



# Unemployment and social exclusion<sup>☆</sup>

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## ABSTRACT

This paper analyzes those economic and social consequences of job loss which contribute to exclusion from society, based on German linked survey and administrative data. In order to study the causal relationship between unemployment and multiple dimensions of social marginalization, I combine inverse propensity score weighting with a difference-in-differences approach. The results suggest that job loss has particularly detrimental effects on the subjective perception of social integration, life satisfaction, access to economic resources and an individual's mental health. Moreover, this paper shows that becoming unemployed hinders the fulfillment of psychosocial needs that are typically associated with employment, such as social status and higher self-efficacy. The effects of job loss are long-lasting, grow more profound the longer the duration of unemployment and persist following reemployment. Looking at effect heterogeneity, I find that having a partner and being highly educated reduces the negative effects of job loss.

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## 1. Introduction

There is growing interest from both a research and policy perspective in the link between labor market integration and social integration. The term ‘social exclusion’ has become increasingly prominent in policy debates regarding poverty and social inequality, and often refers to disadvantages in core living conditions that reduce the possibility of participating in society (European Commission, 2010; Federal Government, 2017). Social exclusion can be viewed as a dynamic multidimensional process wherein various deficits reinforce each other (Room, 1995). In this context, unemployment is considered to be one of the main risk factors for social exclusion. Exclusion from employment might lead to alienation from society, and in turn increase the risks of long-term dependency on social welfare (see e.g. Bhuller et al., 2017), suicide (see e.g. Sullivan and von Wachter, 2009), becoming a criminal or the victim of a crime (see e.g. Freeman, 1999) and political support for extreme parties (see e.g. Falk et al., 2011). Furthermore, social exclusion may not only affect the current generation, it may be passed on to the next generation (Machin, 1998). Hence, from a policy perspective, it is important to understand the mechanisms

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behind the association between unemployment and social exclusion. Based on this knowledge, policy instruments, such as job creation schemes, can be designed to best help mitigate the detrimental effects of unemployment.<sup>2</sup>

From an individual's point of view, periods of unemployment can affect the economic and social situation in different ways and to varying degrees. The reduction in disposable income following a job loss creates financial restrictions. Consequently, maintaining a minimum standard of living, while still participating in social and cultural activities, could become more challenging (Jenkins and Cappellari, 2007). Besides the economic strain, unemployment may take away non-pecuniary benefits associated with working; such as time structure, the chance to demonstrate competences and skills and an individual's status and social relations (see e.g. Jahoda, 1981). Moreover, sociologists and psychologists emphasize that redundancy could come with stigmatization, feelings of insecurity and shame. Hence, the loss of a job represents a potential source of stress, and can lead to emotional and physical distress, isolation and alienation.<sup>3</sup> These economic and social consequences of unemployment are expected to contribute to, or be accompanied by, the subjective feeling of social exclusion.

The aim of this paper is to shed light on the causal impact of job loss on social exclusion at the individual level by discussing in great detail the mechanisms driving this association. I primarily concentrate on the total effects of job loss on different dimensions of social exclusion, and on the relative importance of effect sizes. In particular, I study the effects of job loss on the following aspects: the individual perception of social integration, life satisfaction, mental health status, economic resources, social participation, social status and self-efficacy.

The main contribution of this study is threefold. First, I define a set of interdependent factors which characterize marginalization from society and might be affected by periods of unemployment. By doing so, it is possible to learn more about precisely which aspects of social exclusion are most affected by unemployment. The analysis of these various dimensions is based on the same data set and the same methodology, whereas previous studies have typically only analyzed one or a few of these aspects at the same time.<sup>4</sup>

Second, this study extends the empirical economic literature on the non-pecuniary effects of job loss by investigating outcomes for which the evidence is scarce. This paper is the first to provide a causal analysis on the relationship between unemployment and direct measures of an individuals' subjective perception of social integration, social status and self-efficacy. These outcomes reflect to what extent becoming unemployed is considered to be a personal failure and is associated with the feeling of becoming useless within a society. I also contribute to the literature on the pecuniary effects of job loss by using alternative measures of an individuals' economic situation to household income, the indicator typically used for this type of analysis. Instead, I concentrate on a deprivation index and a subjective evaluation of the individuals' standard of living. These approaches directly measure what individuals are able to be or to do and are more strongly connected to the concept of social exclusion than classical income measures.

Third, I contribute to the existing literature methodically by applying a modified difference-in-differences approach, where the control group is reweighted based on the propensity score to become unemployed within the next year. In a first step, I use a combination of German survey and administrative data to estimate the probability of job loss given a large set of control variables reflecting individual and household-level characteristics as well as the employment history. In a second step, I compare the changes in outcome levels of workers becoming unemployed to still employed workers, weighted with the inverse propensity score. This methodological approach has two major advantages over Fixed Effects estimation, the primary method of choice in previous studies on the effects of unemployment. It is possible to account for reverse causality effects and the fact that the job-related characteristics of treated and control individuals differ substantially.

My results suggest that the strongest detrimental effects of unemployment are on the dimensions life satisfaction, and access to economic resources. Job loss is directly associated with financial restrictions, while the other dimensions are only affected indirectly. A possible explanation for the large drop in life satisfaction is that this outcome summarizes all economic and social consequences of unemployment for affected individuals. Though negative, the effects are less substantial in terms of size with respect to an individuals' subjective perception of social integration, and mental health. Moreover, I find that job loss reduces social status and self-efficacy, but does not appear to change individuals' social participation.

I also study heterogeneous effects for subgroups defined by sociodemographic characteristics, the type of job loss and the duration of the unemployment spell, in order to enrich the discussion and interpretation of the results. I find some evidence that individuals with a partner and high-skilled workers suffer less from unemployment. Moreover, my results suggest that the effects of job loss are long-lasting. They become more profound the longer the duration of unemployment, and the negative consequences of previous unemployment are still present even if the individual finds a new job. I do not find substantial differences dependent on whether the job loss is voluntary or involuntary, showing that the costs of unemployment clearly outweigh the benefits.

The rest of the paper is structured as follows. [Section 2](#) discusses theories regarding the concept of social exclusion and the consequences of job loss. [Section 3](#) describes the data source and the measurement of the outcome variables. [Section 4](#) presents the empirical identification strategy. [Section 5](#) describes the sample, and shows model diagnostics. [Section 6](#) presents the results of the empirical analysis. [Section 7](#) discusses the main findings and [Section 8](#) concludes.

<sup>2</sup> See e.g. Gundert and Hohendanner (2015) and Knabe et al. (2017) on the effects of the German One-Euro-Job program on social integration and subjective well-being, respectively.

<sup>3</sup> See e.g. Brand (2015), who provides a literature review on the economic and non-economic impacts of job loss for the United States.

<sup>4</sup> See e.g. the recent studies on the link between unemployment and life satisfaction by Kassenboehmer and Haisken-DeNew (2009), one overall measure of social integration by Gundert and Hohendanner (2014) and social participation by Kunze and Suppa (2017).

## 2. Theoretical considerations

### 2.1. The concept of social exclusion

The term ‘social exclusion’ originated in France in the 1970s, and referred to persons who were unprotected by social insurance and at risk of permanent detachment from society. A widespread adoption of the term in Europe began in the 1980s, when unemployment rates were high and threatened national models of social integration (Kronauer, 1998). More recently, the European Union declared 2010 as the European Year for Combating Poverty and Social Exclusion.

Thus far, no operationalization of the concept of social exclusion has been established as standard in the literature. However, sociologists have emphasized some key characteristics of the concept on which the theoretical framework of my analysis is based (see e.g. Atkinson, 1998; Rodgers et al., 1995; Room, 1995; Sen, 2000). Social exclusion is viewed as a dynamic process, involving deprivation across a range of dimensions which affect an individuals’ opportunities to be connected to mainstream society.<sup>5</sup> Exclusion from society can be described as disadvantages in core living conditions, such as housing, income, education, employment and well-being (Andre, 2003), which in turn reduce the possibility of maintaining an ‘appropriate’ standard of living and social participation. However, social exclusion is not only determined by an objectively precarious financial situation, but also by an individuals’ perception of belonging to society. Criteria and standards that define social integration are to a large degree subjective, and are weighted differently by different individuals. In order for an individual to feel part of society, and to take part in social activities, it is of great importance that the individual is able to shape his or her life according to subjective perceptions and aims. Hence, social integration depends on both an individual’s capacity to act and an individual’s actual actions (Sen, 1985). The subjective feeling of social integration might be influenced by general life satisfaction, mental health status, an individual’s close social surroundings and their relative position in society, but may also depend on personality traits, such as self-efficacy, which could help them to cope with multiple deprivation (Popp and Schels, 2008).

The above reasoning shows that social exclusion has multiple interdependent dimensions which can reinforce each other. Exclusion from society can also impact, for instance, social participation or mental health through a lack of perceived integration as well as alienation. Higher perceived alienation is associated with lower well-being and a higher risk of depression (Layte et al., 2010). As the hierarchy between the dimensions is not clear, and controlling for post-treatment variables would give rise to a ‘bad control’ problem (Angrist and Pischke, 2009), I concentrate on the total effects of job loss on the following outcome variables which might lead to social exclusion: perceived **social integration, well-being and mental health** and **economic resources**, as well as the **psychosocial needs** *social participation, social status* and higher *self-efficacy*.<sup>6</sup> In the following, I will provide more detailed explanations for the potential effects of job loss on the outcome variables under consideration.

### 2.2. The consequences of job loss

**Economic resources.** Job loss leads to exclusion from the labor market and the lack of opportunity to meet needs typically associated with an employment relationship. Two main functions of paid employment can be emphasized: the first function is the provision of financial resources, which allow individuals to maintain a minimum standard of living and to shape life according to subjective perceptions and aims. Job loss coincides with earnings losses, and hence might constrain access to economic resources. As a consequence, unemployed individuals might have to adjust their lifestyle, for instance, by changing their diet, their place of residence or their general spending behavior. Financial constraints may also affect their participation in social and cultural activities (Jenkins and Cappellari, 2007). Poverty researchers usually distinguish between two approaches to measure poverty; a resource-based poverty measure, and a measure of deprivation. While the former defines poverty primarily in financial terms (a lack of income and consumption), the latter is a direct measure of what individuals are able to be or to do. This approach was first suggested by Sen (1992), who defined poverty as the inability of individuals to achieve a minimal level of capabilities to function (such as the inability to be healthy, clothed, sheltered, etc.). The concept of deprivation is strongly connected to the concept of social exclusion as it refers to living in material circumstances which are lower than a socially agreed upon standard (Christoph, 2010). In this paper, I will concentrate on economic deprivation due to job loss which is reflected in the non-availability of basic goods and non-participation in activities satisfying basic needs.

**Psychosocial needs.** The second function of employment refers to psychosocial needs that go beyond the need for financial resources. Jahoda (1981) proposed a latent deprivation theory which states that unemployment causes deprivation not only of manifest economic resources, but also of five latent psychosocial needs that are usually met through an employment

<sup>5</sup> Social exclusion might depend on several interdependent dimensions of society; such as the labor market, economic resources, social participation, educational, health care and social welfare institutions or civic and human rights. As the institutional and political system of western social welfare states, such as Germany or Scandinavia, should, in principle, be accessible for every citizen, I do not consider these dimensions in this study. However, it should be kept in mind that perceived social exclusion might depend on the institutional and policy setting, as well as on the context of a society. For instance, countries differ with respect to the level of financial and social support, the general economic situation and the design of active labor market policies (see e.g. Layte et al., 2010).

<sup>6</sup> However, I further investigate the relationship of outcome variables in Section 7.2.

relationship: the need for a time structure to one's day, the need for social contacts outside of the immediate family, the need to be a part of a collective purpose, the need for status and personal identity and the need for regular activity. According to Jahoda (1981) and others (e.g. Creed and Muller, 2006; Gundert and Hohendanner, 2014; Paul and Batinic, 2010), the deprivation of those needs, together with economic strain, might explain why an individual's perception of social integration as well as subjective well-being declines when becoming unemployed. This paper focuses on the following psychosocial needs that can be met more easily through working: *social participation*, *social status* and higher *self-efficacy*.

**Social participation.** On the one hand, when individuals become unemployed they typically lose their daily social contacts; for example, to colleagues or customers. In addition, the literature documents a negative relationship between unemployment and social participation. Social participation might comprise formal participation such as activity in an association and informal participation like interaction with friends and relatives (Dieckhoff and Gash, 2015). It has been found that the unemployed engage in social activities less frequently (see e.g. Kunze and Suppa, 2017), and have less social support from close relations and authority figures compared to employed individuals (see e.g. Jackson, 1999). Moreover, the psychological distress that goes along with being unemployed is compounded by the negative social attitudes towards unemployment; which risks further alienating the unemployed from mainstream society (Gallie et al., 2003). As a consequence, the loss of social contacts can lead to lower life satisfaction. Dolan et al. (2008) provide a detailed literature review on the determinants of subjective well-being, and find evidence that social contacts are an important factor positively influencing subjective well-being.

