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# Unemployment benefit II, unemployment and health

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## Abstract

**Objectives:** A multitude of studies has established a negative relationship between unemployment and health. With the "Hartz-reforms", unemployment benefit II was introduced in 2005. Whether unemployment benefit II receipt has an impact, additional to unemployment, on health, is investigated.

**Methods:** For this study data of the panel study "Labour market and social security" is used. The sample consists out of 14.282 respondents aged 18 to 65, who participated up to five years from 2006 to 2011. Measures of subjective health by social status were analyzed using Fixed Effect panel models.

**Results:** Unemployment is negatively and significantly associated with subjective health. A weaker negative association is found for the receipt of unemployment benefit II. Separated by gender, different patterns of associations emerge. For men, an additive association for unemployment and unemployment benefit II is found. For women effect of unemployment alone is sometimes significantly, stronger than the combined effect of unemployment and the receipt of unemployment benefit II. The differences are smaller, after restricting the analysis sample on unemployed and employed. For mediator variables like income and partnership no consistent associations with subjective health are found

**Discussion:** Unemployment and unemployment benefit II receipt should be used as separate factors when analyzing subjective health. Employment is positively associated with health, even if the employment provides insufficient resources for maintaining an appropriate standard of living and unemployment benefit II is needed to provide for the basic needs.

## Zusammenfassung

**Fragestellung:** Eine Vielzahl von Studien belegt den Zusammenhang zwischen Arbeitslosigkeit und Gesundheit. Im Zuge der Hartz-Reformen wurde 2005 das Arbeitslosengeld II eingeführt. Diese Studie befasst sich mit einem weitergehendem Zusammenhang zwischen Arbeitslosengeld II, Arbeitslosigkeit und Gesundheit, der bisher noch nicht untersucht wurde.

**Vorgehen:** In dieser Studie wird auf Daten der Panel Studie „Arbeitsmarkt und soziale Sicherung“ zurückgegriffen. Es wurden Angaben von 14.282 Befragten im Alter von 18 bis 65 Jahren benutzt, die bis zu fünf Jahre von 2006 bis 2011 an der Studie teilgenommen haben. Fragen zur subjektiven Gesundheit werden, abhängig vom sozialen Status, mittels „Fixed Effect“ Modellen analysiert.

**Ergebnisse:** Arbeitslosigkeit hat einen negativen, überwiegend signifikanten, Zusammenhang mit verschiedenen subjektiven Gesundheitsmaßen. Der Zusammenhang zwischen Arbeitslosengeld II und Gesundheit ist schwach negativ. Getrennt nach Geschlecht zeigen sich verschiedene Muster für die gefundenen Zusammenhänge. Für Männer findet sich ein additiver Zusammenhang von Arbeitslosigkeit und Arbeitslosengeld II Bezug auf die Gesundheit. Für Frauen ist das nicht der Fall. Hier zeigt sich, dass der Zusammenhang von Arbeitslosigkeit allein und Gesundheit stärker ist als bei Arbeitslosigkeit und gleichzeitigem Arbeitslosengeld II Bezug. Diese Unterschiede werden geringer, wenn nur Angaben von Erwerbstätigen und Arbeitslosen analysiert werden. Für Mediatorvariablen wie Einkommen und Partnerschaft kann kein kohärenter Zusammenhang mit Gesundheit festgestellt werden.

**Diskussion:** Es zeigt sich, dass Arbeitslosigkeit und der Bezug von Arbeitslosengeld II als getrennte Faktoren behandelt werden sollten. Das Vorliegen einer Beschäftigung weist einen positiven Zusammenhang mit der Gesundheit auf, selbst wenn das Erwerbseinkommen aus der Beschäftigung nicht zur Sicherung der grundlegenden Bedürfnisse ausreicht und zusätzlich Arbeitslosengeld II bezogen werden muss.



**JEL classification:C33, I14, J60**

**Keywords: Unemployment Benefit II, unemployment, subjective health, longitudinal data**

# 1 Introduction

In November 2012, 6.03 million people in Germany received means-tested unemployment benefits - the so-called unemployment benefit II (UB II) (Statistik der Bundesagentur für Arbeit, 2013). However, the association between health, unemployment and UB II receipt has not been analyzed yet. This will be the aim of this study.

UB II was introduced in 2005 as one part of the "Hartz-reforms" in Germany. Under these reforms, the German social security system underwent a major revision. Old schemes of welfare and unemployment assistance were amalgated into UB II. UB II was supposed to be the new basic social security scheme and as such supposed to provide the minimum resources necessary for an individual to meet his or her basic needs. The central aim of UB II was the reintegration of individuals back into the labour market, that had been detached from it. Key features of UB II are, that it targets the household and not the individual as primary recipient of the benefit and that eligibility rules were tightened (Eichhorst/Grienberger-Zingerle/Konle-Seidl, 2010). Eligible for UB II receipt are not only long-term unemployed and people that received welfare prior to 2005, but also individuals, where other forms of income are not enough to provide the sufficient resources to meet basic needs (Bruckmeier et al., 2013). These can be individuals, who are working in low-income jobs or persons who give care to relatives or children and are thus unable to take up an appropriate job. While the negative relationship between unemployment and health was shown in a wide range of studies (Roelfs et al., 2011; Kroll/Lampert, 2011a), a possible additional impact of UB II receipt on health was not studied neither in detail nor in a longitudinal setting. Existing research is either based on cross-sectional data or does not focus on the relationship between UB II and health or both.

This study provides novel evidence whether UB II is associated with health by using longitudinal data. As already mentioned, UB II recipients are not necessarily unemployed. They can be employed or can be out of the labour market for other reasons. Reasons might be the provision of child care or an on-going vocational training (Beste/Bethmann/Trappmann, 2010). Therefore recipients might be unable to take up employment. Unemployment and UB II have to be considered as separate factors affecting health.

It is expected that UB II is negatively associated with health. UB II provides only resources to meet basic needs. A low level of financial resources is associated with low levels of health (Wilkinson/Marmot, 2002) and increases mortality for people over 65 years (Kroh et al., 2012). Psycho-social circumstances might also play a role. Recipients of UB II could feel stigmatized by the society as welfare recipients. With the "Hartz-reforms" public employment services were given a multitude of labour market measures, which should be used on UB II recipients for encouragement but also to increase pressure in order to "activate" them to enter the labour market. Stigmatization and pressure could increase levels of stress and in turn lower the level of health (Creed/Batrum, 2006).

Data of the household panel study "labour market and social security" (PASS) is used for the empirical analysis. PASS is especially suited for the analysis, since it was established to provide data for the scientific community to investigate the impact of UB II on the society

(Trappmann et al., 2010). Therefore, recipients of UB II are oversampled in PASS and make up around 40% of the study population. Data of the first five panel waves and information for approximately 14.000 respondents is used. Since PASS was primarily designed as a socio-economic panel study, objective measures of health are not collected. Subjective measures of health are used as surrogates.

The present study will be structured as follows. The next section will provide background information for the relation between unemployment and health. Section 3 focuses on the methodological approach. Operationalizations of health, unemployment and UB II will be presented. The longitudinal statistical model will be introduced. In the subsequent section 4 results will be presented. A range of sensitivity checks will be performed to assess their stability. The study concludes with a discussion of the results and of the limitations. Since this is one of the first studies tackling the interdependency between unemployment, UB II and health, this includes the discussion of potential topics of future research.

# 2 Unemployment and Unemployment benefit II

## 2.1 Unemployment and health

The relationship between unemployment and health has been investigated for decades. According to a current meta-analysis (Roelfs et al., 2011), unemployment is associated with an increased mortality risk. According to this study, unemployment increased the risk for all-cause mortality by up to 77% for those in their early and middle careers. Research has also shown that unemployment has a impact on self-reported physical and mental health in Germany (Kroll/Lampert, 2011b) and Europe (Bambra/Eikemo, 2009).

The negative association between health and unemployment is assumed to be caused by both a process of selection and causation. Selection means, that people with worse health status are more likely to become unemployed. Causation means, that unemployment causes a deterioration of the individual health status. It is now commonly accepted, that both processes play a role (Kieselbach/Beelmann, 2006).

Causal pathways for this relationship are manifold. Jahoda (1983) argues that employment or the lack thereof has a range of manifest and latent repercussions on the individual well-being. First of all, employment provides manifest resources like income. Unemployment leads to financial hardship and basic needs might not be covered anymore. But it is also argued that unemployment has latent consequences, that might have additional health consequences than those caused by the lack of material resources. Employment provides a time structure, leads to activities, provides social contacts. If these factors are missing, well-being and health diminish. Warr (1987) establishes a "vitamin model" to answer the question of how the interaction of nine different environmental work-related factors affect mental health. These factors include among others the opportunity for skill use, control, valued social position and control. He argues that the relationship between his factors and well-being is non-linear and that from a certain a point on an increase in one of the factors has no additional benefits. Siegrist (2000) argues that the work role is an essential factor for the behavior and self-regulation in individuals and that unemployment impairs that function and causes functional deficits. Creed/Batrum (2006) argue along similar lines. Paid employment has a long history of being an honourable activity with both financial and moral dimensions. It allows individuals to meet their financial obligations, as well as to meet societal expectations and standards. When these goals cannot be met, for example by becoming unemployed, the individual feels humiliated, degraded and shamed. This increases stress levels, which in turn adversely affects health. There is also evidence, that unemployment leads to more harmful health-related behaviors (Henkel, 2011) and weight gain (Marcus, 2012) as coping mechanisms to deal with the stress induced by unemployment. For this study, in concordance with most of the empirical evidence it is expected that unemployment has a negative effect on health.

However, it has to be mentioned, that there are a few studies, that find no effect of unemployment on health, e.g. Schmitz (2011) for Germany or Böckerman/Ilmakunnas (2009) for Finland. Schmitz (2011) states as reasons for an absence of negative effects of unemploy-

ment on health that health insurance services are still provided to unemployed. Thereby, the loss of income has no strong impact on health care utilization and health in Germany.

## 2.2 Unemployment benefit II and health

While there is ample research on the relationship between unemployment and health, research regarding the association between UB II receipt and health is rare or does not use longitudinal data or health is not the main research interest.

In a cross-sectional description by Brussig/Knuth (2010), approximately $60\%$ of UB II recipients reported having "good" or "very good" health. In the general population, this proportion was about $70\%$. According to a study by Achatz/Trappmann (2011), $45\%$ of unemployed UB II recipients reported to have severe health restrictions. In this study, it was also found that bad health is one of the main difficulties when integrating UB II recipients into the labour market. However, it is unclear, whether poor health of UB II recipients had been already prevalent prior to UB II receipt or was caused by long-term unemployment. In a study by Huber/Lechner/Wunsch (2011) it was found, that leaving UB II into employment has a positive effect on subjective health. However, since all UB II recipients in this study were also unemployed, one can not distinguish the effects of unemployment and UB II.

It is expected in this study that UB II has a negative impact on health irrespective of the unemployment status. This raises the question regarding possible causal pathways. UB II as such is a social assistance scheme and as such not necessarily relates to the health of the individual. Yet, different causal pathways for such a negative relationship seem possible.

Employed UB II recipients have in most cases insecure and low-paid jobs (Koller/Rudolph, 2011). Those kinds of jobs are associated with worse health according to several studies (Rosenthal et al., 2012; László et al., 2010). The raise of insufficient income by UB II to a sufficient minimum can be seen as a form of workfare. The possible relations between workfare and health are discussed by Smith (1993). He argues, that on the one hand workfare policies might have a positive impact on health, since they could give the participants a purpose and a time structure. On the other hand it is possible that the participants could be exposed to stigma caused by prejudices in the general population. Another pathway might be caused by the so-called social status syndrome (Marmot, 2006). People in lower social status groups report having worse subjective health scores than people in higher social classes. In this case, the pathway might lead over increased shame and lack of self-worth, since one is not able to provide basic resources for one-self and dependent relatives and thus has to apply for UB II. UB II recipients might also be affected by stigmatization and prejudices prevalent in the general population as reported in a current study funded by the federal employment agency (Institut für Demoskopie Allensbach, 2013). Stress could also be induced by the public employment services. Regulations of UB II rely on a "carrot and stick" approach (Eichhorst/Grienberger-Zingerle/Konle-Seidl, 2010). UB II recipients have to consent to certain agreements and demands stated by the services. If those agreements are not met, a cut in benefits is possible or the UB II claim is even refused. The strict guidelines might foster a feeling of loosing control in recipients. According to Warr

(1987) being in control is one of the environmental factors affecting health. A meta-analysis by Sapolsky (2004) provides a biological explanation how social status and the related stress affects the health of animals and humans. This study presents evidence, that glucocortoid levels are positively associated with low social status, which in turn negatively influence the immune system. In the study it is also argued, that the general health is negatively affected by a low social status.

