in the benchmark analysis.

4.2 Robustness checks

The empirical analysis was performed under the assumption of exogeneity between adult employment probabilities and social maladjustment. The validity of this assumption may be supported by the nature of the social maladjustment indicator. First, the BSAG score is based on responses provided by teachers, counselors and school psychologists, thereby avoiding problems connected to cohort members' self-reporting. Second, the BSAG score focuses on observable and predefined behaviors and avoids descriptions of personality traits that are potentially influenced by the evaluators' subjective feelings. This may reduce the risk of endogeneity resulting from measurement error. Nevertheless, we cannot exclude the hypothesis that confounding factors drive both children's behaviors registered by the BSAG score and adult employment probabilities, which would thus lead to endogeneity issues. For this reason, we explicitly assess the robustness of the exogeneity assumption between adult employment probabilities and the standardized BSAG score and the standardized BSAG score squared measured at age 11. To do so, we estimate a pooled probit model with clustered standard errors to account for endogeneity[15]. We employ three instruments: a dummy variable indicating whether the cohort member experienced a divorce/separation by the parents by age 7, a dummy variable indicating whether family member(s) suffered from mental illness (neurosis) when the cohort member is aged 7, and a dummy variable indicating whether the mother of a cohort member smoked during pregnancy[16]. The Smith-Blundell exogeneity test does not reject the hypothesis of exogeneity for males or females. In addition, we also perform an overidentifying restrictions test. The resulting Amemiya-Lee-Newey statistic does not reject the null hypothesis that the selected instruments are valid (Table 6)[17]. In summary,

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[15] We use the IVPROBIT routine in STATA that does not allow for random effects.

[16] The relevance of these aspects for child development has been documented in a number of studies (e.g., Butler and Goldstein 1973, and Roustit et al. 2007).

[17] Because there are no tests to assess the strength of instruments in the IVPROBIT routine, we rely on a linear version of the estimated model using the IVREG2 routine in STATA. The resulting Anderson canonical

the results of the exogeneity tests are reassuring with respect to the validity of the exogeneity assumption and the robustness of the estimation results presented above.

[Table 6 about here]

Another aspect may affect the robustness of our results. When responding to the verbal items constituting the BSAG score, evaluators may be influenced by the school and living environments. We control for this possibility by introducing a variable measuring the teacher/pupil class ratio and a dummy variable indicating whether the mother of the cohort member is unsatisfied with the area of residence. We find that the introduction of these further controls does not significantly affect our estimation results[18].

Finally, as anticipated, the estimation results could be affected by attrition and item non-response. Although Dearden, Machin and Read (1997) and Hawkes and Plewis (2006) provided considerable reassurance regarding this issue in the NCDS dataset, we provide some tests that assess the attrition and non-response problems in our analysis. First, we estimate a probit model to explain which factors affect the probability of remaining in the sample, net of attrition and item non-response. We find that a number of idiosyncratic characteristics increase the probability of exiting the analysis during adulthood because of attrition and non-response. These include being male, not being Caucasian, having low education, having had trouble with the law during adolescence, area of residence, as well as poor cognitive skills and social maladjustment. We also show that these effects may vary across gender, and this possibly contributes to explain the different relationships between employment probabilities and social maladjustment between males and females, as was explained in the Results section.

correlation test, the Cragg-Donald statistic and the Sargan-Hansen test suggest that the instruments are relevant, are not redundant and are valid and correctly excluded, respectively.

[18] Estimation results are available upon request.

Second, on the basis of the probit predictions, we construct a selectivity term (the Inverse Mill's Ratio, IMR) to be included in employment equations, which are estimated separately in the years 1999-2000, 2004-2005 and 2008-2009. This allows us to evaluate the impact of attrition/item non-response on our estimation results. We find that IMR is significant only for the 1999-2000 employment equation and not for later ones. In addition, the magnitude of the standardized BSAG score variables is relatively little affected when accounting for these problems[19].

Conclusions

This paper investigates the association between social maladjustment at age 11 and adult employment probabilities (individuals aged 41-51) based on the National Child Development Study, a database collecting information on a cohort of British individuals born in March 1958. Social maladjustment was measured using the British Social Adjustment Guide, a standardized psychometric test completed by teachers, counselors and school psychologists. Socially maladjusted individuals exhibit antisocial behavior, creating difficulties in interacting with others and possibly producing detrimental effects on cohort members' socio-economic outcomes in both the short and long term.