On the other hand, the additional leisure time could also be beneficial for the social participation of the unemployed. Studies that focus on the time use of employed and unemployed individuals show that unemployed persons spent more time on home production and leisure activities, such as socializing, than the employed (see e.g. Krueger and Mueller, 2012). Hence, the net effect of job loss on social participation is not clear a priori.

**Social status.** According to Jahoda (1981), an individual's position in life is largely defined by one's job. This notion is supported by Paul and Batinic (2010), who state that individuals tend to see themselves in a similar way to how others see them, and that employed workers with a relatively low occupational status, for example unskilled manual workers, feel that they are treated with more respect and recognition than unemployed individuals. Job loss might bring a certain stigma as well as feelings of shame and worthlessness. This loss of social prestige may be reflected in the subjective perception of occupying a lower social status. There is typically no direct measure to hand which could be used to identify the importance of status or identity effects. Therefore, some empirical economic studies make use of the fact that the degree of adhering to the norms of the social group one belongs to strongly affects the identity value (see e.g. Clark, 2003; Hetschko et al., 2014; Stutzer and Lalive, 2004). Findings point to lower life satisfaction due to status and identity effects caused by the event of job loss.

**Self-efficacy.** In social-cognitive theory, the construct of self-efficacy describes the ability of an individual to deal with demanding situations by taking adaptive action (Bandura, 1997). Self-efficacy might be an important individual characteristic in modern labor markets, in which more and more responsibility is shifted to the worker. Tisch and Wolff (2015) discuss the link between employment and self-efficacy. Employed workers are likely to be more confident with respect to their problem-solving capabilities due to feedback received from colleagues and superiors. Moreover, an employment relationship links individuals to a collective purpose or goal that might lead to increased self-efficacy when such goals are achieved. Regular activity at the workplace may also help an individual to learn about, and to value, his or her own skills. Hence, Jahoda's latent functions of employment should positively influence self-efficacy. Fryer (1986) assumes that individuals want to actively control their lives by making plans and pursuing goals. Hence, job loss and the associated loss of the aforementioned functions may lead to lower levels of self-efficacy. Furthermore, becoming unemployed may be viewed as an individual failure (Silver et al., 2005).

**Social integration.** Besides objective factors, such as access to economic resources and social relationships, the individual evaluation of both the living conditions and social situation is an important dimension of social exclusion. The subjective experience of social exclusion might be determined by the feeling of being or becoming redundant or useless within a society (Popp and Schels, 2008). Labor market integration plays a central role in feeling engaged in society. Sociologists have provided some empirical evidence that employment is related to a higher level of perceived social integration than unemployment (see e.g. Gundert and Hohendanner, 2014; Layte et al., 2010). As discussed above, job loss might lead to deprivations on multiple dimensions, such as financial constraints, a loss of social contacts and reduced social status, all of which may determine the degree to which an individual feels a part of society. In this study, I analyze the impact of job loss on an overall subjective evaluation of social integration, reflecting those components which are regarded as important from an individual-level perspective.

**Well-being and mental health.** Unemployment may have additional psychosocial consequences aside from those above mentioned. For instance, unemployment can worsen both depression and anxiety which might in turn result in a general dissatisfaction with life as well as mental health problems.<sup>7</sup> Life satisfaction can be viewed as the culmination of what resources enable people to do and to be within a society, in other words, their ability to convert resources into a good life. The subjective assessment of quality of life can thus be viewed as a proxy for an individuals' welfare (Frey and Stutzer, 2012),

<sup>7</sup> See e.g. Frey and Stutzer (2002) and Helliwell (2006), who provide a literature review on happiness research, and McKee-Ryan et al. (2005) and Paul and Moser (2009) for meta-analyses on the mental health effects of unemployment.

and serve as an overarching framework for concepts which stress social integration and exclusion issues (Böhnke, 2004). Those experiencing mental health problems, or who are dissatisfied with their lives, are likely to be at risk of experiencing social exclusion. This is partly due to the negative effect on one's ability to work, as being emotionally stable is a central dimension of employability and a basis for regular activity. Studies show that in the long-run the unemployed face a higher risk of dying early, and are more likely to commit suicide (see e.g. Ruhm, 2000; Sullivan and von Wachter, 2009); which could be interpreted as the worst form of social exclusion.

However, individuals might also quit their job voluntarily, for instance, due to dissatisfaction with their working-conditions. In this scenario, the effect of becoming unemployed on subjective well-being is ambiguous from a theoretical point of view.

Based on these theoretical considerations, I expect to find that the strongest negative effects of unemployment are on economic resources, social status, self-efficacy and perceived social integration. The effects on social participation, well-being and mental health are theoretically ambiguous. However, subsequent empirical work on the relationship between unemployment and life satisfaction or mental health clearly suggests strong negative effects (see e.g. Kassenboehmer and Haisken-DeNew, 2009; Paul and Moser, 2009). To best of my knowledge, the economic literature on the measures of deprivation, the subjective perception of being a part of society and of social status, as well as the ability to cope with challenging situations, is scarce, and so the relative importance of these dimensions remains an empirical question.

### 3. Data and measurement of outcomes

#### 3.1. Data source

This study is based on individual level data provided by the German Federal Employment Agency. The PASS-ADIAB 7515 data set combines weakly anonymous survey data provided by the household panel study 'Labour Market and Social Security' (PASS) with administrative data from the Integrated Employment Biographies, which are based on employers notifications to the social security authorities.

The PASS is a household panel survey and is designed for research on the living-conditions of low-income households in Germany (Trappmann et al., 2010). The survey is financed by the Ministry of Labour and Social Affairs, and has been conducted on a yearly basis since December 2006.<sup>8</sup> The PASS-ADIAB 7515 is based on nine consecutive annual waves of the PASS (2007–2015). In the first wave around 12,500 households and 19,000 individuals were interviewed. The initial sample consists of two subsamples of almost equal size; one of which is drawn from the unemployment registers of the Federal Employment Agency, and contains a sample of households where at least one individual is in receipt of social benefits on the reference date in July 2006, while the second is a general population sample, oversampling lower-status households. The initial subsample of benefit recipients is refreshed each year. In the context of panel surveys, sample attrition between survey waves plays a crucial role. Attrition might be caused by death, moving abroad or non-response due to non-contactability or refusal. The attrition rates of the PASS panel range between 18% (Wave 9) and 43% (Wave 2) of households between two consecutive waves. Approximately 20% of the dropouts are only temporary and return in the following wave. In the ninth wave 13,271 individuals living in 8,921 households were interviewed.<sup>9</sup>

The PASS gathers detailed information on individual and household-level characteristics in the fields of employment, education, income, health, social life and housing. For the purpose of this study, examining the effects of job loss, the PASS has the advantage of including questions on the subjective assessment of well-being, living conditions and individual attitudes. The Integrated Employment Biographies complement the survey data with detailed information on individual employment histories, including start and end dates of dependent employment, registered unemployment or registered job-search or unemployment benefit receipt periods on a daily basis. In this way, I am able to construct precise durations and numbers of periods for a particular employment state.<sup>10</sup> This administrative data source covers all surveyed individuals who have at least one entry in their social security records from 1975 onwards in West Germany, and beginning from 1992 onward in East Germany. Periods of self-employment, civil service, and military service are not included in the data set. Alongside information on different labor market states, the data also include individual information on (daily) wage records and firm-level characteristics, such as industry code, median wage paid and firm size. An individual's past labor market performance should be strongly related to unobserved factors, such as ability and motivation, which are in turn likely to influence my outcome variables. Hence, information on individual employment histories may help to identify the causal effects of job loss (Heckman et al., 1997).

<sup>8</sup> A response rate at the household level of 30.5% (Bethmann et al., 2016) for the first wave is in line with other surveys of comparable populations. For example, the LSS 2005 (Meßmann et al., 2008) and the benefit-recipient survey conducted as part of the evaluation of the experimentation clause (ZEW et al., 2007) achieve almost equal response rates.

<sup>9</sup> Table A.1 in Appendix A provides a detailed description of the number of interviews in each wave.

<sup>10</sup> Survey data can only be linked to administrative data from the Federal Employment Agency for those who agreed to the linkage. Table A.2 in Appendix A shows that, on average, 80% of the respondents agreed to merging the two data sets in each wave.



### 3.2. Measurement of outcome variables

In the following, I describe how the outcome variables social integration, well-being, mental health, economic resources and the psychosocial needs social participation, social status and self-efficacy are measured in this study. The PASS questions underlying the outcome variables, and a description of their construction, is presented in the corresponding section in [Appendix B](#).

Social integration is quantified by the subjective perception of social affiliation ranging from 1 to 10; from feeling excluded (1) to feeling a part of society (10) (see [Section B.1](#)). I analyze the impact of job loss on two measures of emotional stability (see [Section B.2](#)): life satisfaction and mental health status. To quantify life satisfaction I make use of a question that is standard in large-scale surveys like the GSOEP. Individuals are asked to assess on a 0 to 10 scale how satisfied they are currently with their life as a whole, with 0 meaning that the person is completely dissatisfied, and 10 meaning completely satisfied. In addition, I use a variable with five categories indicating whether an individual has been “extremely”, “quite a bit”, “moderately”, “a little bit” or “not at all” affected by mental health problems, like fear, dejection or irritability, in the last four weeks.

To measure access to resources enabling a basic standard of living and social participation, I use two variables (see [Section B.3](#)). First, I use a deprivation index which is included in the PASS data set. The surveyed households are asked to indicate whether they possess a list of basic goods considered essential for an appropriate standard of living. For instance, the household is asked whether it has an apartment with at least as many rooms as individuals who live there, a garden or balcony, and whether or not the household possesses a car. Moreover, the household members are asked to indicate whether they participate in activities satisfying basic needs, such as having a hot meal or saving a fixed amount of money, as well as participation in social activities, such as inviting friends over for dinner at home or going to the cinema once in a while. All in all, the deprivation index is based on a list of 23 goods or activities. In addition, survey participants are asked whether the household does not possess these goods or does not participate in certain activities due to financial constraints or for other reasons. In order to construct the deprivation index properly, only items that are missing for financial reasons are counted. In doing so, it is ensured that conscious decisions, for instance, a household choosing not to own a car or television, are not misinterpreted as a reduced standard of living. As a second measure of economic resources, I use subjective satisfaction with the current standard of living in general, measured on a scale from 0 to 10, which ranges from “completely dissatisfied” to “completely satisfied”.

I quantify social participation with the help of two different measures (see [Section B.4](#)). First, I exploit information on how many close friends the individuals have (which may also include family members outside of the household).<sup>11</sup> Moreover, I use information on the activities they participate in as part of an organization or association. The PASS includes a question on whether the respondent is actively engaged in a union, political party, church community, clubs, such as music, sport or culture clubs, or another organization. Based on the responses to this question, I construct a variable ranging from 0 to 5 indicating how many activities the individual is engaged in. To measure social status the relative ranking matters. I make use of a question asked in PASS, where the respondent should rank himself or herself on a 1 to 10 scale, where 1 means belonging to the bottom of society and 10 to the top (see [Section B.5](#)). The self-efficacy index used in this study is introduced and tested by [Schwarzer and Jerusalem \(2006\)](#). It is based on a five item battery where the respondent has to decide whether they “apply completely”, “tend to apply”, “tend not to apply” or “do not apply at all” (see [Section B.6](#)).

## 4. Empirical identification

The aim of this paper is to determine the causal effects of job loss on the dimensions of social exclusion defined in [Section 2](#). The identification of causal effects relies on a comparison of the outcome levels of workers who become unemployed to those of otherwise identical individuals who are still employed. However, in this setting selectivity issues are likely to play a role.

In general, an employment relationship ends either because workers are laid off, their contract expires and is not prolonged or because they quit voluntarily. The PASS-ADIAB does not contain information on mass layoffs or plant closures which could be used to estimate the effects of involuntary job loss, as it is often done in the literature. However, the individual risk of being affected by a mass layoff or plant closure might also be influenced by selection both on the part of the firm as well as by the employee.<sup>12</sup> Firms of a different size, sector or workforce composition face different business risks and vary with respect to their employment contract designs. Similarly, employees might self-select, for instance due to family reasons, to work in firms that are less likely to make layoffs. The German Employment Protection Act (*Kündigungsschutzgesetz*) prescribes the requirements for making workers redundant.<sup>13</sup> This law states that termination with notice is only valid if it is based on reasons relating to either the employees' character, conduct, or urgent operational business requirements. The employer has to undertake a social selection of the relevant employees on the basis of length of employment, age, family support obligations and severe disability. This leads to comparatively flexible individuals with low firm-specific human

<sup>11</sup> Unfortunately, the PASS-ADIAB does not include information on the composition of the social network. The network of unemployed persons might change with a higher proportion of friends also being unemployed and at risk of social marginalization ([Gallie and Paugam, 2003](#)).

