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Social assistance and mental health: evidence from longitudinal administrative data on pharmaceutical consumption

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ABSTRACT

This paper adds to the small literature on the role of welfare benefits and mental health by studying the relationship between uptake of Social Assistance Benefit (SAB) and objective mental health measures. We use rich longitudinal administrative data on income, unemployment benefits and psychopharmaceutic prescriptions (antidepressants, anxiolytics, and hypnotics) for more than 140,000 Swedes in 2006–2012. Relative to earlier studies focusing on subjective mental health, an advantage of our approach is that we use longitudinal administrative data that do not suffer from non-response, under-reporting and self-justification biases. While we document a strong positive association between SAB and psychopharmaca consumption in ordinary least squares models, fixed effects estimates indicate that most of the association is due to unobserved individual-specific predisposition. Insofar as a relationship remains in the fixed effect models, it is driven by highly educated men. This result is consistent with earlier quantitative studies using survey data and with qualitative research suggesting that SAB uptake may be particularly stigmatizing for individuals with a higher initial socioeconomic position.

KEYWORDS
Mental health; social assistance; register data; individual fixed effect

JEL CLASSIFICATION
H51; I10

I. Introduction

Mental health problems impose a massive burden on societies. According to the World Health Organization (WHO), more than 20 percent of all individuals develop a mental disorder at least once over their lifetime (World Health Organization 2001). The prevalence of depression and anxiety has increased by nearly 50 percent since 1990, and depression alone now affects more than 300 million people across the globe, making it one of the main causes of disability worldwide (World Bank 2014). There is also strong evidence that mental problems and their adverse consequences are increasing worldwide, and that Sweden is no exception from this general trend (Försäkringskassan 2014, Inspektionen för socialförsäkringen 2014).

It is well known that low socioeconomic status (SES) associates with worse mental health, irrespective of whether status is proxied by income, material wealth, financial strain, education or by labour market position or security (e.g., Watson and Osberg 2017; Rohde 2016; Reiss 2013; Fryers, Melzer, and Jenkins 2003; Marmot and Bell 2012; Szanton, Thorpe, and Whitfield 2010). However, the pathways underpinning the relationship are less well documented. The social causation hypothesis (Dohrenwend and Dohrenwend 1969) predicts that low SES by itself causes worse health; individuals with low income may be unable to invest in their health via preventive care or to cover pharmaceutical costs related to mental illness. More indirectly, mental health may be affected by psychosocial mechanisms running through the experience of stress, shame and guilt due to economic hardship. As stated by Sen (1983), shame is at the 'irreducible absolutist core' of the idea of poverty and inability to support oneself. A large strand of research in psychology suggests that shame is a very destructive emotion, causing feelings of incompetence and powerlessness (Tangney and Dearing 2002) – negative emotions that have deleterious effects on mental wellbeing (Mirowsky and Ross 2003).

This study focuses on the psychosocial mechanisms of the social causation hypothesis in the context of welfare dependency, i.e. it looks at individuals receiving income support in the form of means-

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tested Social Assistance Benefit (SAB). SAB associates with low material standard, but sociological studies also suggest that the experience of SAB dependency by itself entails psychosocial suffering (see Mayer and Timms (1970) on Britain, Rank (1994) on USA, and Angelin (2009) and Dahlgren and Starrin (2004) on Sweden).

We examine the relationship between welfare dependency and mental health using rich annual administrative panel data on over 140,000 Swedes 2006–2012. Our data allows us to isolate the social causation channel from key competing explanations for a SAB-mental health association. By exploiting the longitudinal dimension of our data, we can abstract from the social selection hypothesis (Eaton 1980), which posits that the causality runs from health to SAB (i.e., that individuals with mental disorders drift down in SES position due to psychopathology and inability to fulfill expected role obligations). By including individual-specific fixed effects in the regression models, we reduce the risk that the observed associations between SAB and mental health reflect omitted confounding factors.