When estimating the impact of childhood social maladjustment on adult employment probabilities, we account for gender differences and the role of state dependence.

Our findings suggest that the impact of social maladjustment at age 11 on adult employment probabilities is statistically significant but relatively small in magnitude.

We observed consistent declines in employment probabilities, especially for males, at relatively high scores of social maladjustment. In addition, the shape of the employment-social maladjustment relationship differs between males and females. It is an inverted U-

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[19] For brevity, we do not show related tables. They are available upon request.

shaped relationship for males and a U-shaped relationship for females. However, we cannot discard the hypothesis that attrition and non-response problems are partially responsible for the U-shaped relationship found for females.

State dependence is the most important predictor of current employment probabilities. In addition, we find that the magnitude of the negative impact of social maladjustment on adult employment probabilities is nearly doubled after we control for state dependence. These findings confirm the relevance of adopting a dynamic framework, which allows us to control the role of previous work history and to account for unobservable factors.

Moreover, when performing a novel separate analysis for individuals with low and high BSAG scores, we find that the magnitude of state dependence is greater for socially maladjusted individuals than for socially adjusted individuals. This suggests that when socially maladjusted individuals are not employed, on average, they experience greater difficulties in finding a job. This may be because of the persistence of interaction problems, antisocial behavior and the association of social maladjustment at age 11 with subsequent disadvantageous characteristics (e.g., mental health problems, human capital accumulation and so forth). This may indicate that socially maladjusted individuals' labor-market entry would be facilitated if accompanied by specific labor-market policies. This could have consequences for the social inclusion of social maladjusted individuals. In addition, we find that social maladjustment at age 11 is less detrimental for adult employment probabilities if cohort-members exhibit reduced antisocial behavioral aspects during adolescence. First, this would be suggestive that the negative effect of social maladjustment is effectively the result of the (in)ability to interact with others. Second, improving interaction skills would be effective in reducing the detrimental impact of childhood social maladjustment. This would also suggest that policies intended to improve the social skills of socially maladjusted children would be effective in attenuating the negative impact on subsequent employment.

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Finally, exogeneity tests and the introduction of control variables accounting for school/living environment support our findings.

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Appendix

[Table A1 about here]