<sup>12</sup> See e.g. [Kletzer \(1998\)](#) and [Pfann \(2006\)](#), who discuss the selection of employees who are affected by mass layoffs.

<sup>13</sup> This law applies only to firms that employ at least ten full-time employees.

capital being dismissed first. Furthermore, the plant closure may be not completely exogenous to an individual if individuals who suffer more from unemployment leave the firm as soon as they become aware of a possible closure. The presence of such selection mechanisms might lead to biased treatment effects, whereby the direction of the bias is not clear.<sup>14</sup>

In this paper, I apply a method that takes into account that the individual probability of becoming unemployed might be influenced by unobservable time-invariant factors, such as ability and/or motivation, but also by lower levels of the outcome variables prior to the job loss. For instance, unhappy people, people with few social contacts or those with mental health problems may be more likely to become unemployed. In the empirical analysis, I study how the effects depend on the type of job loss, as the distinction between voluntary and involuntary unemployment allows me to discern more about the self-selection of employees into unemployment and its importance for social exclusion.

The fundamental challenge of causal inference arises because we cannot observe the outcome levels of the same individual simultaneously with and without job loss, which makes it impossible to observe causal effects directly (Imbens and Wooldridge, 2009). To address this issue, I apply inverse propensity score weighting (IPW). The basic idea of this approach is to make those workers who do not experience a job loss comparable in their observable characteristics to workers who do lose their job. This is achieved by downwards weighting the outcome levels for individuals from the control group who are over-represented and placing greater weight on the outcome variables of those who are under-represented. The weights are determined by the propensity score, or the probability of not being employed in the next period ( $T = 1$ ), given observed covariates  $x$ :

$$p(x) = \mathbb{P}(T = 1|X = x) \quad (1)$$

The difference between the weighted outcome levels of the two groups is then a consistent estimate of the effect of job loss on the different dimensions of social exclusion of unemployed individuals (average treatment effect on the treated (ATT)).

The key assumption for identification of the ATT is the conditional independence assumption, which states that, conditional on the propensity score, potential outcomes are independent of the event of job loss (Rosenbaum and Rubin, 1983). To make the assumption that all selectivity is captured by observables reasonable in my application, I make use of a very large set of determinants of job displacement. For instance, the data provide information on sociodemographic characteristics, subjective indicators, individual health status and household situation. In addition, I have detailed information on individual employment histories and previous job characteristics including firm-level characteristics and whether or not the position was a permanent position. The selection of the covariates follows screening of control variables used in other empirical studies on the non-pecuniary effects of job loss (see e.g. Kassenboehmer and Haisken-DeNew, 2009; Marcus, 2013).<sup>15</sup> Moreover, I carefully study the influence of the outcome levels before job loss on the probability of becoming unemployed.

Given concerns over potentially biased results, due to unobserved differences between workers who lose their job and their matched controls, I follow Heckman et al. (1997) who developed a conditional difference-in-differences extension of matching. In this study, I combine IPW with a difference-in-differences approach (IPW-DID), as suggested by Abadie (2005), to eliminate permanent differences that are time-invariant and unobserved by the researcher.

In a first step, I estimate the individual probability of job loss between two consecutive waves by means of a logit model, given a detailed set of observed individual, household, job and firm characteristics. These variables are measured at the first of two consecutive waves, such that their levels are not affected by future job loss. Then, I use the fitted values of the propensity scores to calculate the weights. In a second step, I use the inverse-probability weights to compute weighted averages of the changes between the two survey waves of outcome levels for each treatment level. The estimator is given by

$$\hat{\tau}_{ATT} = \frac{\frac{1}{N} \sum_{i=1}^N \tilde{p}(x_i^{t_0}) \left( \frac{T_i^{t_1} (Y_i^{t_1} - Y_i^{t_0})}{\tilde{p}(x_i^{t_0})} - \frac{(1 - T_i^{t_1}) (Y_i^{t_1} - Y_i^{t_0})}{1 - \tilde{p}(x_i^{t_0})} \right)}{\frac{1}{N} \sum_{i=1}^N \tilde{p}(x_i^{t_0})} \quad (2)$$

where  $T_i^{t_1}$  indicates the event of job loss for individual  $i$ ,  $i = 1, \dots, N$ , in period  $t_1$ .  $Y_i^{t_0}$  and  $Y_i^{t_1}$  denote the observed outcomes of each individual in two consecutive periods  $t_0$  and  $t_1$ . The weights are normalized to ensure that the weighted number of control observations sums up to the number of treated:  $\tilde{p}(x_i^{t_0}) = \frac{\hat{p}(x_i^{t_0})}{\frac{1}{N} \sum_{i=1}^N \hat{p}(x_i^{t_0})}$ , where  $\hat{p}(x_i^{t_0})$  is the estimated probability of job loss conditional on observed characteristics measured in  $t_0$ . Standard errors are obtained by bootstrapping with resampling at the individual level.

The IPW-DID estimator has two major advantages over the classical Fixed Effects estimator which is typically used to study the non-monetary consequences of job loss. It is possible to take reverse causality effects into account, and to make treatment and control group comparable along job and firm-level characteristics which are usually unobserved for unemployed individuals. A comparison of the different estimators shows that the effects are similar in terms of sign and signif-

<sup>14</sup> See e.g. Kassenboehmer and Haisken-DeNew (2009), who argue in favor of an upward bias, vs. Kunze and Suppa (2017), who argue in favor of a downward bias.

<sup>15</sup> In the final specification I rely on a set of covariates that might determine job loss from a theoretical point of view, and which allows differences between unemployed individuals and those still in employment to disappear for an even larger set of variables.

icance, but differ substantially in size. The Fixed Effects estimator provides coefficients which are up to 50% smaller than estimates based on the IPW-DID approach.<sup>16</sup>

The IPW-DID approach identifies the ATT under the assumption that the average outcomes of unemployed and still employed workers follows a parallel trend in the absence of a job loss event. Hence, this approach assumes that both groups are characterized by similar changes, and not by similar levels of the outcome variables in the case of no job displacement. To test for the similarity or divergence, for example due to anticipation of the treatment, I conduct placebo tests by comparing the change in outcomes of both groups in periods before the event of job loss takes place.

## 5. The sample and model diagnostics

### 5.1. Sample selection

The analysis of the impact of job loss on several dimensions of social exclusion is built on the nine waves of PASS (2007–2015). The sample is restricted to respondents who were interviewed in two consecutive waves  $t_0$  and  $t_1$  and whose social security records could be identified. Daily information on employment biographies from the administrative data allow me to determine an individual's current employment status at the interview date. Individuals are either part-time or full-time employed, and do not receive unemployment benefits in the first of two consecutive waves (wave  $t_0$ ). I define two different groups of individuals that can be distinguished by the event of job loss in the second of two consecutive waves (wave  $t_1$ ). The treatment group consists of individuals who stated that they were employed in wave  $t_0$  and are unemployed and not employed in parallel, for instance via a mini job or an active labor market program, in wave  $t_1$ .<sup>17</sup> This means that I am analyzing a combination of short-term and medium-term effects of job loss: the duration of the current unemployment spell ranges between one day and one year. Individuals that belong to the control group are continuously employed between two consecutive waves.<sup>18</sup> The sample is restricted to individuals who are between 18 and 64 years old, not in education and for whom no information on observable characteristics or outcome variables used in the empirical specification are missing. A detailed description of the variables used in this study can be found in [Appendix C \(Tables C.1 and C.2\)](#).

The final estimation sample consists of 635 treated and 17,047 control individuals. Table S.1 in the Supplementary Appendix shows that the same individual might be either in the treatment group, the control group or in both groups several times. Approximately half of the group of workers who lose their jobs, and 11% of the control cases, are individuals who are considered only once in the analysis.

### 5.2. Descriptive statistics

[Table 1](#) shows selected descriptive statistics of the observable characteristics used in the empirical analysis separately for workers that become unemployed, and workers that are continuously employed between two consecutive waves. Additional descriptive statistics are reported in [Table S.2](#) in the Supplementary Appendix. The variables presented in [Tables 1](#) and [S.2](#) can be grouped into the following categories: initial levels of outcome variables, sociodemographics, subjective indicators, household and partner characteristics, characteristics of the previous job and the previous firm, as well as information on the individuals' employment history.

There are substantial differences in the baseline outcome levels for both groups. I find significantly lower levels in all dimensions for workers whose employment relationship ends between two waves, with the exception of the deprivation index; for which I find a significantly higher level, indicating limited access to economic resources. Regarding sociodemographics, I find that men, young workers and workers with an immigration background are more likely to become unemployed. Individual unemployment probabilities are higher for low-skilled individuals. Furthermore, workers who lose their job between two consecutive waves are, on average, less healthy. There are significant differences between both groups with respect to household characteristics. Workers that become unemployed are less frequently married, and are less likely to have children or to be homeowners. Finally, I find a clear pattern when looking at previous job characteristics, as well as the employment history. Individuals that become unemployed have shorter tenures as well as less employment experience, and more often suffer from interruptions caused by periods of unemployment or non-employment. Moreover, they are more often employed on a temporary basis, receive, on average, lower wages and are more likely to work in the production, construction or service industry than individuals who remain employed.

### 5.3. Model diagnostics

In the baseline specification I apply IPW-DID on the pooled sample, based on the nine waves of PASS. In this paragraph, I describe balance diagnostics for assessing whether the specification of the propensity score model has been adequately chosen. The results of the propensity score matching can be found in [Table S.3](#) in the Supplementary Appendix. As shown

<sup>16</sup> The results of the Fixed Effects estimation are available on request.

<sup>17</sup> The linkage of administrative and survey data is only possible up to wave 8. In order to increase the number of observations, I use survey information on the treatment status in  $t_1$  for wave 9.

<sup>18</sup> 94% of the control persons do not change their employer between two consecutive waves  $t_0$  and  $t_1$ .



**Table 1**  
Descriptive statistics.

Job loss	Yes	No	Difference	
<b>Initial outcome levels</b>				
Social integration [1–10]	7.39	7.99	–0.60	***
Life satisfaction [0–10]	6.77	7.43	–0.66	***
Mental health status [1–5]	3.85	4.04	–0.18	***
Deprivation index [0–11]	0.82	0.39	0.43	***
Satisfaction with standard of living [0–10]	6.62	7.39	–0.77	***
Number of close friends	1.98	2.19	–0.21	***
Social engagement [0–5]	0.50	0.77	–0.27	***
Social status [1–10]	5.73	6.28	–0.55	***
Self-efficacy [1–4]	3.03	3.08	–0.04	*
<b>Sociodemographics &amp; household characteristics</b>				
Female	0.41	0.53	–0.12	***
Age	40.93	44.18	–3.25	***
Migrant	0.07	0.04	0.03	***
Married	0.39	0.60	–0.20	***
Number of own children	1.24	1.46	–0.22	***
Home owner	0.22	0.47	–0.25	***
Serious health restrictions	0.25	0.18	0.06	***
PQ: no vocational training	0.17	0.09	0.08	***
PQ: vocational training	0.66	0.64	0.02	*
PQ: advanced vocational training	0.05	0.10	–0.05	***
PQ: academic degree	0.13	0.17	–0.05	***
East Germany	0.30	0.26	0.04	**
<b>Previous job characteristics &amp; employment history</b>				
Permanent contract	0.57	0.86	–0.29	***
Tenure	19.82	71.85	–52.03	***
Daily wage	51.90	77.57	–25.67	***
Sector: Agriculture/Production	0.10	0.17	–0.07	***
Sector: Consumption/Food	0.05	0.07	–0.01	
Sector: Construction	0.09	0.05	0.05	***
Sector: Trade	0.12	0.13	–0.01	
Sector: Transportation/Services I	0.29	0.19	0.10	***
Sector: Services II	0.15	0.07	0.08	***
Sector: Education/Health	0.12	0.20	–0.07	***
Sector: Public	0.08	0.12	–0.05	***
Number of employment periods with ssc	7.86	5.52	2.34	***
Employment duration with ssc	115.72	183.84	–68.12	***
Number of marginal employment periods	1.63	1.14	0.49	***
Marginal employment duration	12.71	16.77	–4.06	***
Number of unemployment periods	4.53	2.30	2.23	***
Unemployment duration	68.17	30.44	37.74	***
Number of non-employment periods	2.92	2.07	0.85	***
Non-employment duration	41.51	40.69	0.81	
Number of observations	635	17,047		

Notes: PQ: Professional qualification. ssc: social security contributions. Differences are statistically significant at the \*10%, \*\*5% and \*\*\*1% level. Source: PASS-ADIAB 7515, own computations.

in the previous subsection, before weighting, individuals that become unemployed and those who remain employed differ with respect to most determinants of job loss as well as the baseline levels of the social exclusion measures. Following Austin (2011) and Guo and Fraser (2015), I examine the standardized differences in means after weighting between individuals who become unemployed and those who do not, in order to test for balance. The standardized difference gives the difference in averages by treatment status, scaled by the square root of the sum of the variances, formally given by

$$d = \frac{(\bar{x}_{treatment} - \bar{x}_{control})}{\sqrt{\frac{S_{treatment}^2 + S_{control}^2}{2}}} \quad (3)$$

where  $\bar{x}_{treatment}$  and  $\bar{x}_{control}$  denote the sample means, and  $S_{treatment}^2$  and  $S_{control}^2$  the sample variances for the treatment and control group respectively. Moreover, I also look at variance ratios. A perfectly balanced covariate has a standardized difference of zero and variance ratio of one. Austin (2011) points out that there exists no universally agreed upon criterion for how small a standardized difference has to be to provide balance. I follow his rule of thumb, according to which a standardized difference of less than 0.1 is taken to indicate a negligible difference in the means of the treated and control groups.