A negative effect of UB II on health might not only be caused by psycho-social factors. Since the amount of UB II only guarantees the maintaining subsistence level,UB II receipt leads to economic deprivation. Economic deprivation expresses itself through a lack of monetary resources, which might affect health (Kroh et al., 2012). In a qualitative study by Hirseland/Ramos-Lobato (2010), it was reported that UB II recipients, despite having compulsory health insurance, lack the resources to have regular access to the health care system. This can have negative health effects. Additional payments are sometimes necessary in order to acquire pharmaceuticals or other health-related necessities. Another dimension of deprivation is the material deprivation. Material deprivation expresses itself through the living standard. The living standard is not necessarily directly related to the income (Berthoud/Bryan, 2011). This dimension of deprivation can express itself through social contacts or whether certain household goods are present (Decent clothing, household electronics, etc.). A decrease in the living standard can have also health consequences (Gunasekara et al., 2013). UB II receipt can have a negative impact on the living standard, since e. g. only a limited amount of subsidy for the rent is provided to recipients and hence the quality of accommodation might decline or if the lump sum does not allow for the replacement of worn-out or broken hardware.

# 3 Data and Methods

## 3.1 Data

PASS is a household panel survey that started in 2007 to provide data for research on unemployment and poverty dynamics in Germany. The sample design for wave 1 comprised out of a register sample of about 6,800 households that received the recently introduced unemployment benefit II (UB II) at the reference date for sampling and of a second address-based sample of about 6,000 households of the German residential population. PASS collects data annually. In this study, the first five waves (2007-2010) are used. Households are first approached in CATI and non-respondents and households for whom no valid telephone numbers are known are followed up with CAPI. From wave 2 onwards households are first approached in the mode in which they were last interviewed. In each household, first an interview with the household target person is sought, followed by individual interviews with each member of the household aged 15+. In wave 1 PASS had household response rates of $28.7\%$ for the recipient sample and $24.7\%$ for the population sample (RR1 according to (AAPOR, 2009)). Subsequently, refreshment samples are drawn every panel wave. The refreshment samples consist of households that are first time recipients of UB II. Sizes of the refreshment samples vary around 1,000 households and 1,400 individuals.

More detailed information regarding study design, sampling and content can be found in Trappmann et al. (2010) and in the documentation of the panel study (Gebhardt et al., 2009).

Cases are used from the primary samples and the refreshment samples. Individuals, that responded just once, are excluded, since they do not contribute longitudinal information for the analysis. Only respondents in the working age group between 18 and 65 are used in the study. This restricts the number of used cases to 14,282 respondents with 48,762 single observations. The median number of observations for the respondents is three. An unbalanced sample is used. In an unbalanced sample, cases are also included that do not participate in every panel wave.

## 3.2 Variables

### Subjective Health

Health is the variable of interest in this study. Since no objective indicators of health are collected, subjective indicators of health are used instead. Subjective measures of health can be used as valid surrogates for the objective health status (DeSalvo et al., 2006). Subjective indicators have similar prognostic properties for morbidity and mortality as objective measures of health (Lima-Costa et al., 2012; Ng et al., 2012).

To measure the subjective health in PASS, respondents are asked several questions regarding their health. In this study, two questions are primarily evaluated. The first question[1] is

[1] All German and English questionnaires for PASS can be downloaded from the following website: http://fdz.iab.de/de/FDZ_Individual_Data/PASS/Working_Tools.aspx

```
How would you describe your state of health in the past 4 weeks in
general?  Was it ...
```

Answering options are on a 5-point scale (Very Good/ Good /Satisfactory /Poor /Very Poor). This question is widely used as a single item to measure self rated health (SRH) (Fayers/Machin, 2007). The second question is

```
How satisfied are you with your health?
```

Here, the answering scale ranges from 0 "Completely dissatisfied" to 10 "Completely satisfied". This question tries to measure the satisfaction for the individual's health. Both of the questions regarding the self-rated health and regarding health satisfaction are used to assess the subjective health (Idler/Benyamini, 1997). It is argued that the different questions measure different concepts of subjective health, so both questions are used as variables of interest in this study.

**Health as a latent Variable**

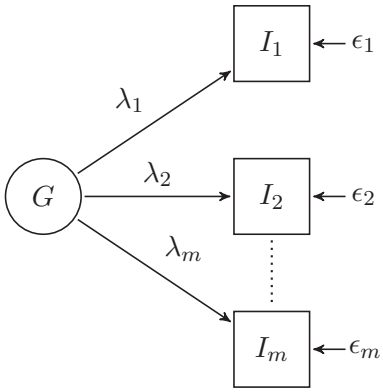



Figure 1: Path Diagram of a common factor model

Health can be seen as a latent variable. A latent variable in a broader sense is a variable whose realizations are hidden from direct observation (Skrondal/Rabe-Hesketh, 2004: p.13). The true health status of the respondent is not known. It can be measured by a range of indicator variables. This would result in a path diagram for a common factor model as shown in figure 1.

The unknown health status $G$ is thereby realized by $k, 1 \dots m$ measured indicator variables $I_1, \dots, I_m$ and their factor loadings $\lambda_1, \dots, \lambda_m$. The relationship between the latent construct $G$ and one indicator variable can be modeled as

$$I_k = \lambda_k G + \varepsilon_k \tag{1}$$

The factor loadings $\lambda$ can be estimated by applying a confirmatory factor analysis. A detailed description of the estimation can be found in Reinecke (2005: p.103). Subsequently, a

factor score $G$ is calculated for each individual by using an additive regression score. The mean of a factor score is zero per default. A higher score means better health.

This approach has the advantage that a wide range of health-related questions can be integrated in one dependent variable $G$ as a factor score. The factor score can be used as an estimation of the underlying latent variable (Loehlin, 2004). This can be a superior representation of the underlying concept of subjective health than the use of a single item as it was proposed in the previous section. Using multiple items to predict a score can enhance the reliability of the measurement (Fayers/Machin, 2007). In this case, both afore mentioned questions about self-rated health and health satisfaction and some additional health-related questions were used to predict a health score. The health score will then be used as the third surrogate for the health status of the individual. The additional questions used to derive the score were

- `Have you been to see a doctor within the last three months? If yes, please state how many times you went to see the doctor.`
- `And what about the last 12 months with regard to hospital visits since [date of last interview/ last year]? Since then, have you been treated in hospital once or several times for at least one night?`
- `How many nights have you spent in a hospital since [date of last interview/ last year] overall?`
- `Do you have any officially recognized disabilities or have you filed an application for official recognition of a disability?`
- `Do you have any other serious health restrictions?`

To assess the validity of the new score, it was correlated with the results of the SF-12 score. The SF-12 is one of the most often used instruments to assess the general health in populations (Fayers/Machin, 2007) and has also been used for prediction of mortality (Haring et al., 2011). In PASS, the SF-12 was collected only in panel wave 3. Hence, it could not be used as the general measure of outcome for this study. In order to assess the reliability of the constructed score with the SF-12, both scores were correlated. The correlation coefficient $r$ between the created health score and the SF-12 score is $0.76$. It is assumed, that the health score can be used as a reasonable surrogate for the SF-12 score.

**Unemployment benefit II and Unemployment**

The independent variables of interest in this study are the receipt of UB II and unemployment status. UB II is a benefit that targets the household. Hence, UB II receipt is assessed in the household questionnaire. In the first wave of PASS, it is asked:

> `What about your household? Have you or any other member of your household at any time since January 2005 obtained unemployment benefit 2?`

If the answer was yes, the time span was collected. PASS is using an event-occurrence approach. This means that the beginning and the end of the spell are assessed. The used questions are:

> From when to when has your household without interruption obtained unemployment benefit 2 ? Please tell me the month and the year.

From wave 2 onwards dependent interviewing (DI)[2] is used for persons with on-going spells of UB II at the time of interview of wave I.

> In the last interview in [date of last interview] you stated that your HH was obtaining UB II at the time. Until when was this benefit obtained without interruption?

Households without reported receipt in a previous wave were asked independently of their previous answer:

> Thinking of the time since the last interview in [date of last interview]: Has your HH obtained UB II at any time since [date of last interview]?

The UB II status of the household is then applied on each eligible person in the household.

The employment status is collected in the personal interview. In the first interview, respondents are given the following questions

> "We would now like to find out more about what you have been doing from 1 January [Year of interview - 2] until today. For example, we would like to know if you have been gainfully employed, doing an apprenticeship, registered as unemployed or if you retired. It is important that you indicate every single activity, even if it lasted only for a short while or ran parallel to another activity. I read out several things to you now. Beginning with January [Year of interview - 2]: what of the following have you been doing in January [Year of interview - 2]? Were you..."

Eight different response options are given to the respondent: 1. gainfully working, with an income above Euro 400 - 2. registered as unemployed - 3. student at school - 3. doing vocational training, an apprenticeship, at a university or college - 4. carrying out military or civil service or a voluntary year of social service or something similar - 5. carrying out domestic duties - 6. on maternal leave, child care leave or parental leave - 7. a pensioner or in early retirement - 8. something different .

[2] With DI, respondents are reminded of their previous answer. It has been shown, that DI enhances response quality in panel and follow-up studies (Jäckle, 2009).

In subsequent panel waves respondents are asked dependently whether an occupational change happened since the last interview.

> During our last interview on [Date of Interview], we noted that you were [employed/unemployed] at that time. Are you still in that position without any interruption?

### 3.3 Statistical analyses

Associations between unemployment, the receipt of UB II and subjective health will be estimated by linear Fixed Effect (FE) regression models. The advantage of this approach is that the FE estimator can not be biased by unknown time-invariant parameters, since each case is used as its own control (Allison, 2009).

The self-reported health status, the health satisfaction and the health score for each time $t$ and subject $i$ are used as the dependent variables $y_{it}$. The ordinal subjective health measures (self-reported health status, health satisfaction) are modeled as linear dependent variables despite being measured on an ordinal scale. It is assumed that the ordinal measurement is an unbiased surrogate of the underlying latent continuous concept, the subjective health. Bollen/Barb (1981) and Rhemtulla/Brosseau-Liard/Savalei (2012) show that the results are very close if at least five categories are used to approximate the underlying continuous variable. Hence, the analysis should still produce unbiased estimates of the effect of unemployment and UB II on subjective health. The continuous health score is used as a third representation for the underlying subjective health status.

Information regarding the employment status and the receipt of UB II is used from the time of the specific interview. The labour market status is used as a dichotomous variable (Registered unemployed or not), which is called unemployed (U). UB II receipt is also dichotomous. In order to assess their respective impact on subjective health, both variables are included. An interaction effect between unemployment and UB II is added to assess a possible additivity between both effects. The panel wave is included as a control for a range of global time variant factors like the general economic situation.

Mediator variabless[3] can influence the effect of employment status and the receipt of UB II on subjective health. The availability of economic resources might act as a mediator of the effect of being unemployed or receiving UB II on the subjective health (Marmot, 2006). Economic resources of persons depend on the resources in the respective household. Therefore, the equivalized household income (HHI) is included to control for the economic situation of the household. The equivalized household income is adjusted for household size according to OECD standards (Hagenaars/de Vos K./Zaidi, 1994). Information regarding

[3] Models without adjustment variables are also estimated for the sake of completeness, but they will not be discussed. They are formulated as such:

$$y_{it} = \alpha + U_{it}\beta_1 + UB\,II_{it}\beta_2 + (U * UB\,II)_{it}\beta_3 + wave_{it}\beta_4 + \mu_i + \varepsilon_{it} \quad (2)$$

"Being in a Partnership" (P) and "Age"(A) are used as additional control variables. Being in a relationship is hypothesized to be a stabilizing factor for the individual health (Klein et al., 2012). Age is included as a control variable. However, in a longitudinal model, age is heavily correlated with panel wave. Hence, the results for age are difficult to interpret. With the inclusion of the covariates the adjusted model can be formulated as such:

$$\begin{aligned} y_{it} = \alpha + U_{it}\beta_1 + UB\ II_{it}\beta_2 + (U * UB\ II)_{it}\beta_3 + wave_{it}\beta_4 \\ + log(HHI)_{it}\beta_5 + P_{it}\beta_6 + A_{it}\beta_7 + \mu_i + \varepsilon_{it} \end{aligned} \tag{3}$$

$\alpha$ is the intercept. $\mu_i$ are fixed unknown parameters, that are eliminated by the within-transformation. $\varepsilon_{it}$ has the expected mean of zero. It is assumed that $Cov(x_{it}, \varepsilon_{it}) = 0$. Panel robust standard errors are used. Panel robust standard errors can control for additional serial correlation in panel data that is not already absorbed by the longitudinal modeling (Angrist/Pischke, 2008).