Tables

Table 1. Descriptive statistics

	Males		Females		Males				Females			
					1st BSAG quartile		4th BSAG quartile		1st BSAG quartile		4th BSAG quartile	
	Mean	Std Dev.	Mean	Std Dev.	Mean	Std Dev.	Mean	Std Dev.	Mean	Std Dev.	Mean	Std Dev.
Employment at time t	0.933	0.250	0.835	0.372	0.960	0.195	0.870	0.336	0.901	0.298	0.761	0.427
BSAG score	8.185	8.608	5.763	6.997	0.454	0.498	0.426	0.495	18.426	7.612	17.007	6.717
Working experience 1974-1981	69.22	27.72	60.97	27.47	63.07	29.75	59.25	27.49	73.89	25.00	62.41	27.17
Working experience 1982-1994	146.80	26.81	112.70	47.51	150.06	19.87	115.98	46.57	143.27	32.44	106.73	49.91
Married/Cohabitant	0.837	0.370	0.817	0.386	0.896	0.305	0.826	0.379	0.787	0.410	0.778	0.416
Children aged 0-16	0.673	0.469	0.696	0.460	0.727	0.446	0.716	0.451	0.631	0.483	0.638	0.481
Disability status	0.029	0.168	0.022	0.146	0.013	0.114	0.014	0.116	0.046	0.209	0.041	0.199
Poor health status	0.076	0.265	0.096	0.295	0.050	0.219	0.076	0.265	0.099	0.298	0.139	0.346
No education	0.068	0.252	0.083	0.276	0.033	0.179	0.036	0.187	0.111	0.314	0.166	0.372
Education NVSQ 1-2	0.352	0.478	0.419	0.493	0.280	0.449	0.366	0.482	0.420	0.494	0.467	0.499
Education NVSQ 3	0.222	0.416	0.179	0.383	0.225	0.418	0.196	0.397	0.219	0.414	0.161	0.368
Education NVSQ 4	0.312	0.463	0.290	0.454	0.401	0.490	0.356	0.479	0.219	0.414	0.187	0.390
Education NVSQ 5-6	0.045	0.208	0.028	0.166	0.061	0.239	0.046	0.209	0.032	0.176	0.018	0.133
Partner employed	0.685	0.464	0.742	0.438	0.728	0.445	0.761	0.426	0.634	0.482	0.678	0.467
No partner	0.165	0.371	0.182	0.386	0.106	0.308	0.175	0.380	0.215	0.411	0.220	0.414
Regional unemployment rate	5.723	1.216	5.733	1.228	5.733	1.211	5.778	1.222	5.741	1.241	5.700	1.214
Low birth weight	0.039	0.194	0.064	0.245	0.036	0.186	0.053	0.224	0.046	0.209	0.068	0.252
Reading test at age 7	23.865	6.507	25.480	5.647	26.171	4.870	26.786	4.605	21.557	7.207	22.887	6.929
Maths test at age 7	5.604	2.413	5.353	2.382	6.232	2.287	5.794	2.287	4.966	2.367	4.641	2.417
Father unskilled/semiskilled at age 7	0.204	0.403	0.215	0.411	0.177	0.381	0.182	0.386	0.241	0.428	0.275	0.447
Father medium skilled at age7	0.565	0.496	0.573	0.495	0.546	0.498	0.554	0.497	0.573	0.495	0.571	0.495
Father high skilled at age 7	0.230	0.421	0.212	0.409	0.277	0.448	0.264	0.441	0.186	0.389	0.153	0.360
Teacher/pupil class ratio at age 11	20.458	12.610	19.991	12.601	19.937	12.850	20.692	12.489	19.683	12.354	20.334	12.784
Mother unsatisfied with living area at age 11	0.324	0.468	0.328	0.469	0.302	0.459	0.341	0.474	0.323	0.468	0.354	0.478
Behavioral change between age 11 and 16	2.782	2.566	2.622	2.529	2.987	2.325	2.553	2.929	2.654	2.326	2.288	3.053
Individuals	2421		2716		555		924		784		574	

Source: our elaboration of NCDS data

Table 2. BSAG score distribution

		Min.	First quartile	Median	Mean	Fourth quartile	Max.
Male	BSAG score	0	2	5	8.185	12	56
	Standardized BSAG score	-0.956	-0.723	-0.374	0	0.441	5.564
Female	BSAG score	0	1	3	5.763	8	56
	Standardized BSAG score	-0.822	-0.681	-0.398	0	0.307	7.084

Source: our elaboration of NCDS data

Table 3. Random effects probit model estimates

	MALES											
	Static model				Dynamic model: exogenous IC				Dynamic model: endogenous IC			
	Coeff.	s.e.		mfx	Coeff.	s.e.		mfx	Coeff.	s.e.		mfx
Standardized BSAG	-0.037	0.069		-0.0005	-0.012	0.043		-0.0008	-0.006	0.047		-0.0003
Standardized BSAG squared	-0.067	0.028	**	-0.0009	-0.042	0.017	**	-0.0029	-0.046	0.019	**	-0.0026
Employment t-1					1.407	0.101	***	0.2655	1.201	0.149	***	0.1761
Employment time 0									0.098	0.174		0.0059
Observations	7263											
	FEMALES											
	Static model				Dynamic model: exogenous IC				Dynamic model: endogenous IC			
	Coeff.	s.e.		mfx	Coeff.	s.e.		mfx	Coeff.	s.e.		mfx
Standardized BSAG	-0.219	0.069	***	-0.0126	-0.123	0.038	***	-0.0196	-0.139	0.046	***	-0.0181
Standardized BSAG squared	0.050	0.027	*	0.0029	0.029	0.015	*	0.0047	0.037	0.019	**	0.0048
Employment t-1					1.386	0.058	***	0.3578	1.074	0.085	***	0.2228
Employment time 0									0.447	0.112	***	0.0702
Observations	8148											

Source: our elaboration of NCDS data. Note: Childhood and adulthood covariates are controlled for.