**Table 2**  
Baseline results for the consequences of job loss.

Change in outcomes	Effect of job loss	Standard error	Standard deviation
<b>Social integration</b>	–0.338***	(0.058)	1.602
<b>Well-being and mental health</b>			
Life satisfaction	–0.554***	(0.063)	1.330
Mental health status	–0.311***	(0.047)	1.152
<b>Economic resources</b>			
Deprivation index	0.602***	(0.073)	0.493
Satisfaction with standard of living	–0.535***	(0.061)	1.451
<b>Psychosocial needs</b>			
Social participation			
Number of close friends	–0.049	(0.043)	1.084
Social engagement	–0.048	(0.039)	0.650
Social status	–0.246***	(0.051)	1.354
Self-efficacy	–0.191***	(0.064)	0.379

Notes: Estimates from IPW-DID are based on 634 treated and 17,047 control persons (the estimates for self-efficacy are based on 417 treated and 10,359 control persons). The propensity of job loss is based on a logit model with the control variables reported in Tables C.1 and C.2 in Appendix C. The differences in the outcome variables are standardized. Standard errors are bootstrapped with 2,500 replications. Coefficients are statistically significant at the \*10%, \*\*5% and \*\*\*1% level.

Source: PASS-ADIAB 7515, own computations.

The balancing tests for the baseline specification can be found in Table S.4 in the Supplementary Appendix. This table shows that the standardized differences are close to zero, and the variance ratios are close to one for a large set of covariates; larger than the set of covariates included in the baseline specification.<sup>19</sup>

The large number of non-treated in comparison to treated individuals (ratio 1:27) enhances the probability of finding a suitable control group, which is confirmed by the balancing test showing that the treated and the weighted control group are comparable with respect to the large set of covariates. Although I include a lot of control variables, the explanatory power of the propensity score estimation is rather low (see pseudo- $R^2$  in Table S.3 in the Supplementary Appendix). This helps to fulfill the common support assumption, as some randomness in the treatment assignment is needed to observe persons with identical characteristics in both states (Heckman et al., 1998). Table S.6 in the Supplementary Appendix shows summary statistics of the propensity scores separately for the unemployed and individuals still in work. In order to guarantee sufficient overlap between treatment and control group, I follow Lechner and Strittmatter (2017) who suggest dropping those treated observations with propensity score values above the maximum value of the non-treated individuals. This procedure reduces the number of treated observations by one person, which leads to a final estimation sample of 634 individuals who become unemployed between two consecutive waves and 17,047 individuals that remain employed.<sup>20</sup>

## 6. Empirical findings

This section presents the baseline results for the IPW-DID estimates of the effect of job loss on the different dimensions of social exclusion as defined in Section 2.2. In a further step, I look at heterogeneous effects for subgroups defined by sociodemographic characteristics, as well as type of job loss and duration of unemployment spell. Finally, I discuss the robustness of the results.

### 6.1. Baseline results

Table 2 presents the estimation results of the baseline specification. The number of observations is constant for all outcomes, with the exception of the self-efficacy index. The measure of self-efficacy is not available in waves 5 and 9, which leads to roughly 40% fewer observations. The results show that individuals who become unemployed experience a large decrease in multiple dimensions. The changes in the outcome variables are standardized, in order to allow for better com-

<sup>19</sup> The baseline specification uses information for 46 covariates. These variables are partially decomposed into dummy variables, leading to 99 control variables in total. I conduct several robustness checks to examine the sensitivity of the choice of covariates included in the estimations. Table S.3 in the Supplementary Appendix presents the estimation results for a larger set of covariates, e.g. including the “Big Five” personality traits: extraversion, tolerance, conscientiousness, neuroticism and openness, as well as an aggregation of the control variables to independent factors using factor analysis. The results are comparable to the baseline specification.

<sup>20</sup> Lechner and Strittmatter (2017) point to the fact that the performance of estimators can be improved by dropping control persons with propensity score values close to one. Those units obtain large weights, and are hence particularly influential in the estimates of the ATT. However, as Table S.6 in the Supplementary Appendix shows, control observations with propensity score values close to one do not play a role in my application.

parability of the estimated effect sizes.<sup>21</sup> My findings provide evidence that job loss is accompanied by a decrease in the overall assessment of social integration and subjective well-being. The estimated short- and medium-term effects on life satisfaction are stronger: job loss leads to a decrease of 0.55 standard deviations (SDs) in life satisfaction, compared to 0.34 SDs in social integration. My results further suggest that job loss may be associated with severe mental health problems. Becoming unemployed reduces mental health by 0.31 SDs. Moreover, I find that the deprivation index, which represents a measure of poverty, increases substantially by 0.60 SDs while satisfaction with the standard of living decreases by 0.54 SDs.

The psychosocial needs that are typically met by an employment relationship are partly influenced by periods of unemployment; I find no relationship between unemployment and social participation. There is no change in the number of close friends or activities an individual is engaged in due to job loss. The variable social status, which measures an individual's relative position in society, decreases by 0.25 SDs if an individual becomes unemployed. The results imply a negative and significant effect of 0.19 SDs on the self-efficacy index, which measures an individual's ability to cope with demanding situations.

To summarize, the largest negative short- and medium-term effects of job loss can be found with respect to economic resources and life satisfaction. The effect size on life satisfaction is comparable to results found in the literature (see e.g. Clark et al., 2008; Kassenboehmer and Haisken-DeNew, 2009). The individual's perception of social integration and mental health status are affected by the same magnitude, while the impact on social status and self-efficacy are slightly weaker. The effect sizes on social integration and mental health status are somewhat smaller than the findings in the sociological and psychological literature (see e.g. Gundert and Hohendanner, 2014; Paul and Moser, 2009). Furthermore, I find no effect of becoming unemployed on social engagement or the number of close friends, which is in line with the findings of Kunze and Suppa (2017), who find no effects of unemployment on volunteering or active participation in sports.

## 6.2. Heterogeneous treatment effects

*Heterogeneous effects by sociodemographic characteristics.* Individuals may react differently to unemployment, for example, due to heterogeneity in commitments to work, or due to expectations about their chances of becoming reemployed. For instance, I expect stronger negative effects of job loss for men than for women, as the social norm's pressure to work may be higher for men and women may consider alternative roles to substitute employment (Hetschko et al., 2014).

Human capital might also be highly relevant for an individual's chances of reemployment. It has been shown that high-skilled workers face a lower risk of becoming long-term unemployed, both due to a greater job search intensity, and increased likelihood of reemployment, when compared to unemployed individuals with lower levels of education (see e.g. Farber, 2005; Riddell and Song, 2011). This may ease high-skilled individuals anxiety during unemployment. Furthermore, being highly educated might also help in coping with shocks like job loss (Bonanno, 2004). Hence, I would expect smaller negative effects of unemployment for high-skilled individuals.

Following the reasoning of Paul and Moser (2009), having a partner can buffer the negative effects of unemployment by offering social support as well as helping to stabilize the household's financial situation.

Based on these considerations, I estimate results separately for men and women, low-/medium-skilled and high-skilled workers and for individuals who have a partner and those who do not. For each of these subgroups I repeat the two-step estimation procedure described in Section 4, and drop treated observations that are off support. In this way, I ensure that observable characteristics are balanced between treated and control individuals for each subgroup.

I find no evidence for substantial effect heterogeneity by gender other than for social engagement (see columns (1) and (2) of Table 3). I do find that men reduce their social activities significantly, although this effect is comparatively small. The results in columns (3) and (4) of Table 3 confirm the hypothesis that low- and medium-skilled individuals feel the effects of unemployment more strongly.<sup>22</sup> The negative effects of job loss are stronger in every dimension, with the exception of economic resources, for which the results are comparable. In particular, low- and medium-skilled workers are significantly more dissatisfied with their lives (difference of 0.38) than high-skilled. The fact that I find no effect of becoming unemployed on self-efficacy for highly educated individuals confirms the hypothesis that this group of workers can cope better with the unemployment shock.

With respect to family status, I find some weak evidence that individuals who have a partner experience less harsh effects from unemployment than single people do (columns (5) and (6)). This is particularly true for life satisfaction and financial restrictions.

*Heterogeneous effects by amount of time since and type of job loss.* In this subsection, I analyze the effects of job loss on social exclusion dependent on the length of the unemployment spell, and whether or not entry into unemployment was voluntary. The effects of unemployment might become more severe the lengthier the duration of unemployment, as stress factors such as financial pressure or unsuccessful job applications might accumulate with prolonged unemployment

<sup>21</sup> Figure S.1 in the Supplementary Appendix presents the distributions of changes in outcome variables between two consecutive waves.

<sup>22</sup> Low-skilled individuals are defined as having no professional qualification, medium-skilled as having a vocational training and high-skilled as having an advanced vocational training or an academic degree.

**Table 3**  
Heterogeneous effects by sociodemographic characteristics.

Specification	(1) Men	(2) Women	(3) Low-/medium- skilled	(4) High- skilled	(5) Partner	(6) No partner
Change in outcomes	Effect of job loss					
<b>Social integration</b>	–0.327*** (0.082)	–0.340*** (0.078)	–0.356*** (0.064)	–0.136 (0.155)	–0.366*** (0.068)	–0.251** (0.117)
<b>Well-being and mental health</b>						
Life satisfaction	–0.478*** (0.085)	–0.587*** (0.085)	<b>–0.593***</b> (0.069)	<b>–0.212</b> (0.146)	–0.414*** (0.072)	–0.679*** (0.210)
Mental health status	–0.311*** (0.073)	–0.317*** (0.069)	–0.335*** (0.052)	–0.129 (0.127)	–0.361*** (0.062)	–0.249*** (0.077)
<b>Economic resources</b>						
Deprivation index	0.667*** (0.109)	0.544*** (0.101)	0.607*** (0.076)	0.527** (0.208)	0.440*** (0.096)	0.689*** (0.145)
Satisfaction with standard of living	–0.517*** (0.081)	–0.543*** (0.084)	–0.537*** (0.066)	–0.446** (0.174)	–0.418*** (0.067)	–0.675*** (0.182)
<b>Psychosocial needs</b>						
Social participation						
Number of close friends	–0.018 (0.064)	–0.091 (0.061)	–0.045 (0.048)	–0.119 (0.119)	–0.022 (0.059)	–0.090 (0.077)
Social engagement	<b>–0.105**</b> (0.053)	<b>0.045</b> (0.057)	–0.070* (0.043)	0.052 (0.116)	–0.047 (0.051)	–0.103 (0.110)
Social status	–0.228*** (0.072)	–0.236*** (0.071)	<b>–0.277***</b> (0.054)	<b>–0.006</b> (0.140)	–0.199*** (0.062)	–0.227** (0.112)
Self-efficacy	–0.183 (0.112)	–0.207** (0.098)	–0.229*** (0.070)	0.102 (0.203)	–0.132 (0.087)	–0.193 (0.142)

Notes: Estimates from IPW-DID are based on 374 treated and 8,053 control persons in specification (1), on 255 and 8,994 in (2), on 524 and 12,401 in (3), on 110 and 4,646 in (4), on 346 and 12,146 in (5) and on 284 and 4,901 in (6). The propensity of job loss is based on a logit model with the control variables reported in Tables C.1 and C.2 in Appendix C. Standard errors are bootstrapped with 2,500 replications (in parentheses). Coefficients are statistically significant at the \*10%, \*\*5% and \*\*\*1% level. Differences in the effects of job loss between subgroups that are significantly different from zero at the 10% level are indicated by bold numbers. Source: PASS-ADIAB 7515, own computations.

(Paul and Moser, 2009).<sup>23</sup> In contrast, individuals could become accustomed to their situation leading to a decrease in effect sizes over time. However, as the empirical literature on subjective well-being points to little or no habituation to unemployment (see e.g. Clark et al., 2008), I expect stagnating or stronger effects the longer the duration of unemployment.

The negative effects of unemployment are likely to vanish as soon as the individual finds a job again. However, Clark et al. (2001) find evidence that employees with past unemployment experience have lower levels of life satisfaction, suggesting that the negative experience of job loss can also be long-lasting, even if the individual becomes reemployed. Finally, I expect smaller negative or even ambiguous effects of job loss if it is a voluntary decision on the part of the individual to become unemployed.