For the adjusted model, Wald tests are used to test whether the effects of unemployment and UB II differ significantly from each other. The primary significance level in this study will be set on $p = 0.05$. Repeated tests will be performed. No corrections for repeated testing will be carried out, since this is a first exploratory study investigating the association between unemployment, UB II and subjective health.

In order to assess the impact of unemployment and UB II on subjective health, two strategies are chosen. In a first step, not unemployed respondents were used as reference group. This includes individuals in the reference group that are neither unemployed nor employed, e. g. in vocational training, in early retirement or doing housework. This estimates the effect of unemployment and UB II on individuals, that are not unemployed. Since this reference group is heterogenous, only employed and unemployed persons are kept in a second step. The second approach allows the estimation of the effect of unemployment on health with employment as reference status. It can be estimated whether a health effect can be found for the so-called "Aufstocker" (employed benefit recipients) in comparison to employed individuals that do not have to claim UB II.

While FE models provide conservative effect estimators, it is possible that the effects of UB II and unemployment differ between subgroups, since average effects are estimated. Hence, the models will be separately estimated by sex. On the one hand, this serves as a check for the robustness of the results. On the other hand, it might also be possible that the effects of unemployment and UB II differ between the sexes. Unemployment and UB II are influencing the social position and men are more prone to be affected by status change of the relative social status than women (Molarius et al., 2007).

Only cases with complete covariate information at the time of the respective interview are used in the analyses. Missing data on item level is rare and assumed to be missing at random. The proportion of missing data on item-level for each of the variables at baseline can be seen in table 1. Missing data can also be caused on unit level due to panel attrition. This can be problematic if the cause of the attrition is correlated with $\varepsilon_{it}$. It is unproblematic if

the cause is correlated with the fixed effect $\mu_i$. This can be tested by including a dichotomous indicator for attriters before attrition in a model (Wooldridge, 2002). The indicator serves as a flag, whether the dependent variable changes differently for attriters in comparison to respondents, who stay in the panel. If the indicator is significant, selective attrition might bias the results. The attrition indicator is not included by default. Stata® version 12 is used for statistical analyses.

**Sensitivity checks**

PASS is based on a complex sample design. As a second sensitivity check, the primary analyses are repeated using design weights. With the use of design weights, each respondent enters the model weighted by his design weight, which is based on the inverse of the initial sampling probability. In a cross-sectional setting, the weighted estimated regression coefficients could be a better approximation of regression coefficients produced by a simple random sample, depending on statistical assumptions (Angrist/Pischke, 2008). If those assumptions are not met, it is possible, that the weighted results are more biased. It has been argued that the use of design weights can be used as a measure of robustness, since under perfect conditions weighted and unweighted estimations would lead to the same results (Lohr, 2010). Weighted estimations are less efficient, caused by larger standard errors. For longitudinal applications as in this study, the use of sampling weights and the implication regarding inference is rarely discussed and no best practice is known to the author. It is assumed, that the use of weights provides some evidence regarding the robustness of the estimators.

As a further measure for the stability of the results, a dichotomous variable called "severe health restriction" is formed to measure the health of the respondents. This variable contains the information whether the respondent reports a disability or the presence of severe health restrictions. It can be argued that such a variable might be a more valid surrogate indicator for the health of the respondents than the subjective assessment of health. This variable will be analyzed using FE logistic regressions. The results of the FE logistic models will be compared regarding effect direction with the estimates of the FE linear models.

# 4 Results

## 4.1 Descriptive statistics

The statistics for variables used in the analysis and additional demographics are reported in table 1. It depicts the information at baseline for each of the respondents. Table 1 shows more variables than are later used in the analyses. In the later analyses stable traits of the respondents are disregarded due to the use of fixed effects regression methods. The display of stable variables allows for better insight regarding the composition of the study population.

Subjective health as the outcome of interest is measured by three different health indicators. The mean for the self-rated health (SRH) is $3.38$ and the cross-sectional standard deviation (SD) is $1.07$ at the time of first observation. For $0.12\%$ of the respondents the information is missing[4]. The mean for health satisfaction is $6.77$ with a SD of $2.53$. The mean for the health score is $0.02$ with a SD of $0.77$. A higher score for all three measurements represents a higher level of subjective health. The presence of severe health restictions is reported by $28.27\%$ of all respondents. Regarding the labour market status of the study population $34.73\%$ are (self-) employed. An individual is classified as employed if the labour-related earnings exceed 400 Euros each month. $35.17\%$ of the study population are unemployed. $27.82\%$ of the study population are neither employed nor unemployed. These can be respondents that are in early retirement, classify themselves as housewife/househusband or still undergo vocational training or higher education. For $43.67\%$ of all respondents, current receipt of UB II is reported at the time of first interview. Due to the described sampling procedure, a higher proportion of unemployed and UB II recipients is found in the study population in contrast to the general German population. In 2011, $7.2\%$ of the general population received unemployment benefit I or UB II or other forms of social assistance. $62.79\%$ of all respondents report that they live in a relationship. The partner is not necessarily living in the same household. The mean of the adjusted household equivalence income is $1038.31$ Euro and the SD is $914.91$. For $1.83\%$ of the respondents, the household equivalence income could not be calculated due to missing values for the household income or due to uncertainty regarding the household structure. Regarding the general demographics, the mean age of the respondents is $39.85$ with a SD of $12.47$. $45.75\%$ of all respondents are male. $46.13\%$ of all respondents have children younger than 18 in their household. $23.17\%$ of the respondents have no formal vocational training. $2.15\%$ are students. $40.23\%$ have vocational training. $15.23\%$ have higher vocational training. $8.95\%$ have a university degree. $4.00\%$ have a foreign or some other vocational qualification. For $0.11\%$ the information for vocational qualification is missing. $78.27\%$ of the respondents have no migrational background. $15.09\%$ emigrated themselves. $5.29\%$ are second generation migrants.

[4] Missing information is usually caused by single-item refusal of the respondents. It is also possible that respondents did not know the answer to the respective question or that the question was not shown to the respondent due to faulty programming of the interview.

Table 1: Sample characteristics at baseline

| Variable | Mean, Proportion | SD | Missing (Proportion) |
|---|---|---|---|
| *Subjective health* | | | |
| Self-rated health (5-point scale) | 3.38 | 1.07 | 0.12 % |
| Health satisfaction (10-point scale) | 6.77 | 2.53 | 0.08 % |
| Health score | 0.006 | 0.77 | 0.78 % |
| *Severe health restriction* | | | |
| Yes | 28.27 % | | |
| No | 71.37 % | | 0.36 % |
| *Labour market status* | | | |
| Employed | 34.73 % | | |
| Unemployed | 35.17 % | | |
| Other | 27.82 % | | 2.28 % |
| *UB II receipt* | | | |
| UB II Yes | 43.67 % | | |
| UB II No | 55.27 % | | 1.05 % |
| *Relationship status* | | | |
| Partner Yes | 62.79 % | | |
| Partner No | 37.21 % | | |
| Household equivalence income | 1038.31 | 914.91 | 1.83 % |
| **Demographics** | | | |
| Age | 39.85 | 12.47 | |
| Male | 45.75 % | | |
| Female | 54.25 % | | |
| *Children under 18 in the household* | | | |
| Yes | 46.13 % | | |
| No | 53.87 % | | |
| *Vocational qualification* | | | |
| None | 23.17 % | | |
| Student | 2.15 % | | |
| Vocational training | 40.23 % | | |
| Higher vocational training | 15.40 % | | |
| University degree | 8.95 % | | |
| Other | 4.00 % | | 0.11 % |
| *Migrant background* | | | |
| No | 78.27% | | |
| 1. Generation | 15.09 % | | |
| 2. Generation | 5.29 % | | 1.35 % |
| *Number of Observations* | | | |
| N | 14,282 | | |

Source: PASS data 2006-2010

**Unemployment, unemployment benefit II and subjective health**

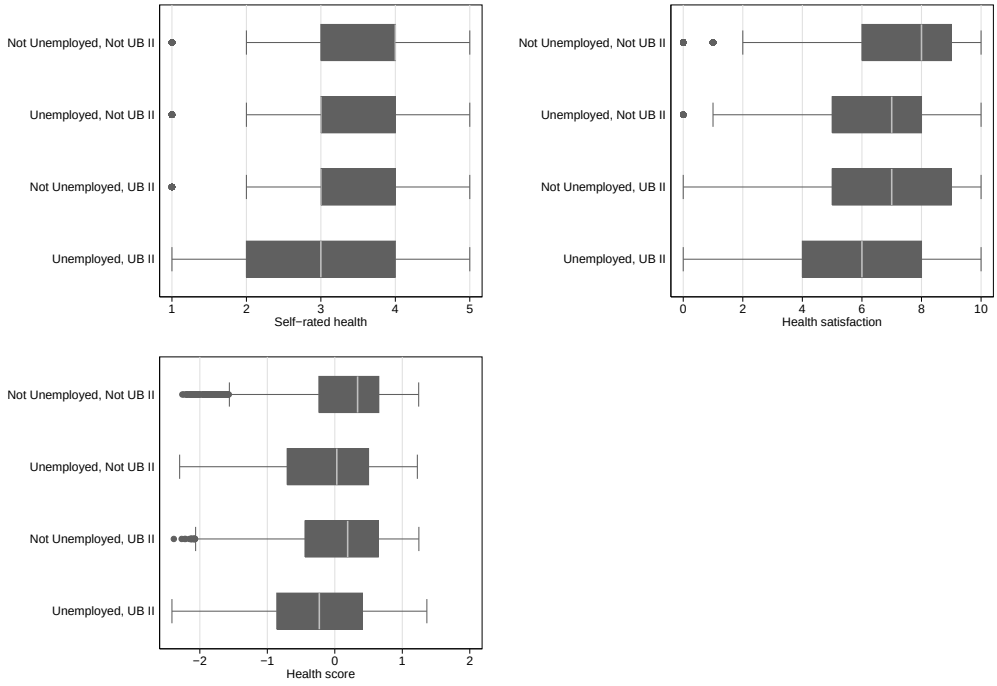
Table 2: Measures of subjective health over unemployment and UB II receipt at baseline

| | Self-rated health | | | Health satisfaction | | | Health score | | |
|---|---|---|---|---|---|---|---|---|---|
| | Mean | SD | N | Mean | SD | N | Mean | SD | N |
| Not Unemployed, No UB II | 3.55 | 1.00 | 7,231 | 7.30 | 2.16 | 7,236 | 0.17 | 0.67 | 7,193 |
| Unemployed, No UB II | 3.23 | 1.12 | 878 | 6.41 | 2.64 | 878 | -0.13 | 0.81 | 872 |
| Not Unemployed, UB II | 3.35 | 1.09 | 2,021 | 6.83 | 2.62 | 2,017 | 0.02 | 0.79 | 1,996 |
| Unemployed, UB II | 3.12 | 1.11 | 4,135 | 5.92 | 2.80 | 4,140 | -0.26 | 0.83 | 4,110 |

Source: PASS data 2006-2010

In figure 2 and table 2 the cross-sectional distributions for the different measures of subjective health, separated by unemployment and UB II status, are shown for the time of first interview. In table 2 the mean, the SD and the number of cases are shown for each of the measures of subjective health. The number of cases differs between the measures due to individual patterns of item non-response. Individuals that are not unemployed and do not receive UB II have the highest scores for all measures of subjective health. Respondents who are unemployed and live in household that receive UB II report the lowest scores for all measures of subjective health. The highest number of cases can be seen for respondents that are both or neither unemployed and recipients of UB II. There is still a substantive number of persons that is not unemployed but receive UB II. The lowest number of cases can be seen for those respondents that are unemployed but do not claim UB II. They also report lower overall health scores than non-unemployed respondents. The same relation between the measures of subjective health and unemployment an UB II receipt is visually depicted in figure 2. It can be seen that the spread of response values is smaller for respondents that are not unemployed and do not receive UB II. The spread of response values is largest for respondents that are unemployed and receive UB II. So those respondent have not only the lowest mean and median for subjective healths measures but also more often report worse values. By eyeballing the descriptive cross-sectional results, it seems straightforward to establish a connection between UB II, unemployment and subjective health. However, this connection can be solely caused by selection bias and confounding. In order to minimize the influence of these disturbance terms, one can use longitudinal data.