Table 4. Dynamic probit model with endogenous initial condition estimates: results by the BSAG distribution—first and fourth quartiles

	Males					Females				
	Coeff.	s.e.		mfx	Obs.	Coeff.	s.e.		mfx	Obs.
Fourth quartile	1.262	0.234	***	0.238	2418	0.995	0.171	***	0.258	1749
First quartile	0.717	0.395	***	0.044	1704	1.017	0.147	***	0.152	2838

Source: our elaboration of NCDS data. Note. The standardized BSAG score variables, childhood and adulthood covariates have been included.

Table 5a. Dynamic probit model with endogenous initial condition estimates: accounting for malleability of behavioral problems

	MALE							FEMALE						
	Coeff.	s.e.		mfx	Coeff.	s.e.		mfx	Coeff.	s.e.		mfx	Coeff.	s.e.		mfx
Standardized BSAG	0.020	0.055		0.0013	0.019	0.055		0.0012	-0.145	0.054	***	-0.0183	-0.141	0.054	***	-0.0175
Standardized BSAG squared	-0.060	0.022	***	-0.0038	-0.057	0.021	***	-0.0035	0.027	0.021		0.0034	0.027	0.021		0.0034
Employment t-1	1.423	0.179	***	0.2564	1.424	0.179	***	0.2469	1.082	0.101	***	0.2210	1.081	0.101	***	0.2118
Employment time 0	-0.011	0.207		-0.0007	-0.017	0.207		-0.0011	0.382	0.131	***	0.0568	0.378	0.131	***	0.0563
Behavioral change	No				0.012	0.014		0.0007	No				0.019	0.014		0.0025
Observations	4755								5640							

Source: our elaboration of NCDS data. Note. The standardized BSAG score variables, childhood and adulthood covariates have been included.

Table 5b. Dynamic probit model with endogenous initial condition estimates: cohort members with improved behavior (BC>0) versus those whose behavior did not improve (BC≤0).

	MALE								FEMALE							
	Not improved				Improved				Not improved				Improved			
	Coeff.	s.e.		mfx	Coeff.	s.e.		mfx	Coeff.	s.e.		mfx	Coeff.	s.e.		mfx
Standardized BSAG	-0.024	0.132		-0.0015	0.013	0.065		0.0007	-0.133	0.131		-0.0202	-0.125	0.060	**	-0.0151
Standardized BSAG squared	-0.090	0.045	**	-0.0057	-0.048	0.027	*	-0.0026	0.047	0.040		0.0071	0.019	0.027		0.0023
Employment t-1	1.353	0.331	***	0.2249	1.406	0.198	***	0.2318	0.909	0.243	***	0.1922	1.119	0.111	***	0.2265
Employment time 0	0.387	0.415		0.0331	-0.007	0.235		-0.0004	0.386	0.314		0.0669	0.370	0.144	***	0.0528
Observations	759				3996				963				4677			

Source: our elaboration of NCDS data. Note. The standardized BSAG score variables, childhood and adulthood covariates have been included.

Table 6. Exogeneity tests

	MALES		FEMALES	
Exogeneity test	Chi2(1)	Prob>chi2	Chi2(1)	Prob>chi2
Smith-Blundell test	0.535	0.765	1.112	0.574

|	MALES		FEMALES	
Overidentifying restrictions test	Chi2(1)	Prob>chi2	Chi2(1)	Prob>chi2
Amemiya-Lee-Newey statistic	0.230	0.631	0.630	0.428

Instruments: divorce/separation of parents when a cohort member is aged 7, household members suffering from mental illness when the cohort member is aged 7, and mother smoked during pregnancy. Source: our elaboration of NCDS data.