I begin by empirically testing the hypothesis that the negative consequences of job loss become more severe the longer the duration of unemployment. To do so, I consider the change in outcome levels two waves after becoming unemployed, in case the individual has still not found a job at this time. Furthermore, I distinguish individuals who have been unemployed for at least six months and less than six months at the interview date after job loss. The results are reported in columns (2), (3) and (4) of Table 4, and suggest that the negative consequences of job loss become more severe the longer the duration of unemployment. The coefficients in column (2) indicate that this is particularly true with respect to life satisfaction (decrease by 0.27) and economic resources (the deprivation index increases by 0.34, and satisfaction with current standards of living decreases by 0.30). The estimated coefficients point in the same direction when looking at the unemployment duration at the first interview date after job loss (columns (3) and (4)).

Individuals who experience periods of unemployment between two waves, but are employed again in the second of two consecutive waves, are not included in my analysis so far as their outcome levels are measured during periods of employment. Column (5) in Table 4 shows the estimates for treated individuals who are reemployed in  $t_1$ . I find that individuals whose employment relationship is interrupted by a period of unemployment still have worse outcomes on most dimensions. These results suggest that unemployment has long-lasting negative effects even for the currently employed.

<sup>23</sup> In Germany, unemployed individuals usually receive insurance-based unemployment benefits amounting to 60% (67% for claimants with children) of their previous net salary for a period of 12 months. After the expiration of insurance-based benefits, needy individuals receive means-tested benefits which implies a considerable reduction in payments.

**Table 4**  
Heterogeneous effects by time since and type of job loss.

Specification	(1) Baseline	(2) Unempl. in $t_2$	(3) $\geq 6$ months unempl.	(4) < 6 months unempl.	(5) Reempl. in $t_1$	(6) Laid off	(7) Other job loss
Change in outcomes	Effect of job loss						
<b>Social integration</b>	−0.338*** (0.058)	<b>−0.516***</b> (0.120)	−0.335*** (0.079)	−0.333*** (0.074)	<b>−0.061*</b> (0.032)	−0.374*** (0.092)	−0.298*** (0.078)
<b>Well-being and mental health</b>							
Life satisfaction	−0.554*** (0.063)	<b>−0.825***</b> (0.119)	−0.586*** (0.088)	−0.540*** (0.074)	<b>−0.100***</b> (0.035)	−0.546*** (0.083)	−0.564*** (0.087)
Mental health status	−0.311*** (0.047)	−0.445*** (0.103)	−0.240*** (0.069)	−0.332*** (0.059)	<b>−0.057*</b> (0.029)	−0.362*** (0.067)	−0.254*** (0.071)
<b>Economic resources</b>							
Deprivation index	0.602*** (0.073)	<b>0.941***</b> (0.158)	<b>0.813***</b> (0.120)	<b>0.504***</b> (0.088)	<b>0.139***</b> (0.042)	0.576*** (0.102)	0.643*** (0.113)
Satisfaction with standard of living	−0.535*** (0.061)	<b>−0.829***</b> (0.121)	−0.602*** (0.087)	−0.474*** (0.071)	<b>−0.206***</b> (0.035)	−0.556*** (0.082)	−0.494*** (0.086)
<b>Psychosocial needs</b>							
Social participation							
Number of close friends	−0.049 (0.043)	−0.098 (0.082)	−0.127** (0.062)	−0.001 (0.056)	−0.013 (0.029)	−0.043 (0.070)	−0.024 (0.062)
Social engagement	−0.048 (0.039)	<b>0.083</b> (0.069)	−0.041 (0.057)	−0.066 (0.047)	−0.014 (0.027)	−0.036 (0.048)	−0.025 (0.064)
Social status	−0.246*** (0.051)	<b>−0.426***</b> (0.107)	−0.212*** (0.073)	−0.262*** (0.062)	<b>−0.073**</b> (0.031)	<b>−0.381***</b> (0.074)	<b>−0.157**</b> (0.071)
Self-efficacy	−0.191*** (0.064)	−0.273* (0.146)	<b>−0.068</b> (0.100)	<b>−0.281***</b> (0.077)	<b>−0.042</b> (0.041)	−0.201** (0.095)	−0.192** (0.095)

Notes: Unempl.: unemployed, Reempl.: reemployed. Estimates from IPW-DID are based on 634 treated and 17,047 control persons in specification (1), (3)–(7), on 180 and 12,884 in (2), on 265 treated in (3), on 362 in (4), on 1,287 in (5), on 341 in (6) and on 242 in (7) (for 48 treated this information is missing). The propensity of job loss is based on a logit model with the control variables reported in Tables C.1 and C.2 in Appendix C. Standard errors are bootstrapped with 2,500 replications (in parentheses). Coefficients are statistically significant at the \*10%, \*\*5% and \*\*\*1% level. Differences in the effects of job loss between subgroups that are significantly different from zero at the 10% level are indicated by bold numbers. Source: PASS-ADIAB 7515, own computations.

Finally, I show results separately for individuals who are laid off and those whose contract expired or who quit their job voluntarily (specification (6) and (7) in Table 4).<sup>24</sup> In my sample, 58% of all workers for whom the information is available become unemployed due to dismissal by the employer. This number is comparable to Kassenboehmer and Haisken-DeNew (2009), who found a share of involuntary job losses of 56% of all new entries into unemployment. The results suggest a larger effect of being laid off on social status. The other coefficients do not differ much.

### 6.3. Sensitivity analysis

**Propensity score estimators.** In this subsection, I conduct some sensitivity checks to examine the robustness of my findings (see Tables D.1 and D.2 in Appendix D). In a first step, I check the robustness of my results with respect to the choice of the propensity score estimator. The review article of Imbens and Wooldridge (2009) discusses in great detail the properties of different estimators which are standard in the treatment effects literature. In comparison to simple matching estimators, which impute the missing potential outcomes of the treated individuals with outcome levels of nearest neighbors of the comparison group, IPW can be more efficient. This is likely to be the case when the control group is much larger than the treatment group, as is the case in this study. Moreover, IPW is fast, easy to implement and it avoids the requirement of choosing a tuning parameter. Hence, finding an optimal value for the number of nearest neighbors for nearest-neighbor matching, a caliper for radius caliper matching or a bandwidth for kernel matching is not needed. Imbens and Wooldridge (2009) point out that with IPW estimators, concerns arise when the covariate distributions of the two treatment groups are substantially different, implying that the propensity score is close to one. This does not play a large role in this application as no unit has a propensity score above 85% (see Section 5.3). Another concern is that in this case the parametric model of choice for calculating the propensity score, such as probit vs logit, becomes more important. To address this issue, specification (2) of Table D.1 shows the estimation results when applying a probit rather than a logit estimation of the probability of job loss. Moreover, I compare the results of the baseline specification to results obtained by alternative estimators (specifications (3) and (4) of Table D.1): IPW with regression adjustment (see e.g. Wooldridge, 2007) and radius matching with bias adjustment (see e.g. Huber et al., 2013). Overall, the estimates are not sensitive to the choice of the model specification.

<sup>24</sup> Unfortunately, the administrative data and the survey data do not provide any additional information on the reasons for a job loss (such as health, misbehavior or plant closure). Potential shortcomings of this issue are discussed in Section 7.4.



*Sample selection.* In a second step, I conduct several robustness checks with respect to the sample selection. I begin by using the exact information from the administrative data to define the treatment status, rather than relying on survey data, in case administrative information is missing (specification (2) of Table D.2). Next, I only consider individuals who experience a job loss and those who have never experienced a job loss (specification (3) of Table D.2). Finally, specification (4) of Table D.2 shows the results for an estimation sample which includes only the first observation of each individual. In this specification, the number of individuals that become unemployed decreases to 411 and the number of individuals that remain employed between two consecutive waves to 5,499. The estimated coefficients in all specifications are comparable to the baseline specification.

#### 6.4. Placebo tests

Finally, I test the reliability of my results by conducting placebo tests. In particular, I estimate the effect of job loss on the change in outcomes between wave  $t_{-1}$  and  $t_0$ . If the outcomes are affected in periods before the job loss occurs, this would suggest either the treatment or the control group are still systematically different, or that anticipation effects play a role. The results of the placebo test shown in Table D.3 in Appendix D do not indicate any significant effects. In addition, Fig. D.1 in Appendix D presents the mean of the outcome variables in levels in the consecutive waves  $t_{-3}$ ,  $t_{-2}$ ,  $t_{-1}$ ,  $t_0$  and  $t_1$  separately for treated and control individuals before and after inverse propensity score weighting. While there are highly significant differences between the treated and control groups before weighting in the time period before job loss, these differences vanish after weighting.<sup>25</sup> Furthermore, Fig. D.1 illustrates the importance of selection into treatment based on observed characteristics. The plots show a positive trend in most outcomes for the control group after IPW, whereas the trend is instead zero for the control group prior to IPW. This is also confirmed when looking at the results of an unconditional difference-in-differences estimation, whose estimated coefficients are substantially smaller than the estimates obtained by IPW-DiD.<sup>26</sup> All in all, the placebo tests indicate that the treatment and weighted control groups are similar with respect to changes in outcomes in earlier periods.

### 7. Discussion of results

This study provides evidence that unemployment leads to social exclusion. I view social exclusion as a multidimensional process, by focusing both on subjective assessments and access to resources which affect individual choices. The empirical results suggest that the strongest effects of unemployment are on life satisfaction, and economic resources. Job loss directly leads to a reduction in disposable income, while the other dimensions are only affected indirectly. The large decrease in subjective well-being may be attributed to the fact that all economic, psychological and social costs caused by unemployment are reflected in this outcome variable. This argument is supported by the empirical finding that there exists no effect heterogeneity for voluntarily and involuntarily unemployed individuals; suggesting that the costs of unemployment clearly outweigh the benefits.

In comparison to subjective well-being and economic resources, I find slightly weaker, though still significant, negative effects on perceived social integration, mental health, social status and self-efficacy. These findings confirm the theoretical considerations regarding the comorbidity of unemployment and subjective feelings of social exclusion, depression and anxiety, a lower perceived social status and self-doubt. Finally, I do not find a significant effect on social participation. One possible explanation for this finding is that the time spent on meeting friends and social engagement is affected by unemployment rather than the absolute number of close friends and organizations the individual is engaged in. Unfortunately, I do not have information on the frequency of participation in social activities.

The following subsections are intended to shed some light on the mechanisms behind the observed effects, investigating in greater detail the monetary channel, the relationship between the outcome variables and the meaning of social exclusion for labor market prospects. I will conclude with a general discussion of the interpretability of my results.

#### 7.1. Economic resources

In this paper, I concentrate on a measure of deprivation which captures both the non-availability of basic goods, and non-participation in activities. The aim of this subsection is to study in greater detail these two facets of deprivation as well as the relationship between deprivation and income. In a first step, I split the deprivation index into two variables: basic goods and activities, and subsequently investigate the impact of job loss on these two measures. In Table 5, specification (1) shows that deprivation is primarily caused by a lack of participation in activities due to financial constraints. The ‘activities’ are those actions considered critical for maintaining an appropriate standard of living, such as paying bills on time or going on vacation. In a second step, I include the change in monthly net household income as a control variable, as income is

<sup>25</sup> The number of observations decreases considerably the further I go back in time. The difference in outcome levels between treatment and control group after IPW is insignificant for each outcome variable in the time periods before job loss, except for mental health status in  $t_{-2}$ , deprivation in  $t_{-1}$  (significant at 10% level) and number of close friends in  $t_{-2}$  (significant at 5% level). However, the reduced number of observations and the three mentioned differences in outcome levels do not lead to diverging trends across both groups.

<sup>26</sup> These estimates are available on request. The results of the IPW-DiD are very similar to the results of a conditional difference-in-difference specification.

**Table 5**  
Effects of job loss on deprivation.

Specification	(1) Without income	(2) With income
Change in outcomes	Effect of job loss	
Non-availability of basic goods	0.254*** (0.073)	0.214*** (0.075)
Non-participation in activities	0.601*** (0.070)	0.466*** (0.074)

Notes: Estimates from IPW-DID are based on 635 treated and 17,047 control persons in specification (1) and on 619 and 16,762 in (2). Specification (2) includes the change in log net household income as additional control variable. The indexes are calculated in a similar way as the deprivation index (see Section B.3 in Appendix B). The propensity of job loss is based on a logit model with the control variables reported in Tables C.1 and C.2 in Appendix C. The differences in the outcome variables are standardized. Standard errors are bootstrapped with 2,500 replications. Coefficients are statistically significant at the \*10%, \*\*5% and \*\*\*1% level. Source: PASS-ADIAB 7515, own computations.

likely to be a crucial determinant of deprivation. The effect of job loss on deprivation becomes smaller but is still present (see specification (2)).<sup>27</sup> One possible explanation for this finding is that unemployed individuals reduce consumption even if their income level remains unchanged due to uncertainty about future income flows (precautionary savings motive). This suggests that income alone is an insufficient measure of the material living situation of an individual.