Figure 2: Boxplots for measures of subjective health over unemployment and UB II receipt at baseline

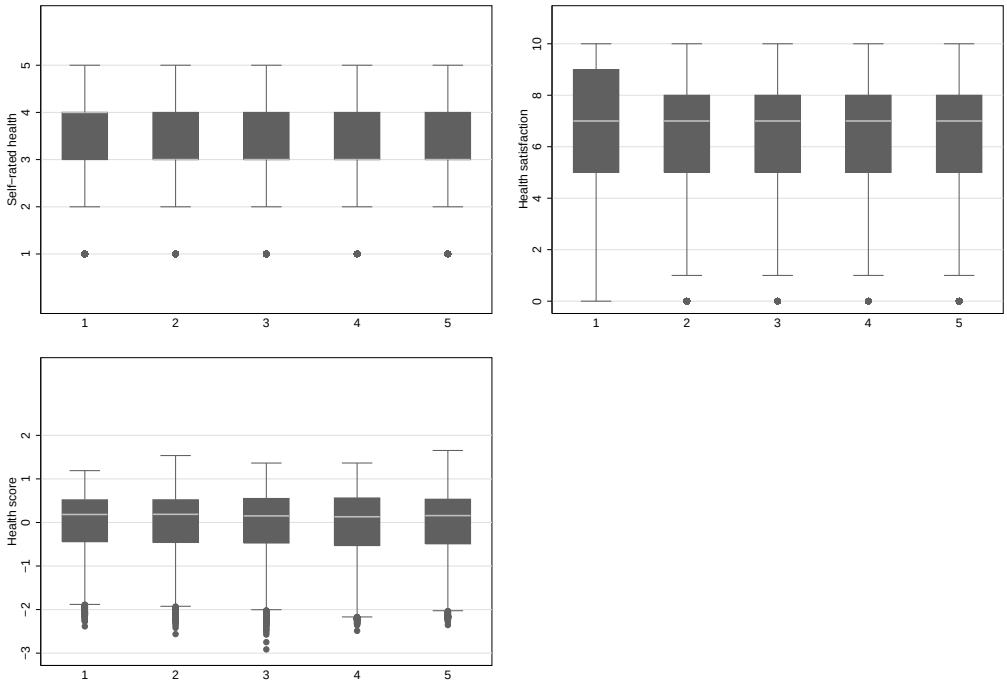



Source: PASS 2006−2010

### Longitudinal descriptions

Longitudinal analysis depends on within-person variation. The within-person variation over the five panel waves for the SRH is $0.64$. The within-person variation for the health satisfaction is $1.30$. The within-person variation for the health score is $0.37$. The analyses also depend on the frequency of change in the dependent variables. If no change for unemployment or recipiency of UB II can be observed, then longitudinal analyses are not feasible. For this study, $34,480$ transitions out or into unemployment respectively UB II are possible. $2,829$ transitions out of unemployment and $2,075$ transitions into unemployment are observed. $2,862$ transitions out of UB II receipt and $1,511$ transitions into UB II receipt are observed. This implies that enough transitions to conduct longitudinal analyses are present, but also that most of the respondents are stable in (un-)employment and/or UB II receipt. Figure 3 depicts the box plots for the different measures of subjective health over

Figure 3: Boxplots for measures of subjective health over subsequent panel waves



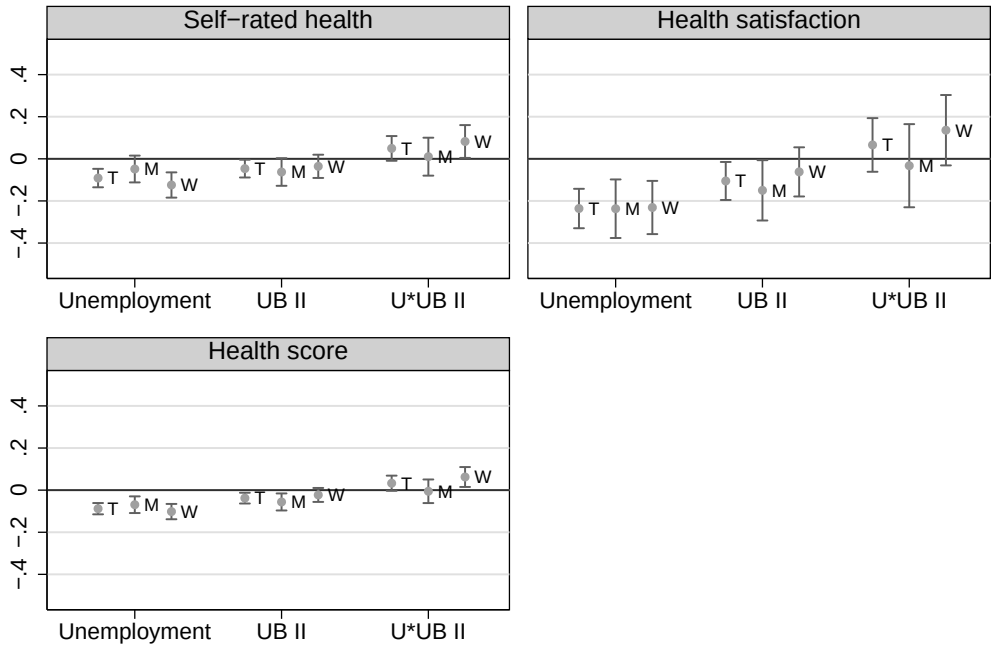

Source: PASS 2006−2011

the subsequent panel waves. The distributions of the measures are stable over the panel waves. No big shifts of the measures can be seen between the panel waves. Bigger shifts of the distributions would be problematic when using longitudinal analysis, since they would point towards unknown exogenous shocks which then needed to be controlled for.

## 4.2 Fixed Effect regression analyses

To test whether UB II has a significant adverse effect on different measures of subjective health, fixed effects linear regression models for self-rated health (SRH), health satisfaction and the health score are estimated. The results will be presented graphically as can be seen in figure 4. Coefficients are displayed for the total[5] (T) of observations and then separately for men (M) and women (W). For the respective tables with the separate models for men (table A3) and women (table A4) and the total (A1), one is referred to the appendix. The models are adjusted for panel wave, age, living in a partnership and the logarithm of the equivalized household income.

Figure 4: Adjusted FE linear coefficients and 95% confidence intervals for measures of subjective health; separated by gender



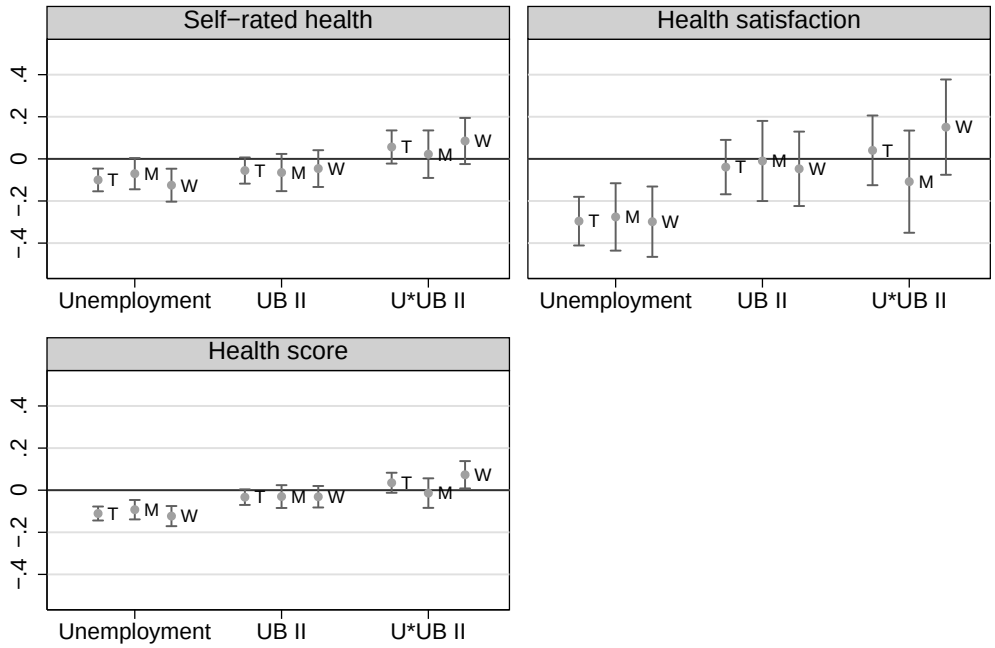

Adjusted for income, partnership and age
Source: PASS 2006−2011

It can be established on a first glance, that the effects for UB II and unemployment differ between the genders only to some degree. Larger differences can be seen for the interaction effect between unemployment and UB II (U * UB II) . Regarding the single effects seen in figure 4, unemployment has a significant negative association for women for all indicators. For men, unemployment is significantly associated only for health satisfaction and the health score. For women, UB II receipt is negatively, but not significantly associated with health. For men, UB II receipt is significantly associated for health satisfaction and the health score, but not for SRH. For women, the interaction effect is positive for all outcomes and is significant for two outcomes. For men, the interaction effect is zero for all outcomes. For women, the effect do not additively affect the measures of subjective health. Yet for

[5] Results for the total will not be discussed.

men, unemployment and UB II receipt additively affect the measures of subjective health, since the interaction effect is zero. Subsequently, the combined negative association of unemployment and UB II is at least twice as large for men than for women. This will be illustrated for the results for health satisfaction (upper right graph in figure 4). The associations for unemployment with health satisfaction are similar ($Men : \hat{\beta}_{Unempl} = -0.259,\ p < 0.001; Women : \hat{\beta}_{Unempl} = -0.228,\ p < 0.001$). The receipt of UB II has a stronger impact for men ($-0.169,\ p = 0.020$) than for women ($-0.066,\ p = 0.262$). The interaction term for men is close to zero ($-0.026,\ p = 0.798$). The interaction term for women is positive ($0.136,\ p = 0.111$). Thus, the combined effect of unemployment and UB II receipt for men is $-0.259 - 0.169 - 0.026 = -0.453$. The combined effect for women is $-0.228 - 0.066 + 0.136 = -0.159$. For men the combined association is larger than the sole associations, while for women the combined association is situated between the sole associations. This pattern can be established for all outcomes for subjective health. For both sexes, the control variables living in a relationship and the logarithm of the adjusted household income have no significant effect on any of the measures for subjective health.

Figure 5: Adjusted FE linear coefficients and 95% confidence intervals for measures of subjective health; separated by gender, restricted to employed and unemployed




Adjusted for income, partnership and age
Source: PASS 2006−2011

In a next step, it is checked whether the gender differences are also present if the analysis sample is restricted and only employed and unemployed cases are included. In figure 5, the adjusted restricted models are presented, separated by gender. The results for SRH can be seen in the upper left graph, the results for health satisfaction in the upper right graph and the result for the health score in the lower left graph in figure 5. The tables can be found in the appendix (table A5, table A6, table A2 ).

Unemployment is negatively significantly associated with health for men and women, with the exception of the result for SRH for men, which is not significant. For all outcomes across both sexes, UB II receipt is not significantly associated with the outcomes for subjective health. For women, the interaction effect is positive in all models and significant for the health score. For men, it is zero or below zero. Therefore, an additivity of the associations can be seen for men. For women, the combined negative association of health with UB II and unemployment is smaller than the sole association with unemployment. Compared with the unrestricted sample, the results for the restricted sample show a more similar pattern between the sexes. This is caused mainly by the male sample. For the restricted male sample, the association with UB II shifts to zero in comparison to the unrestricted sample. So for men and for women, UB II receipt has no significant negative association with health, if the individual is otherwise employed. Therefore, employment has a positive association with subjective health, even if the individual has to claim UB II.