Table A1. Estimated control variables

|	MALES				FEMALES			
	Coeff.	s.e.		mfx	Coeff.	s.e.		mfx
Working experience 1974-1981	0.000	0.001		0.000	0.004	0.001	***	0.000
Working experience 1982-1994	0.002	0.001		0.000	0.001	0.001	*	0.000
Married/cohabitant	-0.212	0.324		-0.010	-0.116	0.270		-0.014
Children aged 0-16	0.109	0.137		0.006	-0.056	0.107		-0.007
Disability status	-0.167	0.184		-0.011	-0.701	0.201	***	-0.143
Poor health status	-0.540	0.130	***	-0.047	-0.606	0.099	***	-0.111
Education NVSQ 1-2	0.228	0.113	**	0.012	0.285	0.100	***	0.036
Education NVSQ 3	0.298	0.126	**	0.014	0.371	0.114	***	0.041
Education NVSQ 4	0.343	0.128	***	0.017	0.576	0.117	***	0.064
Education NVSQ 5-6	0.285	0.199		0.012	0.832	0.215	***	0.060
Partner employed	0.334	0.133	**	0.021	0.556	0.126	***	0.089
No partner	-0.114	0.337		-0.007	0.235	0.296		0.027
Regional unemployment rate	-0.094	0.051	*	-0.005	-0.051	0.038		-0.007
Low birth weight	-0.193	0.152		-0.013	0.036	0.117		0.005
Standardized reading test	-0.040	0.034		-0.002	-0.027	0.039		-0.003
Standardized math test	0.014	0.038		0.001	-0.024	0.033		-0.003
Father unskilled/semiskilled	-0.089	0.079		-0.005	0.064	0.072		0.008
Father highly skilled	0.092	0.088		0.005	-0.109	0.075		-0.015
Year 1999-2000	-0.052	0.083		-0.003	-0.122	0.058	**	-0.016
Year 2008-2009	-0.130	0.112		-0.008	0.078	0.085		0.010
Constant	0.271	0.532			0.105	0.532		
Average Married/cohabitant	0.015	0.545		0.001	-0.593	0.547		-0.077
Average Children aged 0-16	-0.054	0.167		-0.003	-0.030	0.131		-0.004
Average Disability status	-1.198	0.282	***	-0.066	-1.054	0.350	***	-0.137
Average Poor health status	-0.844	0.210	***	-0.047	-1.005	0.175	***	-0.131
Average Partner employed	0.187	0.174		0.010	0.230	0.181		0.030
Average No partner	-0.050	0.561		-0.003	-0.178	0.566		-0.023
Average Regional unemployment rate	0.091	0.065		0.005	-0.010	0.052		-0.001
sigma u	0.391	0.144			0.740	0.079		
rho	0.133	0.085			0.354	0.049		
LR test rho=0	2.45 [0.059]				43.96[0.000]			

Source: our elaboration of NCDS data.

Figure 1. Univariate Kernel density estimation of the BSAG score
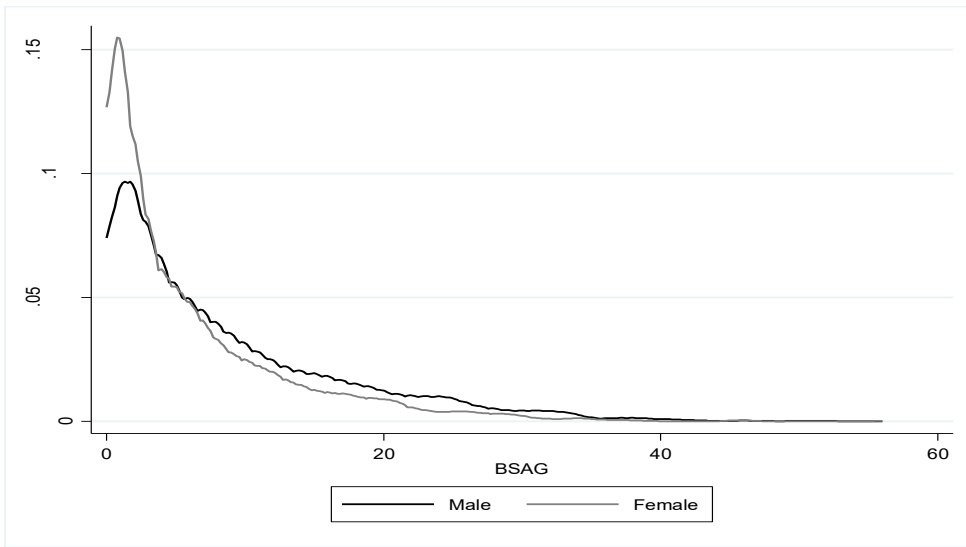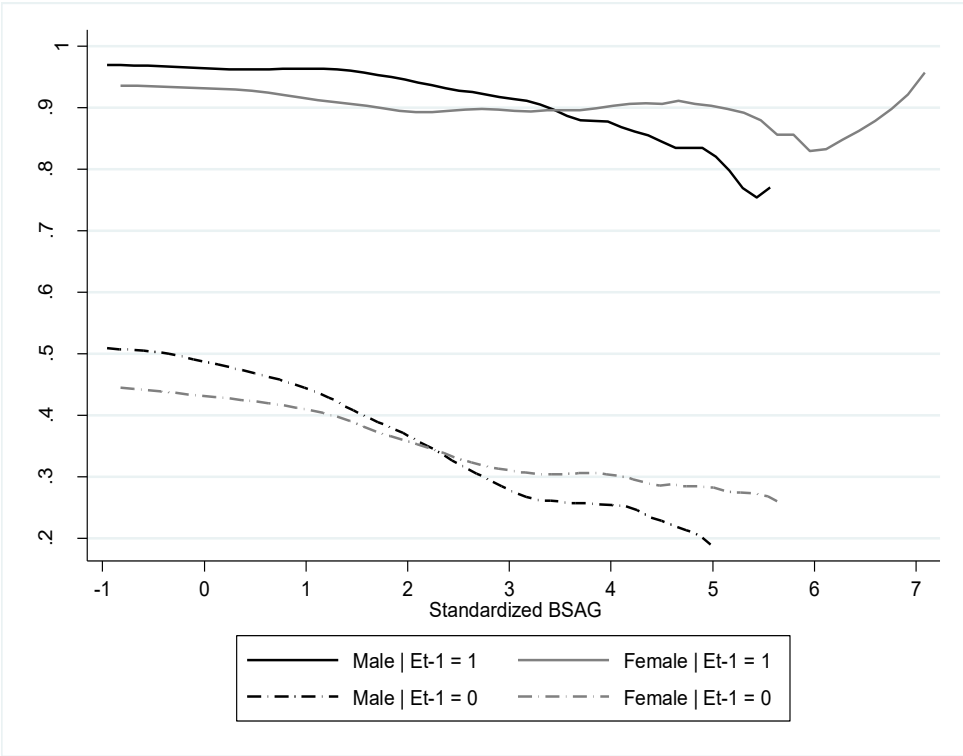