## 7.2. Relation of outcomes

The aim of this subsection is to shed more light on the relationship between the outcomes under consideration. As discussed in Section 2.1, the dimensions of social exclusion are interdependent and likely highly correlated. To investigate these dependencies more closely, Table D.4 in Appendix D shows a simple correlation matrix of the outcome variables. I find that satisfaction with standard of living and with life in general are particularly highly correlated (correlation coefficient of 0.64). Moreover, the correlations between the subjective measures of social integration, life satisfaction, satisfaction with standard of living and social status are comparatively high (correlation coefficients of around 0.5). The other dimensions are also interdependent, but to a lesser extent. Overall, the correlation matrix suggests that the studied outcomes are indeed related but do measure different aspects of social exclusion.

In a further step, following the literature on subjective well-being, mental health and perceived social integration, I investigate how these outcomes are influenced by access to economic resources and fulfillment of psychosocial needs with help of Fixed Effects regressions.<sup>28</sup> Table D.5 in Appendix D shows that the feeling of being part of society depends on both economic resources and psychosocial functions, whereby the relevance of social status and self-efficacy is highest. The same pattern is observed with respect to life satisfaction, but there is no clear link with social engagement. Mental health status is mainly related to economic resources and self-efficacy.<sup>29</sup> These findings hint that the loss of self-efficacy, and thus the loss of a sense of self and purpose in life, can, in part, explain the negative effects of unemployment on social integration, life satisfaction and mental health status. The lower perceived social status is an important determinant of reduced social integration and well-being, while deprivation is more important in explaining mental health problems. However, this analysis is mostly descriptive as the different dimensions of social exclusion can mutually reinforce each other. For instance, it is not clear whether the feeling of social exclusion is determined by a loss of close friends or self-efficacy, or whether the loss is a result of the subjective experience of social exclusion.

This subsection ends with a discussion of the potential channels via which unemployed individuals are socially excluded, which cannot be analyzed with the given data set. The individual perception of labor market attachment and uncertainty might also influence whether or not individuals feel like they are a part of society. Job loss can come along with discouragement effects, stigmatization, the decay of human capital and living in deprived neighborhoods. This can, in turn, lead to both decreased job search efforts, and a reduced chance of being rehired, and hence, to lengthier spells of unemployment (see e.g. Atkinson and Kintrea, 2001; Biewen and Steffes, 2010; Pissarides, 1992). The importance of labor market prospects has previously been investigated, for instance by Clark et al. (2010), who show that unemployed individuals with poor reemployment prospects are worse off than the unemployed with better prospects. In general, unemployed individuals are likely to face greater uncertainty compared to employed workers, as their situation might require a change of residence or getting

<sup>27</sup> When interpreting the results, it should be kept in mind that including post-treatment variables, such as income, can bring about the so-called ‘bad control’ problem when unemployment changes the composition of the pool of individuals with a certain income level.

<sup>28</sup> I do not include satisfaction with standard of living in these analyses, as this subjective measure is highly related to deprivation and life satisfaction.

<sup>29</sup> These interdependencies between outcomes are confirmed by a comparison of the adjusted- $R^2$  in regressions with successive addition of the variables measuring economic resources and psychosocial needs (see Table D.6 in Appendix D).

involved with new social groups (Gundert and Hohendanner, 2014). In addition, the loss of trust in institutions and experiences of discrimination may also foster social exclusion (Helliwell and Wang, 2011; Murie and Musterd, 2004). To capture these channels it would require, for instance, measures on the subjective perception of job prospects, discrimination experiences and trust in institutions. Unfortunately, the PASS does not contain questions reflecting information on these potential channels. However, these factors are likely to influence the studied outcomes and might partially explain the large negative effects of job loss on these dimensions of social exclusion.

### 7.3. Employment prospects

From an economic perspective, social exclusion is strongly related to exclusion from the labor market. Obsolete skills, living in deprived neighborhoods and discouragement effects might in turn considerably reduce individual employment prospects, hence leading to long-term dependency on social welfare. The outcomes I am looking at should be highly related to employment prospects, as social capital, emotional stability and personality traits such as self-efficacy are important determinants of reemployment probabilities (see e.g. Darity and Goldsmith, 1996; Helliwell and Putnam, 2004).

In this subsection, I investigate the relevance of the outcomes under consideration for reemployment prospects of unemployed individuals. Table D.7 in Appendix D presents the coefficients of a logit estimation of the probability to search for a job in  $t$ , and the likelihood of finding a job in  $t + 1$ , based on a stock sample of unemployed individuals.<sup>30</sup> The results are shown for all individuals who indicate that they are currently looking for a job (specification (1)), as well as those for whom information on job-seeking activities are available in both periods  $t$  and  $t + 1$  (specification (2) and (3)). The findings show that panel attrition does not change the conclusions. The analysis suggests that a higher perceived social integration, number of close friends, social engagement and self-efficacy has a positive impact on both the probability of searching for and finding a job. However, unemployed individuals who are happy with their lives are both less likely to search for a job and to exit unemployment. Individuals who are more financially constrained are more likely to search, though less likely to find a new job. The lower reemployment rate of this group could, for instance, stem from poor local labor market conditions or stigma effects.

Overall, I find some evidence that social exclusion can worsen the employment prospects for unemployed individuals. This could be the beginning of a vicious circle: low reemployment probabilities may again foster social exclusion. The subgroup analyses for less educated and long-term unemployed give a hint that individuals with low reemployment prospects are particularly affected by social exclusion.

### 7.4. General remarks

There are some general issues that are worth mentioning here, and which have to be kept in mind when interpreting the results. My identification strategy relies on the assumption that the change in outcome variables is only due to the unemployment shock, and that the treatment and control groups are characterized by otherwise similar changes in the absence of such an event. Although the placebo tests shown in Section 6.4 substantiate this assumption, it cannot be completely ruled out that becoming unemployed coincides with other unobservable individual shocks, e.g. health shocks, misbehavior at the firm or a deterioration in working conditions. As information on the outcome levels are only available on a yearly basis, it may be the case that these factors lower the outcome levels and thus an individual's performance on the job. If this were the case, I would overestimate the negative impact of unemployment and my results should then be interpreted as upper bounds of the absolute size of the negative effect on social exclusion.

Finally, it should be kept in mind that the data set PASS oversamples low income households. On the one hand, low income households face a higher risk of job loss, which facilitates the finding of a suitable control group. On the other hand, medium and high income individuals are underrepresented in this study which may lead to a lack of generalizability, wherein the results cannot be interpreted as average effects for all employees. Studying the effects separately for low-/medium-skilled and high-skilled individuals hints at how the findings are affected by the sample selection. As I find larger negative effects for low-/medium-skilled individuals, the estimated coefficients are likely to represent an upper bound.<sup>31</sup>

## 8. Conclusion

In this paper, I empirically assess the economic and social consequences of job loss. While the number of economic studies on the relationship between unemployment and measures of social integration are quite rare, studies in the field of psychology and sociology point to social exclusion following unemployment. These studies typically rely on survey data alone, cannot rule out bias due to unobservables or reverse causality, and also do not examine the multidimensionality of the consequences of job loss in any great detail.

<sup>30</sup> It is not possible to study the effects for the inflow sample of unemployed individuals due to sample size restrictions. This analysis relies on a stock sample, leading to the fact that unemployed individuals with bad employment prospects are overrepresented (only 20% of them are employed in  $t + 1$ ).

<sup>31</sup> These considerations are supported when directly looking at heterogeneous effects by household income; individuals with a low household income prior to job loss suffer more from unemployment.

By applying inverse propensity score weighting combined with differences-in-differences, I study the causal impact of unemployment on different dimensions of the process of social exclusion. I find the strongest negative effects in terms of size on life satisfaction and economic resources, slightly weaker negative effects on perceived social integration, mental health, social status and self-efficacy and no effect on social participation. The results suggest that, aside from financial constraints which go beyond the loss in income, an individuals' perception of social exclusion, of lower social status and of their own failure are important explanations for the negative effects of unemployment. As the studied outcomes are interdependent, the negative effects on economic resources and psychosocial functions can partially explain the large drop in perceived social integration, life satisfaction and mental health. However, there may be additional mechanisms that drive marginalization from society, such as an individual's perception of labor market prospects, discrimination experiences and a lost in trust that could not be tested due to data limitations. Analyzing these potential dimensions of social exclusion is an important topic for future research.

Studying the effects of job loss for different subgroups and over time gives some hints as to who is particularly affected by social exclusion, and on the dynamic component of the process. My results suggest that less educated individuals suffer more from unemployment. In addition, I find that the effects are long-lasting in the sense that individuals who are unemployed for more than one year perceive a greater degree of social exclusion, are unhappier and are more financially constrained. The negative effects of job loss are still present even if the individual becomes employed again.

From an economic perspective, social isolation carries a risk of individuals ending up in a state with low reemployment prospects. The results of this study could provide new insights into the effectiveness of active labor market policy programs with respect to reducing this risk. While the effects of government sponsored programs on reemployment probabilities are rather mixed (for an overview, see e.g. [Bergemann and van den Berg, 2008](#); [Card et al., 2018](#)), temporary employment, for instance in the form of job creation schemes or wage subsidies, might foster the reintegration of the unemployed into society. Along these lines, the German government recently launched the federal program “*soziale Teilhabe am Arbeitsmarkt*” to promote the social inclusion of long-term unemployed individuals (see [IAQ et al., 2018](#)). From a policy perspective, it is important to design employment measures that counteract the psychosocial costs of unemployment. Programs that positively influence the perceived social status and the self-efficacy might prevent individuals from feeling rejected by society and thus avoid the onset of a downward spiral ending in long-term unemployment.

## Appendix A. PASS Data Addendum

**Table A.1**  
Number of interviews.

Sample	Number of interviews	Refreshment sample
1st wave (2006/07)	18,954 individuals living in 12,794 households	
2nd wave (2007/08)	12,487 individuals living in 8,429 households	1,041 households
3rd wave (2008/09)	13,439 individuals living in 9,535 households	1,186 households
4th wave (2010)	11,768 individuals living in 7,848 households	748 households
5th wave (2011)	15,607 individuals living in 10,235 households	753 households
6th wave (2012)	14,619 individuals living in 9,513 households	961 households
7th wave (2013)	14,449 individuals living in 9,509 households	949 households
8th wave (2014)	13,460 individuals living in 8,998 households	795 households
9th wave (2015)	13,271 individuals living in 8,921 households	900 households

Notes: The panel household sample in wave 5 was supplemented for both recipients of Unemployment Benefit II and the general population sample from new postcode regions in wave 4.

Source: [Bethmann et al. \(2016\)](#).

**Table A.2**  
Agreement on linkage of survey data to administrative data.

Sample	Number of interviews with question on linkage	Number of interviews with agreement on linkage	in %
1st wave (2006/07)	17,249	13,766	79.8
2nd wave (2007/08)	3,358	2,560	76.2
3rd wave (2008/09)	2,656	2,128	80.1
4th wave (2010)	2,032	1,774	87.3
5th wave (2011)	5,145	4,414	85.8
6th wave (2012)	2,482	2,002	80.7
7th wave (2013)	1,973	1,613	81.8
8th wave (2014)	1,653	1,327	80.3
9th wave (2015)	1,727	1,471	85.2

Source: [Bethmann et al. \(2016\)](#).

## Appendix B. Construction of the outcome variables

### B.1. Social integration

*PASS question on social integration.* Some people may feel like they are integrated into normal social life and that they are a proper part of society while others may feel excluded. What about in your case? To what extent do you feel that you are part of society or to what extent do you feel excluded? Please use the numbers from 1 to 10 to rate your opinion. 1 means that you feel excluded from social life. 10 means, that you feel part of it. The numbers from 2 to 9 allow you to grade your assessment.

### B.2. Well-being and mental health

1. *PASS question on life satisfaction.* How satisfied are you currently with your life as a whole? 0 means that you are “completely dissatisfied”, 10 means that you are “completely satisfied”. The numbers 1 to 9 allow you to grade your assessment.
2. *PASS question on mental health status.* How strongly have you been affected by mental health problems, like fear, rejection or irritability in the past four weeks? Please tell me, whether you have been affected “not at all”, “a little bit”, “moderately”, “quite a bit” or “extremely”?
3. *Construction of variable “mental health status”.* The variable measures the mental health status ranging from 1 “extreme problems” to 5 “no problems”.

### B.3. Economic resources

1. *PASS question on deprivation.* If you think of your household, which of the following items do you have? For the items you don't have, is this for financial reasons or for other reasons?
  - (a) Do you have an apartment with at least as many rooms as persons living there?
  - (b) Do you have an apartment without damp walls or floors?
  - (c) Do you have a separate bathroom with a bathtub or shower in your apartment?
  - (d) Do you have a toilet inside your apartment?
  - (e) Do you have a garden, a balcony or a terrace?
  - (f) Do you have sufficient winter clothing for each member of the household?
  - (g) Do you have a car?
  - (h) Do you have a television?
  - (i) Do you have a video recorder or DVD player?
  - (j) Do you have a computer with internet access?
  - (k) Do you have a washing machine?