The gender-separated results show some unanticipated patterns. The single effect of unemployment differs little between the genders, even if unemployment has a predominantly stronger effect on the outcomes for women. For the unrestricted models, UB II is more strongly associated with the outcome variables for men than for women. For the restricted models, UB II shows similar associations for men and women. For all thus far presented results, the interaction term differs considerably gender-wise. This points to a non-additive effect of unemployment and UB II receipt on subjective health for women. Therefore, women that are both unemployed and UB II recipients report (for some outcomes even considerably) better values for their subjective health than unemployed women. For men, an additive effect can be established, since the negative effects of unemployment and UB II receipt can be added up. If the sample is restricted to employed and unemployed, even negative interaction terms are found for men. In this case, the negative effects of unemployment and UB II receipt on subjective health might even reinforce each other. Regarding the adjustment variables, neither the income nor the relationship status have a strong association with the measures of subjective health. Also the coefficients of those variables is not consistently negative or positive between the measures of subjective health or between the genders.

**Sensitivity checks**

In a further step, the previously presented models for the different measures of subjective health are estimated, weighted additionally by design weights. Design weights are used to adjust for the unequal sampling probabilities of the analysis sample. When using design weights, the weight depends on the reciprocal of the sampling probability. Observations with a lower sampling probability get a higher weight, observations with a higher sampling probability a lower height. The weight for each observation stays fixed over the panel waves. The use of design weights provides a robustness check on the one hand. On the other hand, depending on assumptions, a better approximation of the effect that could be found in a simple random sample drawn from the general population. The corresponding figures and tables can be found in the appendix (figure A1, figure A2, table A7, table A8, table A9).

Using design weights, for women unemployment is significantly negatively associated with all three health outcomes. For men, the estimators for unemployment are not significant. For UB II receipt, no significant effect is found for women. For men, UB II receipt has a significant association with the health score. The interaction terms are not significant for both sexes. The different patterns regarding the interaction effect can also be seen for the weighted models. In comparison to the non-weighted models, some points have to be discussed. Firstly, the confidence levels are considerably larger. Weighted models are less efficient in their estimation, which leads to larger standard errors. However, the primary interest here lies in the pattern of the results regarding possible differences between the genders. Weighting seems to have a greater effect on the estimates for men than for women, which seem to be stable. For men, the associations with unemployment decrease and the associations with UB II receipt increase. For SRH as measure of subjective health, the effect is even indistinguishable from a zero effect for men. The effect of unemployment was not necessarily significant in the previous non-weighted models for SRH for men, but the presence of some negative effect could be assumed. The interaction effects remain stable in their differences between men and women. When restricting the analysis sample to employed and unemployed individuals, the weighted models show the same shifts as the non-weighted models. The associations for unemployment increase and the associations for UB II decrease.

Logistic fixed effects regressions were estimated as a second sensitivity check. The used standard software solution does not allow for the inclusion of panel weights or panel-corrected standard errors when using FE logistic regressions. This leads to smaller confidence intervals and p-values for the logistic models in comparison to the previous FE linear regressions. The dependent variable is defined to be one, if the respondent reported a disability or the presence of other severe health restrictions. The respective figure A3 and tables A11 and A12 can be found in the appendix. For the logistic models, unemployment has a significant association for men and women. As for the linear models, stronger associations for unemployment can be seen for women and for the restricted models. UB II has no significant association for men. In contrast to the linear models, stronger associations for UB II can be seen for women than for men. Also, the associations for UB II increase for women when restricting the sample. A positive significant interaction effect can be seen for

women. This means, that the combined association of unemployment and UB II is smaller than the association of sole unemployment for women. For men, on the other hand the single associations for UB II and unemployment are smaller than the combined one.

In order to analyze associations between unemployment, UB II and health, the results for a range of model specifications were discussed. The results show a stable pattern for the association between unemployment, UB II and various indicators for subjective health, even if the results differ somewhat depending on the specification of the respective model. Unemployment has a negative association with subjective health. This confirms the hypothesis, that unemployment is negatively associated with subjective health. When restricting the analysis sample to employed and unemployed individuals, the effect of unemployment increases. It seems reasonable to assume, that unemployment has a weaker impact for individuals that are outside the labour force, since a transition from employment to unemployment seems to be more severe than e.g. a transition from unemployment into early retirement. Excluding these individuals is thereby increasing the effect estimates for unemployment. Regarding the results for the gender-separated models, unemployment has a stronger association for women than for men. This difference could have several reasons. Unemployment could have a stronger effect on women, since women have patchier employment histories and hence lower unemployment entitlements (Bambra/Eikemo, 2009). It might also be possible, that the reporting of subjective health might differ gender-wise. Self-selection could also explain the finding. Only those women who do not have the possibility to retreat into a housewife position or something similar, are defining themselves as unemployed. For women, where such a "safety net" does not exist, unemployment could have a stronger impact. Such a self-selection might also explain, why the sex-specific differences weaken when restricting the sample to employed and unemployed. Still for the restricted results, larger effect estimates for unemployment are seen for women. In an earlier study, Kroll/Lampert (2011a) found a stronger association for men than for women between unemployment and health, but they do not discuss possible causes. Using weights causes shifts in the results for men. The estimates decrease considerably, even a zero effect of unemployment on SRH can be found. For women, weighting seems to cause little change in the results. In this analysis, design weights were used for the primary samples and the refreshment samples. While methodical literature regarding inference and weighting can be found in abundance for cross-sectional applications, this is not the case for the used longitudinal application. Here, the weighted models were mainly used for assessing robustness. Since unemployment has a negative effect for all other models and is also grounded on empirical evidence, it is hard to argue that the weighted results are more valid, when some weighted results are not plausible.

There is some evidence of a negative association of UB II receipt with subjective health in all of the presented models. This association is significant in some of them. UB II receipt seems to be somewhat associated with lower levels of subjective health. The effect of UB II receipt is smaller than the effect of unemployment in most of the presented models. When restricting the analysis sample to employed and unemployed, the effect of UB II receipt decreases for the linear models and increases for the logistic models. UB II receipt seems to have only a small negative association with subjective health, if the individual is employed.

Hence, employment maintains its positive association with subjective health, even if the employment does not provide a sufficient income. The differences between the results for men and women for UB II receipt are not constant. For men, the effect of UB II receipt is found to be significant for some of the linear models, whereas for women this is found to be for some of the logistic models. The results for the weighted models show some shifts in comparison to the non-weighted models for men.

An interesting pattern can be found for the interaction effect between unemployment and UB II receipt. For women, the interaction effect is positive for all and significant in some of the presented models. For men, no such interaction could be found and an additivity of the effects seems to be present. Hence, the combined effect of unemployment and UB II receipt is stronger for men than for women for all of the presented models. For women, the combined effect is always smaller, sometimes significantly, than the effect of unemployment alone. The sex-specific difference for the interaction effect becomes smaller, yet still visible, if the sample is restricted on unemployed and employed individuals. The smaller differences imply a greater degree of heterogeneity between men and women that are not in the labour force.

# 5 Discussion and Conclusion

In this explorative study, the association between unemployment, the receipt of UB II and different measures of subjective health was analyzed using longitudinal data. More than 14.000 respondents were followed up to five years. Fixed-effect linear and logistic models were calculated. Different indicators for subjective health were used to improve the robustness of the results.

This study used longitudinal data to explore a possible association between unemployment, UB II receipt and subjective health. Results showed a small, negative, association between UB II receipt and health. However, there are some limitations to the study. Only self-reported surrogate measures of health were used as outcome variables. Objective measures like biomarkers or medical records were not available. For the four different indicators of subjective health used in this study, similar patterns were found regarding the interdependence between unemployment, UB II receipt and health. Hence, some robustness is assumed for the results. The subjective health status is a valuable, unique indicator of human health status. It is the summary of information that is collected by the individual from the individual's body and mind (Jylhä, 2009).

The used approach does not explain the causal direction of the found associations between unemployment, UB II and subjective health. Selection and causation are known to explain the association between unemployment and subjective health. The presented effects are a mixture of both. Hence, the association between UB II and health should be investigated using dynamic panel or structural equation models in further research. This should allow for a better dissemination of the interdependence between UB II and subjective health.

Controlled for unemployment status, the negative effect of UB II is not necessarily caused by UB II. This holds especially for the models, where the sample is restricted on unemployed and employed. Employed UB II recipients often work in part-time and precarious jobs (Koller/Rudolph, 2011). Working in those jobs can have a negative impact on health of its own (Kim et al., 2012). Thus, the negative impact of UB II might be caused by the employment type. This possible mediating relation should be considered in further research. After twelve months of unemployment, individuals are defined as long-term unemployed, loose the coverage of the unemployment insurance and can claim UB II instead. The established associations for UB II might hence be only the effects of long-term unemployment for parts of the study population. Therefore additional models were calculated that included the separate lengths of unemployment and UB II periods (Results not shown). Those results did not lead to different conclusions. Therefore, the coefficients for UB II can not be seen as the effects of long-term unemployment.

Selective panel attrition might have an impact on the study results. Selective panel attrition arises, if the respondents that remain in the panel study are different from those who drop out, e.g. when healthier respondents are more likely to participate in further panel waves. This can cause attrition bias. A test for attrition bias was performed for the presented models in table A1 . An indicator variable for attriters was added (for details see (Wooldridge, 2002: p.581)). The attrition indicator was significant for the models for health satisfaction. It was

not significant for the models for SRH and the health score[6]. Hence, it cannot be ruled out that the results might be partially biased by panel attrition.

These are first results regarding an association between unemployment, UB II and subjective health. Further research is needed to assess the validity of the presented results. As in previous research, it is found that unemployment is negatively associated with subjective health. UB II is also negatively associated with subjective health. The effect of UB II receipt is weaker than the effect of unemployment. The negative effect of UB II could be caused by negative implications of stigmatization, institutional stress and financial hardship. The negative effect of UB II might be also caused by what Marmot (2006) calls the status syndrome. Subjective health is influenced by the social standing in the society. Causal pathways between social status and impact on stress-response mechanisms of the body have been established. Having a low social status causes stress. Stress triggers a wide range of responses in the human physiology that negatively affect health (Sapolsky, 2004). In a study by Tung et al. (2012) it was found that having a lower social status has an impact on relevant gene expressions leading to a higher output of stress hormones negatively affecting the immune status.

Having controlled for the household income, the negative association between UB II receipt and subjective health is only slightly attenuated. The effect of income varies around zero depending on the model specification. Income might not be the appropriate mediator for the relation between UB II and health. UB II receipt can also decrease the living standard. Berthoud/Bryan (2011) argue that the living standard is a better approximation of the underlying economic position than income and that a change in yearly income is of minor importance in comparison to the living standard. Deprivation indices, that depict the living standard, should be kept in mind as possible mediators in further research. Further research should also consider the association between UB II receipt and mental health. In this study, only the outcomes for physical health were used. UB II receipt might have a different impact on mental health or mental health could be a pathway variable.

For most of the models unemployment has a stronger impact for women than for men. Bambra/Eikemo (2009) find the same relation in a cross-sectional study conducted in 13 European countries. They argue that this is due to the fact that social assistance is usually lower for unemployed women than for men, since women have usually patchier employment histories. Still further analysis is needed, why unemployment has a stronger impact on subjective health for women than for men.

For UB II receipt, no gender dimension can be established. Depending on restriction and weighting, the effect is sometimes stronger for men and sometimes stronger for women. However, the interaction between unemployment and UB II receipt differs sex-specifically. For men, the effects of unemployment and UB II receipt can be summed up. Whereas for women, the combined effect is also still negative, but it is considerably smaller than the effect of mere unemployment. An adhoc hypothesis is that the population of female unemployed UB II recipients comprises to a large degree out of single-parent mothers. Single parents are

[6] Results are shown in table A13.

treated differently by the authorities, that are responsible for UB II recipients. Single parents do not have to accept any job offer and do not have to meet the same demands regarding labour market integration. The society might also have less prejudices against unemployed single parents, since having a child is a reasonable excuse from not participating in the labour market. As a consequence, institutional and societal acceptance of welfare receipt might be higher for single parents. This could lead to a lower level of negative repercussions for single parents and explain the gender-specific patterns. As an additional sensitivity check further research should restrict the analysis sample on single men and women without children. This could decrease the differences between the sexes.

Comparing the unrestricted with the restricted models, the effect of unemployment increases and the effect of UB II receipt decreases, if the analysis sample is restricted for unemployed and employed respondents. It is a reasonable assumption, that unemployment has a stronger effect on those, who are otherwise employed than for those, who are otherwise neither employed nor unemployed. For the restricted models, sex-specific differences decrease to some extent. Employed men and women might comprise out of a more homogenous group than men and women that are neither employed nor unemployed.