Source: our elaboration of NCDS data

Figure 2. Employment probabilities and standardized BSAG score.
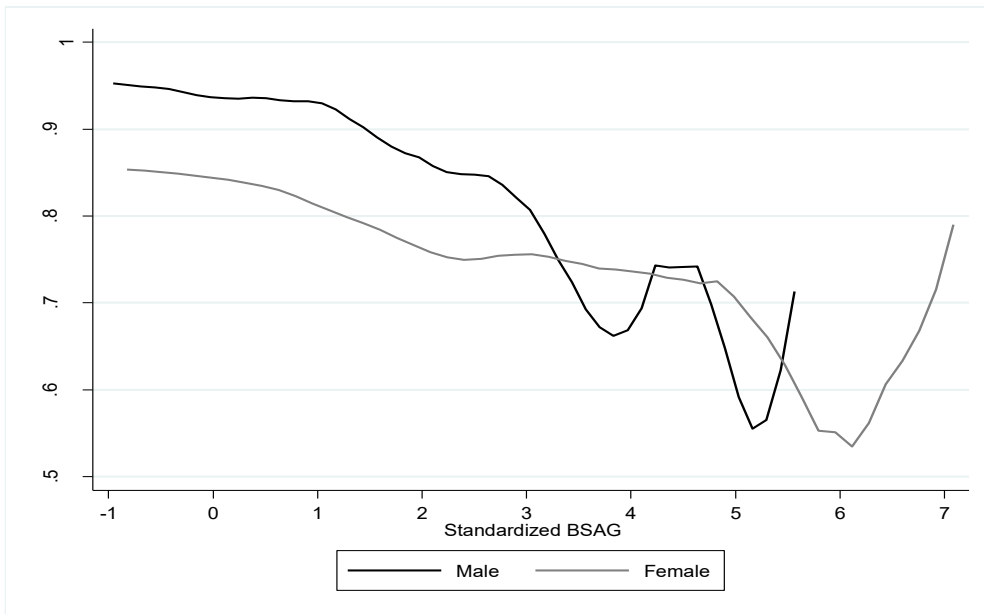
Source: our elaboration of NCDS data

Figure 3. Employment probabilities, standardized BSAG score and state dependence

Source: our elaboration of NCDS data.