And which of the following things do you or does your household do? For those activities you don't do, is this for financial reasons or for other reasons?

  - (a) Buy new clothing once in a while for each family member, even if the old clothes are not yet worn out?
  - (b) Do you have a hot meal at least once a day?
  - (c) Go on vacation away from home for at least one week a year for each member of the family (this need not be taken jointly)?
  - (d) Invite friends over for dinner at your home at least once a month?
  - (e) Eat out at a restaurant with the family at least once a month?
  - (f) Can each member of the family go to the cinema, the theater or a concert at least once a month?
  - (g) Save a fixed amount of money at least once a month?
  - (h) Replace worn but still usable furniture with new furniture?
  - (i) Pay for unexpected expenses with one's own money, e.g. to replace a broken washing machine?
  - (j) Receive medical treatment which is not fully covered by your health insurance, such as dentures or glasses if you/one of your family members need them?
  - (k) Always pay the rent for the apartment and/or the interest on the house or apartment one lives in on time?
  - (l) Always pay the gas, heating and electricity bill on time?
2. *Construction of deprivation index.* The deprivation index used in this study is included in PASS, and ranges between 0 and 11.08 (see [Bethmann et al. \(2016\)](#) for a detailed description of the construction of the variable). This index is based on how many items are missing, and how many activities are not done for financial reasons. Items that are answered with “don't know” or “details refused” are not considered. The index is a weighted index which weights the items according



to the share of respondents who considered a particular item as necessary. This procedure is commonly used for the construction of poverty measures (applied, for instance, by Halleröd, 1995).

3. *PASS question on satisfaction with standard of living.*

How satisfied are you today with your overall standard of living? For your assessment you can use the numbers from 0 to 10. 0 means that you are “completely dissatisfied”, 10 means you are “completely satisfied”. The numbers 1 to 9 allow you to grade your assessment.

#### B.4. Social participation

1. *PASS question on number of close friends.*

How many close friends, or family members with whom you have a close relationship, do you have outside your household?

2. *PASS question on social engagement.*

Are you actively engaged in one of the following organizations or associations? (Multiple responses possible.)

- (a) Union
- (b) Political party
- (c) Church community
- (d) Clubs such as music, sport or culture clubs
- (e) Another organization not mentioned here
- (f) No, not actively engaged

3. *Construction of variable “social engagement”.*

This variable indicates the engagement in organizations/associations out of the five options (a) to (f). This measure ranges from 0 “not actively engaged” to 5 “engaged in all 5 organizations/associations”.

#### B.5. Social status

*PASS question on social status.* There are groups in our society which tend to be at the top of the social ladder and other groups that tend to be at the bottom. How would you rank yourself using the numbers 1 to 10? 1 means that you are at the very bottom, 10 means that you are positioned at the very top. The numbers from 2 to 9 allow you to grade your assessment.

#### B.6. Self-efficacy

1. *PASS question on self-efficacy.*

If unexpected difficulties or problems occur, you can deal with them in a number of different ways. Here we have compiled a couple of opinions regarding this topic. Please tell me whether they apply to you “completely”, “tend to apply” or “tend not to apply” or “do not apply at all”.

- (a) For every problem I have a solution.
- (b) Even if surprising events occur, I believe I can handle them well.
- (c) I have no difficulties in realizing my goals.
- (d) In unexpected situations I always know how to act.
- (e) I always succeed in resolving difficult problems if I make an effort.

2. *Construction of self-efficacy index.*

I take the sum of the four possible outcomes of the five items for each individual and divide by the number of items. If an individual responded only to some of the items, the index is based on the items that are answered. The resulting index ranges from 1 “low self-efficacy” to 4 “high self-efficacy”.

## Appendix C. Description of variables

**Table C.1**

Description of variables based on PASS.

Variable	Description
<b>Outcomes measured in waves <math>t_0</math> and <math>t_1</math></b>	
Social integration	Categorical variable measuring perceived social affiliation ranging from 1 (feeling excluded) to 10 (feeling affiliated)
Life satisfaction	Categorical variable measuring life satisfaction ranging from 0 (completely dissatisfied) to 10 (completely satisfied)
Mental health status	Categorical variable for assessment of mental health status over the last 4 weeks ranging from 1 (extreme problems) to 5 (no problems)
Economic resources	Deprivation index based on 26 items (for construction of variable see <a href="#">Appendix B Section B.3</a> ) &
	Categorical variable measuring satisfaction with standard of living ranging from 0 (completely dissatisfied) to 10 (completely satisfied)
Social participation	Number of close friends &
	Categorical variable measuring social engagement ranging from 0 (not actively engaged) to 5 (engaged in all 5 organizations/associations) (for construction of variable see <a href="#">Appendix B Section B.4</a> )
Social status	Categorical variable measuring assessment of position in society ranging from 1 (belonging to bottom) to 10 (belonging to the top)
Self-efficacy	Index ranging from 1 (low self-efficacy) to 4 (high self-efficacy) (for construction of variable see <a href="#">Appendix B Section B.6</a> )
<b>Control variables measured in wave <math>t_0</math></b>	
<b>Sociodemographics</b>	
Female	Dummy for being female
Age	Dummies for age groups: 25–34 years, 35–44 years, 45–54 years, > 54 years, reference category is < 25 years
Migrant	Dummy for being an immigrant
Married	Dummy for being married
Religious community	Dummy for belonging to a religious community
Smoker	Dummy for having ever smoked on a regular basis (in 2% of cases the information is missing and is treated as 0)
Serious health restrictions	Dummy for having serious health restrictions (includes officially recognized disabilities)
Hospital visits in last 12 months	Dummy for hospital visits in the last 12 months (in 1% of cases the information is missing and is treated as 0)
Professional qualification	Dummies for highest professional qualification level: vocational training ( <i>Teilfacharbeiter, Lehre, abgeschlossene Berufsfachschule</i> ), advanced vocational training ( <i>Meister, Techniker</i> ), academic degree ( <i>Universität, Fachhochschule</i> ), reference category is no vocational training
East Germany	Dummy for living in East Germany
<b>Subjective indicators</b>	
Attitudes to work	Index ranging from 1 (low work attitude) to 4 (high work attitude) (construction similar to the construction of the self-efficacy index)
Health satisfaction	Categorical variable measuring satisfaction with health from 0 (completely dissatisfied) to 10 (completely satisfied)
<b>Household characteristics</b>	
Household income	Dummies for net household income per month in € : 1000–1499, 1500–1999, 2000–2999, ≥ 3000, reference category is ≤ 999
Couple with children aged < 16 years	Dummy for couple with children younger than 16 years
Number of own children	Dummies for number of own children (living in and outside the household): 1, 2, > 2, reference category is 0
Homeowner	Dummy for being a homeowner
<b>Partner characteristics</b>	
Partner in PASS	Dummy for identification of partner in PASS
Professional qualification of partner	Dummies for highest professional education level: vocational training, advanced vocational training/academic degree, information is missing, reference category is no vocational training
Employment status of partner	Dummies for being employed and information is missing
<b>Employment status</b>	
Permanent contract	Dummies for permanent contract and information is missing
Wave	Dummies indicating the wave of the interview, ranging from wave 2 to 8, reference category is wave 1

Notes: The variables married, professional qualification and number of own children are supplemented by information from the IEB if missing. The variables migrant, religious community, professional qualification, attitudes to work are treated as time-constant and filled with previous or subsequent information if missing. The variables married and number of own children are filled with previous information if missing. In 1% of cases information on household income is missing and filled with previous or subsequent information if the composition of the household does not change. Source: PASS-ADIAB 7515, own computations.

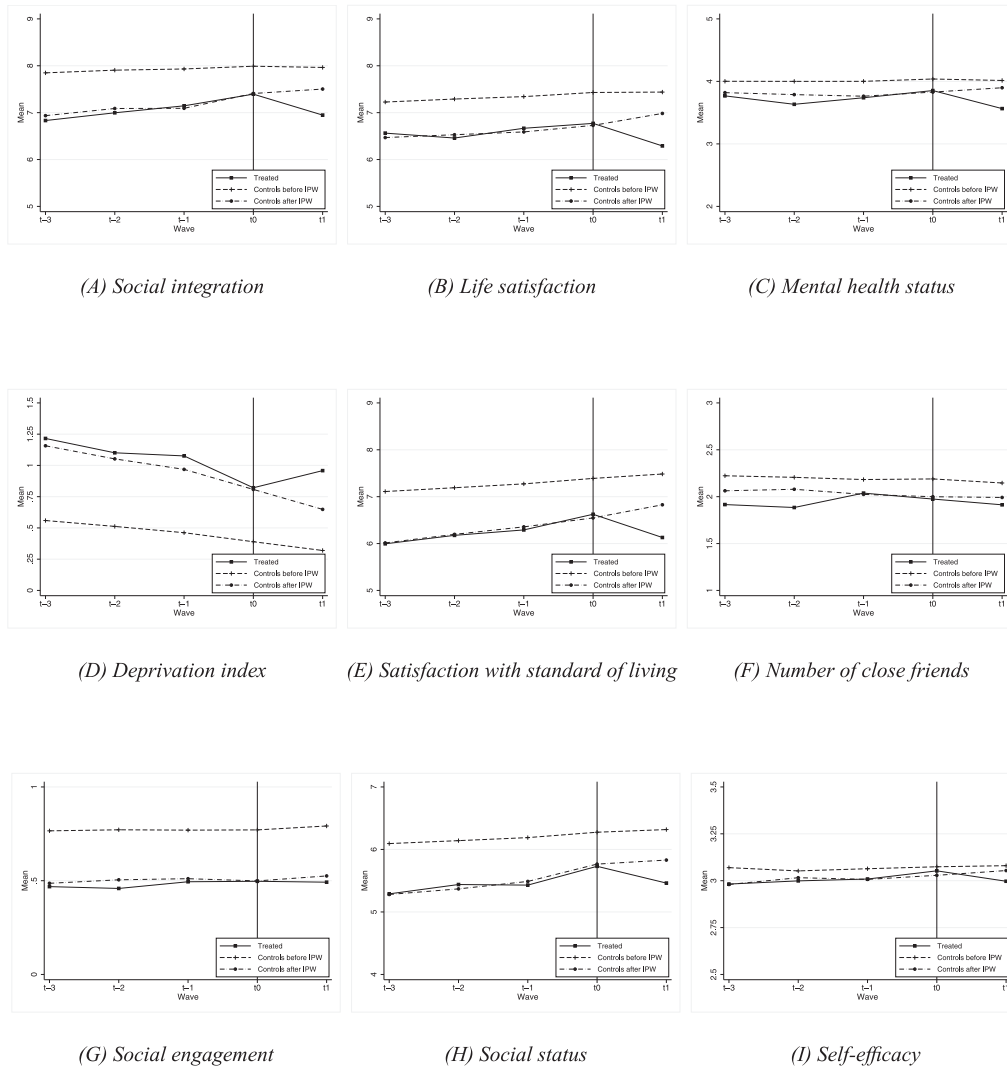
**Table C.2**

Description of variables based on IEB.

Variable	Description
<b>Job loss measured in wave <math>t_1</math></b>	Dummy for becoming unemployed between two consecutive waves $t_0$ and $t_1$ . Individuals are considered as unemployed in $t_1$ in case they are unemployed according to the IEB in $t_1$ or they have no unemployment entry in the IEB for at most 6 months but had one before and have an unemployment or employment entry thereafter. In addition, I consider individuals as unemployed in $t_1$ if they have no unemployment entry in $t_1$ but enter unemployment from employment within 3 months. I use survey information on the employment status in $t_1$ for wave 9.
<b>Control variables measured in wave <math>t_0</math></b>	
<b>Previous job characteristics</b>	
Employment with ssc	Dummy for being employed with social security contributions (ssc)
Employment full-time	Dummy for being employed full-time
Job classifications	Dummies for 5 job classifications: 1 Farmer/Production/Craftspeople/Technician, 2 White-collar employee, 3 Salesperson, 4 Clerical workers, 5 Service workers, reference category is 1
Tenure	Dummies for employment duration: categories are spitted according to percentiles of distribution: 25–50, 50–75, > 75, reference category is 0–25
Daily wage	Dummies for daily wage in € (2010 prices): categories are spitted according to percentiles of distribution: 25–50, 50–75, > 75, reference category is 0–25
<b>Previous firm characteristics</b>	
Firm size	Dummies for number of employees: 10–49, 50–249, 250–499, > 500, reference category is < 10
Sector of firm	Dummies for 8 sectors: 1 Agriculture/Production, 2 Consumption/Food, 3 Construction, 4 Trade, 5 Transportation/Services I, 6 Services II, 7 Education/Health, 8 Public, reference category is 1
<b>Employment history</b>	
Number of employment periods with ssc	Number of employment periods with social security contributions
Employment duration with ssc	Dummies for employment duration with social security contributions: categories are spitted according to percentiles of distribution: 25–50, 50–75, > 75, reference category is 0–25
Number of marginal employment periods	Number of marginal employment periods
Marginal employment duration	Dummies for marginal employment duration: categories are spitted according to percentiles of distribution: 25–50, 50–75, > 75, reference category is 0–25
Number of unemployment periods	Number of unemployment periods
Unemployment duration	Dummies for unemployment duration: categories are spitted according to percentiles of distribution: 25–50, 50–75, > 75, reference category is 0–25
Number of non-employment periods	Number of non-employment periods
Non-employment duration	Dummies for non-employment duration: categories are spitted according to percentiles of distribution: 25–50, 50–75, > 75, reference category is 0–25
District unemployment rate	District unemployment rate measured at the date of the interview

Notes: IEB: Integrated Employment Biographies, ssc: social security contributions. Periods of self-employment, civil service, and military service are not included in the IEB. Non-employment is defined as periods without entry in the social security records if the period lasts longer than one month. I allow for gaps of one month between periods of employment at the same firm and between two unemployment spells. Source: PASS-ADIAB 7515, own computations.