The results of this study imply that unemployment has a larger impact on subjective health compared to UB II receipt. Employment and UB II receipt is associated with better subjective health than unemployment and UB II receipt. So one could argue from a public health point of view, that it is a valid strategy, if any job has to be taken up as has to be done under UB II regulations, even if the employment does not provide sufficient resources. Even inadequate employment has a positive effect on health. Still, UB II can be seen as a double-edged sword, since the results also imply that UB II might have an additional negative association with health, independent of unemployment status. One of the core aims of UB II is the reintegration of individuals back into the labour market. The main tool is the imposing of financial restraints on recipients. The restraints could lead to a higher effort regarding job search, the same restraints might also cause a negative impact on physical and psychologic wellbeing, which might then lower the chance for job up-take or finding an appropriate job.

This study deals with the specific situation in Germany. While unemployment is a general problem in all work-centered societies, UB II is a specific national program. However, UB II can also be seen as the introduction of a workfare approach. Under the new legislation, any kind of job has to be accepted by unemployed UB II recipients, even if it does not provide an adequate income. Also the amount of welfare was cut considerably and set up as a means-tested flat-rate, independent of prior earnings. This resulted in considerable welfare cuts for parts of the population. With the current economic crisis in Europe and a number of countries facing structural welfare reforms, the results can be used for the discussion, whether the introduction of workfare schemes and welfare cuts have an impact on individual health.

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# A Appendix

Table A1: FE linear regression: parameter estimates and 95% confidence intervals for measures of subjective health

| | Self-rated health | | | | | | Health satisfaction | | | | | | Health score | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | M1 | | | M1 Adjusted | | | M2 | | | M2 Adjusted | | | M3 | | | M3 Adjusted | | |
| | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | |
| Unemployed | -0.094*** | -0.138 | -0.051 | -0.091*** | -0.135 | -0.048 | -0.244*** | -0.337 | -0.151 | -0.236*** | -0.330 | -0.142 | -0.090*** | -0.116 | -0.063 | -0.088*** | -0.115 | -0.061 |
| UB II | -0.048* | -0.090 | -0.006 | -0.046* | -0.089 | -0.004 | -0.117* | -0.207 | -0.028 | -0.105* | -0.196 | -0.015 | -0.040** | -0.065 | -0.015 | -0.038** | -0.064 | -0.012 |
| Unempl.*UBII | 0.053 | -0.005 | 0.112 | 0.049 | -0.009 | 0.108 | 0.069 | -0.058 | 0.196 | 0.066 | -0.062 | 0.193 | 0.034 | -0.002 | 0.069 | 0.033 | -0.003 | 0.069 |
| Wave | -0.027*** | -0.033 | -0.021 | -0.050*** | -0.068 | -0.033 | -0.023*** | -0.036 | -0.011 | -0.065*** | -0.103 | -0.028 | -0.006** | -0.010 | -0.002 | -0.018** | -0.029 | -0.006 |
| Partner Yes | | | | 0.024 | -0.012 | 0.059 | | | | -0.021 | -0.090 | 0.049 | | | | 0.005 | -0.016 | 0.025 |
| log(HH-income) | | | | -0.004 | -0.024 | 0.016 | | | | 0.051* | 0.006 | 0.096 | | | | 0.007 | -0.006 | 0.019 |
| Age | | | | 0.023** | 0.006 | 0.039 | | | | 0.039* | 0.004 | 0.073 | | | | 0.011* | 0.001 | 0.021 |
| _cons | 3.451*** | 3.427 | 3.476 | 2.582*** | 1.925 | 3.239 | 6.906*** | 6.856 | 6.957 | 5.048*** | 3.657 | 6.439 | 0.047*** | 0.032 | 0.062 | -0.430* | -0.845 | -0.016 |
| N | 48706 | | | 48085 | | | 48737 | | | 48111 | | | 48483 | | | 47874 | | |
| N_g | 14281 | | | 14261 | | | 14282 | | | 14264 | | | 14276 | | | 14258 | | |

$*p < 0.05, **p < 0.01, ***p < 0.001$

Source: PASS data 2006-2011

Table A2: FE Linear regression: parameter estimates and 95% confidence intervals for measures of subjective health: restricted to employed and unemployed

| | Self-rated health | | | | | | Health satisfaction | | | | | | Health score | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | M4 | | | M4 Adjusted | | | M5 | | | M5 Adjusted | | | M6 | | | M6 Adjusted | | |
| | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | |
| Unemployed | -0.101*** | -0.155 | -0.048 | -0.100*** | -0.154 | -0.046 | -0.310*** | -0.423 | -0.196 | -0.296*** | -0.411 | -0.180 | -0.114*** | -0.146 | -0.081 | -0.111*** | -0.144 | -0.078 |
| UB II | -0.061 | -0.123 | 0.001 | -0.055 | -0.118 | 0.007 | -0.056 | -0.184 | 0.072 | -0.039 | -0.168 | 0.090 | -0.038* | -0.074 | -0.001 | -0.033 | -0.070 | 0.004 |
| Unempl.*UBII | 0.062 | -0.016 | 0.141 | 0.056 | -0.022 | 0.135 | 0.047 | -0.117 | 0.212 | 0.040 | -0.125 | 0.206 | 0.039 | -0.009 | 0.086 | 0.035 | -0.012 | 0.083 |
| Wave | -0.035*** | -0.042 | -0.028 | -0.057*** | -0.079 | -0.035 | -0.040*** | -0.055 | -0.024 | -0.093*** | -0.144 | -0.042 | -0.012*** | -0.017 | -0.008 | -0.025** | -0.039 | -0.010 |
| Partner Yes | | | | 0.042 | -0.001 | 0.086 | | | | -0.017 | -0.101 | 0.068 | | | | 0.012 | -0.013 | 0.037 |
| log(HH-income) | | | | -0.007 | -0.030 | 0.015 | | | | 0.054 | -0.001 | 0.108 | | | | 0.007 | -0.008 | 0.022 |
| Age | | | | 0.021* | 0.001 | 0.042 | | | | 0.050* | 0.003 | 0.097 | | | | 0.012 | -0.002 | 0.026 |
| _cons | 3.486*** | 3.455 | 3.518 | 2.658*** | 1.820 | 3.495 | 6.942*** | 6.874 | 7.009 | 4.578*** | 2.627 | 6.530 | 0.073*** | 0.054 | 0.093 | -0.460 | -1.023 | 0.103 |
| N | 36863 | | | 36434 | | | 36891 | | | 36458 | | | 36720 | | | 36295 | | |
| N_g | 12165 | | | 12137 | | | 12169 | | | 12143 | | | 12153 | | | 12127 | | |

$*p < 0.05, **p < 0.01, ***p < 0.001$

Source: PASS data 2006-2011

Table A3: FE linear regression: parameter estimates and 95% confidence intervals for measures of subjective health for men

| | Self-rated health | | | | | | Health satisfaction | | | | | | Health score | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | M7 | | | M7 Adjusted | | | M8 | | | M8 Adjusted | | | M9 | | | M9 Adjusted | | |
| | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | |
| Unemployed | -0.048 | -0.111 | 0.014 | -0.048 | -0.112 | 0.015 | -0.259*** | -0.396 | -0.121 | -0.237*** | -0.376 | -0.098 | -0.072*** | -0.110 | -0.033 | -0.069*** | -0.109 | -0.030 |
| UB II | -0.060 | -0.125 | 0.005 | -0.063 | -0.128 | 0.003 | -0.169* | -0.311 | -0.027 | -0.150* | -0.293 | -0.006 | -0.058** | -0.098 | -0.018 | -0.056** | -0.097 | -0.016 |
| Unempl.*UBII | 0.007 | -0.083 | 0.096 | 0.010 | -0.080 | 0.100 | -0.026 | -0.222 | 0.171 | -0.033 | -0.230 | 0.165 | -0.006 | -0.062 | 0.049 | -0.005 | -0.061 | 0.051 |
| Wave | -0.026*** | -0.035 | -0.017 | -0.056*** | -0.082 | -0.031 | -0.013 | -0.032 | 0.005 | -0.076* | -0.139 | -0.014 | -0.004 | -0.009 | 0.002 | -0.019* | -0.037 | -0.001 |
| Partner Yes | | | | 0.032 | -0.021 | 0.084 | | | | 0.004 | -0.097 | 0.105 | | | | 0.011 | -0.019 | 0.041 |
| log(HH-income) | | | | -0.003 | -0.030 | 0.024 | | | | 0.059 | -0.001 | 0.119 | | | | 0.010 | -0.007 | 0.026 |
| Age | | | | 0.029* | 0.006 | 0.052 | | | | 0.060* | 0.002 | 0.119 | | | | 0.015 | -0.002 | 0.032 |
| _cons | 3.537*** | 3.501 | 3.572 | 2.400*** | 1.462 | 3.338 | 6.950*** | 6.878 | 7.022 | 4.165*** | 1.819 | 6.512 | 0.078*** | 0.056 | 0.099 | -0.569 | -1.247 | 0.109 |
| N | 21969 | | | 21681 | | | 21980 | | | 21688 | | | 21859 | | | 21577 | | |
| N_g | 6533 | | | 6523 | | | 6534 | | | 6526 | | | 6529 | | | 6521 | | |

$*p < 0.05, **p < 0.01, ***p < 0.001$

Source: PASS data 2006-2011

Table A4: FE linear regression: parameter estimates and 95% confidence intervals for measures of subjective health for women

| | Self-rated health | | | | | | Health satisfaction | | | | | | Health score | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | M10 | | | M10 Adjusted | | | M11 | | | M11 Adjusted | | | M12 | | | M12 Adjusted | | |
| | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | |
| Unemployed | -0.130*** | -0.190 | -0.071 | -0.124*** | -0.184 | -0.064 | -0.228*** | -0.354 | -0.103 | -0.231*** | -0.358 | -0.105 | -0.103*** | -0.139 | -0.067 | -0.102*** | -0.138 | -0.065 |
| UB II | -0.040 | -0.095 | 0.015 | -0.036 | -0.091 | 0.020 | -0.066 | -0.182 | 0.049 | -0.062 | -0.179 | 0.055 | -0.025 | -0.057 | 0.008 | -0.023 | -0.056 | 0.010 |
| Unempl.*UBII | 0.092* | 0.014 | 0.169 | 0.082* | 0.004 | 0.160 | 0.136 | -0.031 | 0.302 | 0.136 | -0.031 | 0.303 | 0.064** | 0.017 | 0.111 | 0.062** | 0.015 | 0.110 |
| Wave | -0.028*** | -0.036 | -0.019 | -0.045*** | -0.069 | -0.021 | -0.032*** | -0.050 | -0.014 | -0.056* | -0.100 | -0.011 | -0.008** | -0.013 | -0.003 | -0.016* | -0.030 | -0.003 |
| Partner Yes | | | | 0.018 | -0.031 | 0.067 | | | | -0.039 | -0.134 | 0.056 | | | | 0.000 | -0.028 | 0.028 |
| log(HH-income) | | | | -0.005 | -0.034 | 0.025 | | | | 0.036 | -0.032 | 0.105 | | | | 0.002 | -0.016 | 0.021 |
| Age | | | | 0.017 | -0.005 | 0.039 | | | | 0.021 | -0.019 | 0.061 | | | | 0.008 | -0.004 | 0.020 |
| _cons | 3.381*** | 3.348 | 3.414 | 2.731*** | 1.840 | 3.622 | 6.870*** | 6.799 | 6.940 | 5.823*** | 4.198 | 7.449 | 0.022* | 0.002 | 0.042 | -0.302 | -0.797 | 0.194 |
| N | 26737 | | | 26404 | | | 26757 | | | 26423 | | | 26624 | | | 26297 | | |
| N_g | 7748 | | | 7738 | | | 7748 | | | 7738 | | | 7747 | | | 7737 | | |