## Appendix D. Additional estimation results



**Fig. D.1.** Placebo tests on outcome levels. *Notes:* Means of the outcome variables are measured in levels in the consecutive waves  $t_{-3}$ ,  $t_{-2}$ ,  $t_{-1}$ ,  $t_0$  and  $t_1$  separately for treated and control individuals before and after inverse propensity score weighting (IPW). The difference in outcome levels between treatment and control group before IPW is significant at the 1%-level for each outcome variable in the time periods before job loss. The difference in outcome levels between treatment and control group after IPW is insignificant for each outcome variable in the time periods before job loss, except for mental health status in  $t_{-2}$ , deprivation in  $t_{-1}$  (significant at 10%-level) and number of close friends in  $t_{-2}$  (significant at 5%-level). *Number of observations:*  $t_{-3}$ : 190 treated and 7,027 control persons,  $t_{-2}$ : 303 treated and 9,690 control persons,  $t_{-1}$ : 447 treated and 13,075 control persons,  $t_0$  and  $t_1$ : 634 treated and 17,047 control persons. *Source:* PASS-ADIAB 7515, own computations.

**Table D.1**

Robustness checks I: results for the consequences of job loss.

Specification	(1) Baseline	(2) Probit	(3) IPW-RA	(4) RM with BA
Change in outcomes	Effect of job loss			
<b>Social integration</b>	–0.338*** (0.058)	–0.336*** (0.054)	–0.340*** (0.052)	–0.357*** (0.072)
<b>Well-being and mental health</b>				
Life satisfaction	–0.554*** (0.063)	–0.533*** (0.055)	–0.540*** (0.054)	–0.503*** (0.072)
Mental health status	–0.311*** (0.047)	–0.317*** (0.046)	–0.301*** (0.045)	–0.334*** (0.065)
<b>Economic resources</b>				
Deprivation index	0.602*** (0.073)	0.612*** (0.070)	0.629*** (0.068)	0.640*** (0.098)
Satisfaction with standard of living	–0.535*** (0.061)	–0.515*** (0.056)	–0.495*** (0.053)	–0.566*** (0.073)
<b>Psychosocial needs</b>				
Social participation				
Number of close friends	–0.049 (0.043)	–0.050 (0.041)	–0.066 (0.041)	0.002 (0.060)
Social engagement	–0.048 (0.039)	–0.044 (0.036)	–0.051 (0.036)	–0.075 (0.050)
Social status	–0.246*** (0.051)	–0.236*** (0.048)	–0.261*** (0.048)	–0.250*** (0.068)
Self-efficacy	–0.191*** (0.064)	–0.184*** (0.061)	–0.181*** (0.060)	–0.216*** (0.083)

Notes: IPW-RA: Inverse propensity score weighting with regression adjustment, RM with BA: Radius matching with bias adjustment. IPW-RA is performed by combining regression with the variables used in the propensity score estimation, and propensity score weighting. RM with BA is performed by regressing the outcome on the propensity score, the propensity score squared and the variables female and number of unemployment periods to compute the mahalanobis distance within the counterfactual treatment state. The chosen radius is equal to 3-times the 0.9th quantile of distances in pair matching. Estimates are based on 634 treated and 17,047 control persons. The propensity of job loss is based on a logit model in specification (1), (3) and (4). The variables used in the propensity score estimation are reported in Tables C.1 and C.2 in Appendix C. Standard errors are bootstrapped with 2,500 replications (in parentheses). Coefficients are statistically significant at the \*10%, \*\*5% and \*\*\*1% level. Source: PASS-ADIAAB 7515, own computations.

**Table D.2**

Robustness checks II: results for the consequences of job loss.

Specification	(1) Baseline	(2) Admin info	(3) One group	(4) One person
Change in outcomes	Effect of job loss			
<b>Social integration</b>	–0.338*** (0.058)	–0.379*** (0.063)	–0.347*** (0.060)	–0.356*** (0.071)
<b>Well-being and mental health</b>				
Life satisfaction	–0.554*** (0.063)	–0.580*** (0.073)	–0.557*** (0.064)	–0.605*** (0.084)
Mental health status	–0.311*** (0.047)	–0.308*** (0.054)	–0.321*** (0.050)	–0.283*** (0.063)
<b>Economic resources</b>				
Deprivation index	0.602*** (0.073)	0.581*** (0.083)	0.610*** (0.075)	0.530*** (0.088)
Satisfaction with standard of living	–0.535*** (0.061)	–0.531*** (0.071)	–0.527*** (0.063)	–0.552*** (0.081)
<b>Psychosocial needs</b>				
Social participation				
Number of close friends	–0.049 (0.043)	–0.066 (0.050)	–0.054 (0.046)	–0.060 (0.064)
Social engagement	–0.048 (0.039)	–0.039 (0.045)	–0.031 (0.040)	–0.077 (0.054)
Social status	–0.246*** (0.051)	–0.240*** (0.056)	–0.244*** (0.052)	–0.273*** (0.066)
Self-efficacy	–0.191*** (0.064)	–0.182*** (0.069)	–0.196*** (0.065)	–0.223*** (0.085)

Notes: Estimates are based on 634 treated and 17,047 control persons in specification (1), on 537 and 14,114 in (2), on 634 and 16,509 in (3) and on 411 and 5,499 in (4). The propensity of job loss is based on a logit model in specification (1), (3) and (4). The variables used in the propensity score estimation are reported in Tables C.1 and C.2 in Appendix C. Standard errors are bootstrapped with 2,500 replications (in parentheses). Coefficients are statistically significant at the \*10%, \*\*5% and \*\*\*1% level. Source: PASS-ADIAAB 7515, own computations.



**Table D.3**

Placebo results for the consequences of job loss.

Change in outcomes between $t_{-1}$ and $t_0$	Effect of job loss	Standard error	Standard deviation
<b>Social integration</b>	–0.044	(0.064)	1.630
<b>Well-being and mental health</b>			
Life satisfaction	–0.050	(0.066)	1.381
Mental health status	0.026	(0.053)	1.148
<b>Economic resources</b>			
Deprivation index	–0.126	(0.093)	0.548
Satisfaction with standard of living	0.035	(0.067)	1.523
<b>Psychosocial needs</b>			
Social participation			
Number of close friends	–0.042	(0.053)	1.096
Social engagement	0.029	(0.042)	0.648
Social status	0.005	(0.068)	1.372
Self-efficacy	–0.024	(0.071)	0.379

Notes: Estimates from IPW-DID are based on 448 treated and 13,075 control persons (the estimates for self-efficacy are based on 207 treated and 5,319 control persons). The propensity of job loss is based on a logit model with the control variables reported in Tables C.1 and C.2 in Appendix C. The differences in the outcome variables are standardized. Standard errors are bootstrapped with 2,500 replications. Coefficients are statistically significant at the \*10%, \*\*5% and \*\*\*1% level. Source: PASS-ADIAB 7515, own computations.

**Table D.4**

Correlation matrix of outcome levels.

	Social integration	Life satisfaction	Mental health status	Deprivation index	Satisfaction with s.o.l.	Number of close friends	Social engagement	Social status	Self-efficacy
Social integration	<b>1.00</b>	0.47	0.21	–0.26	0.42	0.17	0.14	0.47	0.26
Life satisfaction	0.47	<b>1.00</b>	0.36	–0.32	0.64	0.12	0.09	0.46	0.31
Mental health status	0.21	0.36	<b>1.00</b>	–0.16	0.24	0.06	0.01	0.18	0.26
Deprivation index	–0.26	–0.32	–0.16	<b>1.00</b>	–0.45	–0.08	–0.14	–0.32	–0.15
Satisfaction with s.o.l.	0.42	0.64	0.24	–0.45	<b>1.00</b>	0.10	0.12	0.46	0.26
Number of close friends	0.17	0.12	0.06	–0.08	0.10	<b>1.00</b>	0.12	0.11	0.09
Social engagement	0.14	0.09	0.01	–0.14	0.12	0.12	<b>1.00</b>	0.11	0.03
Social status	0.47	0.46	0.18	–0.32	0.46	0.11	0.11	<b>1.00</b>	0.24
Self-efficacy	0.26	0.31	0.26	–0.15	0.26	0.09	0.03	0.24	<b>1.00</b>

Notes:s.o.l.: standard of living. The table shows Pearson correlation coefficients. All correlation coefficients are significant at the 5% level. The number of observations amounts to 18,363. Source: PASS-ADIAB 7515, own computations.

**Table D.5**

Effects of economic resources and psychosocial needs on social integration, well-being and mental health.

	Social integration	Life satisfaction	Mental health status
Deprivation index	–0.045*** (0.014)	–0.084*** (0.014)	–0.075*** (0.014)
Number of close friends	0.034*** (0.009)	0.032*** (0.008)	0.006 (0.010)
Social engagement	0.037*** (0.010)	0.006 (0.009)	0.003 (0.011)
Social status	0.223*** (0.011)	0.168*** (0.010)	0.037*** (0.010)
Self-efficacy	0.093*** (0.010)	0.123*** (0.010)	0.115*** (0.011)
Adjusted- $R^2$	0.096	0.122	0.036

Notes: Estimates from Fixed Effects regressions with control variables reported in Tables C.1 and C.2 in Appendix C. The number of observations amounts to 18,363. The outcome levels are standardized. Coefficients are statistically significant at the \*10%, \*\*5% and \*\*\*1% level. Source: PASS-ADIAB 7515, own computations.

**Table D.6**  
Comparison of  $R^2$ .

Specification	Social integration	Life satisfaction	Mental health status
(1) $R^2$ without outcomes	0.029	0.065	0.021
(2) $R^2$ with deprivation index	0.032	0.072	0.024
(3) $R^2$ with social participation	0.032	0.067	0.021
(4) $R^2$ with social status	0.084	0.100	0.023
(5) $R^2$ with self-efficacy	0.041	0.085	0.032
(6) $R^2$ all	0.096	0.122	0.036

Notes: The table shows the adjusted- $R^2$  from Fixed Effects regressions without controlling for economic resources and psychosocial needs (1), controlling for economic resources (2), for social participation (3), for social status (4), for self-efficacy (5) and for economic resources and psychosocial needs (6). The control variables are reported in Tables C.1 and C.2 in Appendix C. The number of observations amounts to 16,215. Source: PASS-ADIAB 7515, own computations.

**Table D.7**  
Effects of outcome levels on employment prospects.

Specification	(1) Probability to search for a job (unbalanced panel)	(2) Probability to search for a job (balanced panel)	(3) Probability to find a job
Social integration	0.048** (0.024)	0.068** (0.029)	0.078** (0.034)
Life satisfaction	−0.241*** (0.025)	−0.234*** (0.031)	−0.075** (0.034)
Mental health status	0.029 (0.021)	0.012 (0.026)	0.019 (0.029)
Deprivation index	0.069*** (0.022)	0.065** (0.027)	−0.094*** (0.031)
Number of close friends	0.086*** (0.019)	0.070*** (0.024)	0.016 (0.027)
Social engagement	0.090*** (0.021)	0.104*** (0.025)	0.051* (0.026)
Social status	0.026 (0.023)	0.023 (0.028)	−0.032 (0.033)
Self-efficacy	0.061*** (0.021)	0.039 (0.027)	0.026 (0.030)
Number of observations	17,786	11,765	11,765
Pseudo- $R^2$	0.121	0.115	0.117

Notes: Estimates from logit estimation controlling for current unemployment duration and control variables reported in Tables C.1 and C.2 in Appendix C except for previous job and firm characteristics. The outcome levels are standardized. Specification (2) is based on an estimation sample in which both outcome variables, the probability to search for a job and to find a job, are available (balanced panel). Coefficients are statistically significant at the \*10%, \*\*5% and \*\*\*1% level. Source: PASS-ADIAB 7515, own computations.

## Supplementary material

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.jebo.2019.06.006](https://doi.org/10.1016/j.jebo.2019.06.006).

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