$*p < 0.05, **p < 0.01, ***p < 0.001$

Source: PASS data 2006-2011

Table A5: FE linear regression: parameter estimates and 95% confidence intervals for measures of subjective health for men: restricted to employed and unemployed

| | Self-rated health | | | | | | Health satisfaction | | | | | | Health score | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | M13 | | | M13 Adjusted | | | M14 | | | M14 Adjusted | | | M15 | | | M15 Adjusted | | |
| | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | |
| Unemployed | -0.070 | -0.143 | 0.003 | -0.070 | -0.144 | 0.004 | -0.304*** | -0.460 | -0.148 | -0.276*** | -0.436 | -0.116 | -0.098*** | -0.143 | -0.053 | -0.093*** | -0.139 | -0.047 |
| UB II | -0.067 | -0.155 | 0.020 | -0.065 | -0.153 | 0.023 | -0.045 | -0.233 | 0.144 | -0.010 | -0.200 | 0.180 | -0.037 | -0.090 | 0.017 | -0.030 | -0.084 | 0.024 |
| Unempl.*UBII | 0.021 | -0.091 | 0.133 | 0.022 | -0.091 | 0.135 | -0.096 | -0.337 | 0.145 | -0.108 | -0.351 | 0.135 | -0.011 | -0.081 | 0.058 | -0.014 | -0.084 | 0.056 |
| Wave | -0.033*** | -0.043 | -0.024 | -0.067*** | -0.094 | -0.040 | -0.028** | -0.049 | -0.007 | -0.109** | -0.180 | -0.038 | -0.009** | -0.015 | -0.003 | -0.028** | -0.048 | -0.007 |
| Partner Yes | | | | 0.033 | -0.029 | 0.095 | | | | 0.012 | -0.111 | 0.134 | | | | 0.011 | -0.025 | 0.047 |
| log(HH-income | | | | -0.003 | -0.031 | 0.026 | | | | 0.083* | 0.014 | 0.152 | | | | 0.014 | -0.005 | 0.033 |
| Age | | | | 0.032* | 0.008 | 0.057 | | | | 0.076* | 0.010 | 0.143 | | | | 0.017 | -0.001 | 0.036 |
| _cons | 3.569*** | 3.527 | 3.610 | 2.268*** | 1.255 | 3.282 | 6.992*** | 6.906 | 7.078 | 3.322* | 0.576 | 6.069 | 0.106*** | 0.080 | 0.131 | -0.704 | -1.481 | 0.073 |
| N | 18224 | | | 17998 | | | 18237 | | | 18007 | | | 18149 | | | 17926 | | |
| N_g | 5855 | | | 5842 | | | 5858 | | | 5847 | | | 5848 | | | 5837 | | |

$*p < 0.05, **p < 0.01, ***p < 0.001$

Source: PASS data 2006-2011

Table A6: FE linear regression: parameter estimates and 95% confidence intervals for measures of subjective health for women: restricted to employed and unemployed

| | Self-rated health | | | | | | Health satisfaction | | | | | | Health score | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | M16 | | | M16 Adjusted | | | M17 | | | M17 Adjusted | | | M18 | | | M18 Adjusted | | |
| | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | |
| Unemployed | -0.128** | -0.206 | -0.051 | -0.125** | -0.203 | -0.047 | -0.298*** | -0.463 | -0.132 | -0.298*** | -0.466 | -0.131 | -0.124*** | -0.171 | -0.076 | -0.123*** | -0.171 | -0.075 |
| UB II | -0.054 | -0.141 | 0.033 | -0.046 | -0.133 | 0.041 | -0.045 | -0.220 | 0.130 | -0.047 | -0.224 | 0.129 | -0.033 | -0.084 | 0.017 | -0.031 | -0.082 | 0.020 |
| Unempl.*UBII | 0.097 | -0.013 | 0.206 | 0.085 | -0.025 | 0.194 | 0.150 | -0.075 | 0.376 | 0.151 | -0.076 | 0.377 | 0.077* | 0.012 | 0.141 | 0.073* | 0.008 | 0.138 |
| Wave | -0.037*** | -0.048 | -0.026 | -0.040* | -0.076 | -0.003 | -0.051*** | -0.074 | -0.028 | -0.058 | -0.127 | 0.012 | -0.015*** | -0.021 | -0.008 | -0.018 | -0.038 | 0.003 |
| Partner Yes | | | | 0.051 | -0.010 | 0.111 | | | | -0.040 | -0.156 | 0.077 | | | | 0.013 | -0.022 | 0.048 |
| log(HH-income) | | | | -0.014 | -0.050 | 0.022 | | | | 0.007 | -0.083 | 0.097 | | | | -0.005 | -0.029 | 0.019 |
| Age | | | | 0.003 | -0.031 | 0.037 | | | | 0.006 | -0.058 | 0.070 | | | | 0.003 | -0.016 | 0.021 |
| _cons | 3.406*** | 3.357 | 3.455 | 3.339*** | 1.965 | 4.712 | 6.886*** | 6.781 | 6.991 | 6.619*** | 3.954 | 9.283 | 0.040** | 0.010 | 0.071 | -0.045 | -0.809 | 0.719 |
| N | 18639 | | | 18436 | | | 18654 | | | 18451 | | | 18571 | | | 18369 | | |
| N_g | 6310 | | | 6295 | | | 6311 | | | 6296 | | | 6305 | | | 6290 | | |

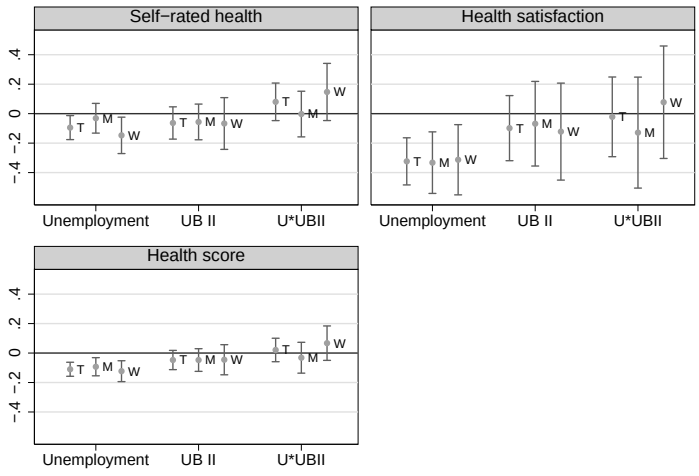
$*p < 0.05, **p < 0.01, ***p < 0.001$

Source: PASS data 2006-2011

Figure A1: Adjusted FE linear coefficients and 95% confidence intervals for measures of subjective health; separated by gender, weighted by design weights


Adjusted for income, partnership and age
Source: PASS 2006−2011

Figure A2: Adjusted FE linear coefficients and 95% confidence intervals for measures of subjective health; separated by gender, restricted to employed and unemployed, weighted by design weights




Unadjusted

Table A7: FE linear regression: parameter estimates and 95% confidence intervals for measures of subjective health: unrestricted and restricted to employed and unemployed, weighted by design weights

| | Unrestricted | | | | | | | | | Restricted | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Self-rated health | | | Health satisfaction | | | Health score | | | Self-rated health | | | Health satisfaction | | | Health score | | |
| | M19 | | | M20 | | | M21 | | | M22 | | | M23 | | | M24 | | |
| | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | |
| Unemployed | -0.090** | -0.155 | -0.024 | -0.232*** | -0.359 | -0.105 | -0.082*** | -0.121 | -0.044 | -0.088* | -0.170 | -0.005 | -0.306*** | -0.469 | -0.143 | -0.105*** | -0.154 | -0.057 |
| UB II | -0.047 | -0.132 | 0.037 | -0.163* | -0.322 | -0.004 | -0.044 | -0.097 | 0.009 | -0.057 | -0.167 | 0.054 | -0.082 | -0.304 | 0.140 | -0.042 | -0.108 | 0.023 |
| Unempl.*UBII | 0.076 | -0.022 | 0.174 | 0.072 | -0.136 | 0.281 | 0.028 | -0.037 | 0.092 | 0.075 | -0.054 | 0.204 | -0.029 | -0.301 | 0.243 | 0.018 | -0.062 | 0.099 |
| Wave | -0.045*** | -0.069 | -0.022 | -0.042* | -0.081 | -0.002 | -0.013* | -0.026 | -0.000 | -0.061*** | -0.092 | -0.031 | -0.071* | -0.127 | -0.015 | -0.028*** | -0.044 | -0.011 |
| Partner Yes | 0.024 | -0.035 | 0.083 | -0.019 | -0.121 | 0.084 | 0.007 | -0.026 | 0.040 | 0.014 | -0.060 | 0.089 | -0.043 | -0.172 | 0.086 | 0.001 | -0.040 | 0.042 |
| log(HH-income) | 0.007 | -0.026 | 0.040 | 0.048 | -0.040 | 0.137 | 0.008 | -0.018 | 0.035 | 0.014 | -0.025 | 0.053 | 0.085 | -0.027 | 0.197 | 0.021 | -0.012 | 0.053 |
| Age | 0.015 | -0.006 | 0.036 | 0.021 | -0.014 | 0.055 | 0.007 | -0.004 | 0.019 | 0.025 | -0.003 | 0.053 | 0.032 | -0.018 | 0.083 | 0.015* | 0.001 | 0.030 |
| _cons | 3.566*** | 3.538 | 3.594 | 6.050*** | 4.502 | 7.598 | -0.211 | -0.709 | 0.287 | 2.452*** | 1.232 | 3.671 | 5.401*** | 3.098 | 7.703 | -0.592 | -1.242 | 0.058 |
| N | 47361 | | | 47385 | | | 47150 | | | 35952 | | | 35974 | | | 35813 | | |
| N_g | 14171 | | | 14174 | | | 14166 | | | 11993 | | | 11999 | | | 11983 | | |

$*p < 0.05, **p < 0.01, ***p < 0.001$

Source: PASS data 2006-2011

Table A8: FE linear regression: parameter estimates and 95% confidence intervals for measures of subjective health for men: unrestricted and restricted to employed and unemployed, weighted by design weights

| | Unrestricted | | | | | | | | | Restricted | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Self-rated health | | | Health satisfaction | | | Health score | | | Self-rated health | | | Health satisfaction | | | Health score | | |
| | M25 | | | M26 | | | M27 | | | M28 | | | M29 | | | M30 | | |
| | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | |
| Unemployed | 0.022 | -0.067 | 0.111 | -0.162 | -0.341 | 0.018 | -0.034 | -0.088 | 0.020 | -0.025 | -0.128 | 0.079 | -0.302** | -0.519 | -0.086 | -0.086** | -0.150 | -0.022 |
| UB II | -0.112 | -0.252 | 0.027 | -0.270 | -0.542 | 0.002 | -0.101* | -0.191 | -0.012 | -0.050 | -0.172 | 0.073 | -0.041 | -0.328 | 0.246 | -0.041 | -0.118 | 0.037 |
| Unempl.*UBII | 0.014 | -0.139 | 0.166 | -0.055 | -0.402 | 0.291 | -0.017 | -0.121 | 0.087 | -0.004 | -0.160 | 0.153 | -0.140 | -0.518 | 0.238 | -0.034 | -0.140 | 0.071 |
| Wave | -0.045* | -0.085 | -0.005 | -0.052 | -0.115 | 0.011 | -0.012 | -0.032 | 0.009 | -0.064** | -0.103 | -0.025 | -0.087* | -0.157 | -0.018 | -0.025* | -0.046 | -0.003 |
| Partner Yes | 0.019 | -0.060 | 0.099 | -0.053 | -0.185 | 0.080 | -0.003 | -0.045 | 0.040 | -0.037 | -0.124 | 0.049 | -0.063 | -0.224 | 0.098 | -0.023 | -0.070 | 0.025 |
| log(HH-income) | 0.006 | -0.047 | 0.058 | 0.078 | -0.070 | 0.227 | 0.016 | -0.029 | 0.062 | 0.025 | -0.029 | 0.078 | 0.126 | -0.035 | 0.287 | 0.033 | -0.015 | 0.081 |
| Age | 0.015 | -0.023 | 0.053 | 0.043 | -0.014 | 0.101 | 0.008 | -0.010 | 0.027 | 0.028 | -0.008 | 0.065 | 0.064* | 0.000 | 0.128 | 0.016 | -0.003 | 0.036 |
| _cons | 2.988*** | 1.398 | 4.578 | 4.949*** | 2.373 | 7.524 | -0.284 | -1.120 | 0.552 | 2.350** | 0.773 | 3.927 | 3.771* | 0.822 | 6.719 | -0.687 | -1.576 | 0.202 |
| N | 21303 | | | 21309 | | | 21199 | | | 17723 | | | 17731 | | | 17651 | | |
| N_g | 6470 | | | 6473 | | | 6466 | | | 5760 | | | 5765 | | | 5755 | | |

$*p < 0.05, **p < 0.01, ***p < 0.001$

Source: PASS data 2006-2011

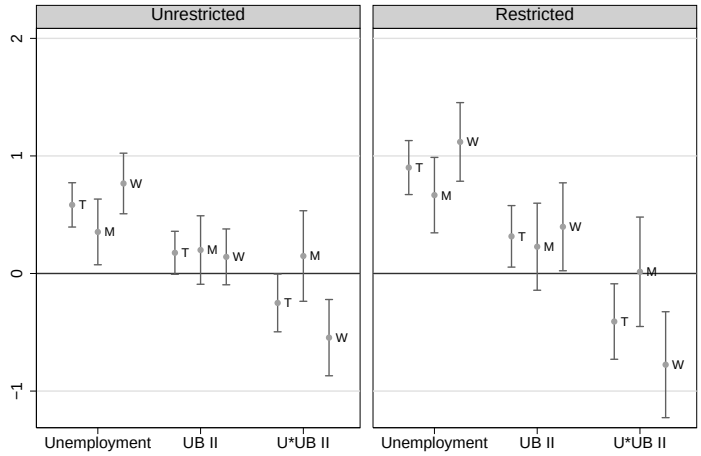
Table A9: FE linear regression: parameter estimates and 95% confidence intervals for measures of subjective health for women: unrestricted and restricted to employed and unemployed, weighted by design weights

| | Unrestricted | | | | | | | | | Restricted | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Self-rated health M31 | | | Health satisfaction M31 Adjusted | | | Health score M32 | | | Self-rated health M32 Adjusted | | | Health satisfaction M33 | | | Health score M33 Adjusted | | |
| | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | |
| Unemployed | -0.172*** | -0.263 | -0.080 | -0.282** | -0.459 | -0.105 | -0.118*** | -0.171 | -0.065 | -0.125** | -0.203 | -0.047 | -0.298*** | -0.466 | -0.131 | -0.123*** | -0.171 | -0.075 |
| UB II | -0.001 | -0.105 | 0.103 | -0.084 | -0.279 | 0.110 | -0.003 | -0.067 | 0.060 | -0.046 | -0.133 | 0.041 | -0.047 | -0.224 | 0.129 | -0.031 | -0.082 | 0.020 |
| Unempl.*UBII | 0.128* | 0.001 | 0.256 | 0.187 | -0.077 | 0.450 | 0.069 | -0.013 | 0.150 | 0.085 | -0.025 | 0.194 | 0.151 | -0.076 | 0.377 | 0.073* | 0.008 | 0.138 |
| Wave | -0.046** | -0.075 | -0.017 | -0.044 | -0.094 | 0.007 | -0.016 | -0.032 | 0.001 | -0.040* | -0.076 | -0.003 | -0.058 | -0.127 | 0.012 | -0.018 | -0.038 | 0.003 |
| Partner Yes | 0.029 | -0.057 | 0.116 | 0.014 | -0.140 | 0.168 | 0.018 | -0.032 | 0.067 | 0.051 | -0.010 | 0.111 | -0.040 | -0.156 | 0.077 | 0.013 | -0.022 | 0.048 |
| log(HH-income) | 0.011 | -0.030 | 0.052 | 0.020 | -0.068 | 0.108 | 0.001 | -0.024 | 0.027 | -0.014 | -0.050 | 0.022 | 0.007 | -0.083 | 0.097 | -0.005 | -0.029 | 0.019 |
| Age | 0.015 | -0.011 | 0.040 | 0.012 | -0.029 | 0.053 | 0.007 | -0.007 | 0.021 | 0.003 | -0.031 | 0.037 | 0.006 | -0.058 | 0.070 | 0.003 | -0.016 | 0.021 |
| _cons | 2.793*** | 1.704 | 3.882 | 6.564*** | 4.758 | 8.371 | -0.178 | -0.768 | 0.412 | 3.339*** | 1.965 | 4.712 | 6.619*** | 3.954 | 9.283 | -0.045 | -0.809 | 0.719 |
| N | 26058 | | | 26076 | | | 25951 | | | 18436 | | | 18451 | | | 18369 | | |
| N_g | 7701 | | | 7701 | | | 7700 | | | 6295 | | | 6296 | | | 6290 | | |

$*p < 0.05, **p < 0.01, ***p < 0.001$

Source: PASS data 2006-2011

Figure A3: Adjusted logistic FE coefficients and 95% confidence intervals for having severe health restrictions; separated by gender




Adjusted for income, partnership and age
Source: PASS 2006−2011

Table A10: FE logistic regressions: parameter estimates and 95% confidence intervals for severe health restriction

| | Unrestricted | | | | | | Restricted | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | M34 | | | M34 Adjusted | | | M35 | | | M35 Adjusted | | |
| | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | |
| Unemployed | 0.576*** | 0.390 | 0.762 | 0.570*** | 0.381 | 0.759 | 0.906*** | 0.680 | 1.133 | 0.888*** | 0.658 | 1.119 |
| UB II | 0.173 | -0.009 | 0.355 | 0.170 | -0.014 | 0.353 | 0.324* | 0.063 | 0.585 | 0.312* | 0.050 | 0.573 |
| Unempl.*UBII | -0.239 | -0.484 | 0.005 | -0.238 | -0.485 | 0.009 | -0.415* | -0.734 | -0.095 | -0.400* | -0.721 | -0.078 |
| Wave | 0.062*** | 0.035 | 0.090 | 0.011 | -0.073 | 0.095 | 0.089*** | 0.056 | 0.121 | 0.044 | -0.054 | 0.142 |
| Partner | | | | 0.054 | -0.099 | 0.207 | | | | 0.048 | -0.131 | 0.227 |
| log(HH-Income) | | | | -0.003 | -0.084 | 0.079 | | | | -0.014 | -0.109 | 0.081 |
| Age | | | | 0.050 | -0.028 | 0.128 | | | | 0.041 | -0.051 | 0.132 |
| N | 12350 | | | 12135 | | | 9189 | | | 9046 | | |
| N_g | 3366 | | | 3323 | | | 2584 | | | 2555 | | |

$*p < 0.05, **p < 0.01, ***p < 0.001$
Source: PASS data 2006-2011

Table A11: FE logistic regressions: parameter estimates and 95% confidence intervals for severe health restriction; separated by sex

| | Men M36 | | | Women M37 | | | Men M36 Adjusted | | | Women M37 Adjusted | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | |
| Unemployed | 0.374** | 0.099 | 0.648 | 0.735*** | 0.481 | 0.990 | 0.337* | 0.056 | 0.618 | 0.752*** | 0.494 | 1.010 |
| UB II | 0.212 | -0.079 | 0.504 | 0.120 | -0.115 | 0.355 | 0.204 | -0.089 | 0.497 | 0.128 | -0.110 | 0.366 |
| Unempl.*UBIII | 0.130 | -0.254 | 0.514 | -0.506** | -0.827 | -0.184 | 0.157 | -0.231 | 0.545 | -0.527** | -0.852 | -0.202 |
| Wave | 0.079*** | 0.037 | 0.121 | 0.051** | 0.014 | 0.087 | -0.025 | -0.151 | 0.101 | 0.036 | -0.071 | 0.142 |
| Partner Yes | | | | | | | 0.125 | -0.117 | 0.366 | -0.003 | -0.202 | 0.197 |
| log(HH-income) | | | | | | | -0.069 | -0.179 | 0.042 | 0.082 | -0.042 | 0.206 |
| Age | | | | | | | 0.102 | -0.016 | 0.221 | 0.013 | -0.085 | 0.110 |
| N | 5458 | | | 6892 | | | 5365 | | | 6770 | | |
| N_g | 1520 | | | 1846 | | | 1501 | | | 1822 | | |

$*p < 0.05, **p < 0.01, ***p < 0.001$

Source: PASS data 2006-2011

Table A12: FE logistic regressions: parameter estimates and 95% confidence intervals for severe health restriction; restricted to employed and unemployed, separated by sex

| | Men M38 | | | Women M39 | | | Men M38 Adjusted | | | Women M39 Adjusted | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | |
| Unemployed | 0.693*** | 0.379 | 1.008 | 1.095*** | 0.764 | 1.427 | 0.657*** | 0.335 | 0.979 | 1.100*** | 0.764 | 1.435 |
| UB II | 0.237 | -0.133 | 0.607 | 0.403* | 0.031 | 0.776 | 0.225 | -0.146 | 0.595 | 0.391* | 0.017 | 0.765 |
| Unempl.*UBIII | -0.003 | -0.465 | 0.459 | -0.773*** | -1.221 | -0.325 | 0.032 | -0.435 | 0.498 | -0.768*** | -1.219 | -0.317 |
| Wave | 0.094*** | 0.048 | 0.140 | 0.083*** | 0.038 | 0.129 | -0.008 | -0.140 | 0.123 | 0.112 | -0.040 | 0.265 |
| Partner Yes | | | | | | | 0.223 | -0.054 | 0.499 | -0.089 | -0.327 | 0.149 |
| log(HH-income) | | | | | | | -0.063 | -0.184 | 0.059 | 0.059 | -0.093 | 0.212 |
| Age | | | | | | | 0.099 | -0.025 | 0.222 | -0.033 | -0.174 | 0.108 |
| N | 4502 | | | 4687 | | | 4426 | | | 4620 | | |
| N_g | 1274 | | | 1310 | | | 1257 | | | 1298 | | |

$*p < 0.05, **p < 0.01, ***p < 0.001$

Source: PASS data 2006-2011

Table A13: FE linear regression: parameter estimates and 95% confidence intervals for measures of subjective health with an added indicator for panel attrition

| | Self-rated health | | | | | | Health satisfaction | | | | | | Health score | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | M40 | | | M40 Adjusted | | | M41 | | | M41 Adjusted | | | M42 | | | M42 Adjusted | | |
| | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | | $\hat{\beta}$ | 95% CI | |
| Unemployed | -0.094*** | -0.138 | -0.051 | -0.091*** | -0.135 | -0.048 | -0.244*** | -0.337 | -0.152 | -0.236*** | -0.330 | -0.143 | -0.090*** | -0.116 | -0.063 | -0.088*** | -0.115 | -0.061 |
| UB II | -0.048* | -0.090 | -0.006 | -0.047* | -0.089 | -0.005 | -0.120** | -0.210 | -0.031 | -0.108* | -0.198 | -0.018 | -0.040** | -0.066 | -0.015 | -0.038** | -0.064 | -0.013 |
| Unempl.*UBII | 0.054 | -0.005 | 0.112 | 0.050 | -0.009 | 0.109 | 0.072 | -0.055 | 0.199 | 0.068 | -0.059 | 0.196 | 0.034 | -0.002 | 0.070 | 0.033 | -0.003 | 0.069 |
| Wave | -0.027*** | -0.033 | -0.020 | -0.049*** | -0.067 | -0.031 | -0.019** | -0.032 | -0.005 | -0.060** | -0.098 | -0.022 | -0.006** | -0.010 | -0.002 | -0.017** | -0.029 | -0.006 |
| Partner Yes | | | | 0.024 | -0.012 | 0.060 | | | | -0.019 | -0.088 | 0.051 | | | | 0.005 | -0.016 | 0.026 |
| log(HH-income) | | | | -0.004 | -0.024 | 0.015 | | | | 0.051* | 0.005 | 0.096 | | | | 0.007 | -0.006 | 0.019 |
| Age | | | | 0.023** | 0.006 | 0.039 | | | | 0.039* | 0.004 | 0.073 | | | | 0.011* | 0.001 | 0.021 |
| Attrition | -0.006 | -0.033 | 0.021 | -0.012 | -0.039 | 0.015 | -0.060* | -0.116 | -0.005 | -0.059* | -0.116 | -0.003 | -0.004 | -0.020 | 0.012 | -0.005 | -0.022 | 0.011 |
| _cons | 3.451*** | 3.426 | 3.475 | 2.583*** | 1.926 | 3.240 | 6.900*** | 6.849 | 6.951 | 5.055*** | 3.663 | 6.447 | 0.047*** | 0.032 | 0.062 | -0.429* | -0.844 | -0.015 |
| N | 48706 | | | 48085 | | | 48737 | | | 48111 | | | 48483 | | | 47874 | | |
| N_g | 14281 | | | 14261 | | | 14282 | | | 14264 | | | 14276 | | | 14258 | | |

$*p < 0.05, **p < 0.01, ***p < 0.001$

Source: PASS data 2006-2011

## Recently published

| No. | Author(s) | Title | Date |
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