There is only a handful of earlier quantitative studies on SAB and mental health.[1] An American prospective study shows that mothers on welfare benefits are more likely to develop mental problems (Ensminger 1995), similar to the results of a Swedish study examining self-reported general health among mothers (Fritzell et al. 2007). Comparing the mental health of individuals entitled to various social benefits in England, Ford et al. (2010) find that uptake of income support is associated with a higher risk of mental problems, conditional on employment status. Rodriguez, Lasch, and Mead (1997) show that the gap in the prevalence of depression between unemployed and employed Americans is largely explained by unemployed individuals on means-tested welfare benefits.[2] Furthermore, the association between welfare and depression persists in the long run (Rodriguez, Frongillo, and Chandra 2001) and welfare is also negatively correlated with general health measures in the US, UK, and Germany (Rodriguez 2001). Huber, Lechner, and Wunsch (2011) study a sample of Germans making the transition from welfare benefits into employment and use a propensity score matching design to account for selection bias. They find that the transition to employment associated with improved mental health, though mainly among men.

Except Huber, Lechner, and Wunsch (2011), none of the previous studies employs a research design that deals with the empirical challenge that SAB may correlate with other individual determinants of mental health. Our approach enables us to discriminate between the key competing hypotheses in the SAB-mental health nexus. Our paper also contributes to the literature by using objective mental measures from administrative registers on the consumption of psychopharmaca – antidepressants, anxiolytics, and hypnotics (for another recent example of using pharmaceutical data to proxy mental health, see Lyk-Jensen, Weatherall, and Jepsen (2016)) – rather than self-reported measures of mental health. As shown by e.g. Kjellsson, Clarke, and Gerdtham (2014) and Ljungvall, Gerdtham, and Lindblad (2015), self-reported health measures often generate measurement errors that may matter for estimated disparities in health. Our measures have the advantage of not being susceptible to non-response bias, under-reporting, or justification bias (Huber, Lechner, and Wunsch 2011), and therefore complement the existing literature.

We document strong cross-sectional associations between SAB and psychopharmaceutic consumption,

[1]For qualitative evidence, see e.g. Underlid 2005; Angelin (2009); Wilton 2004. Another strand of quantitative research documents elevated health problems among children growing up in a family receiving SAB (McMunn et al. 2001; Weitoft et al. 2008; Mörk, Sjögren, and Svaleryd 2014), a question distinct from the one studied in this paper.

[2]Related literature considers how unemployment affects mental health, without considering the role of SAB. This literature comes to mixed conclusions reaching from zero to negative effects (Björklund and Eriksson 1998; Böckerman and Ilmakunnas 2009; Gallo et al. 2000; Eliason and Storrie 2009; Korpi 2001; Kuhn, Lalive, and Zweimüller 2009; Salm 2009). From a social selection perspective, Peng, Meyerhoefer, and Zuvekas (2016) and Tefft (2012) show that exhibiting depressive symptoms reduces the individual's likelihood of obtaining employment and thus the opportunity to earn an income. While unemployment and welfare are related issues, the experience of SAB is distinct from that of unemployment. Unemployment is not a prerequisite for SAB uptake (which may also function as an income supplement for low-wage earners) and some psychosocial mechanisms activated by job loss are not relevant for the SAB-mental health relationship. For instance, SAB uptake does not imply that individuals experience the loss of other attributes associated with being employed e.g. time structure, social experience, identity and participation in a collective purpose (Jahoda 1982). Further, much research on unemployment has exploited mass layoffs to avoid the problem of the selection of unhealthy individuals into unemployment. This strategy is not ideal to derive conclusions on the shame and guilt mechanism of the social causation hypothesis, as there is less stigma associated with job loss when the unemployment spell is due to external circumstances. Relatedly, Heggebø and Elstad (2018) find that the negative association between unemployment and mental health is stronger in countries with lower unemployment.

but the associations are largely explained by selection effects: when adding individual fixed effects to the model, the elevated drug risks among SAB beneficiaries fall from 21 to less than 2 percent for women, and from 44 to 9 percent for men. A bounds analysis further suggests that the relationship for men at least partly reflects a causal effect of SAB. The fixed effects estimates are unaffected when we include (current) income in the model, which suggests that something else than lower material standard accounts for the remaining effect. We cannot directly discriminate between psychosocial dimensions, but we document that highly educated men drive the fixed effects association between SAB and mental health. This is consistent with qualitative research on SAB and mental health suggesting that feelings of shame and guilt related to the SAB experience are particularly common among high-SES individuals.

The next section gives an institutional background on SAB and health care in Sweden. Thereafter, we delineate our data and empirical specification and present the empirical findings. The paper ends with a discussion of interpretations and limitations and concluding remarks.

II. Institutional background

Social assistance benefit (SAB)

Sweden has a comprehensive social safety net offering income support to individuals lacking labour market income. Most benefits – e.g. sickness, unemployment, parental and pension benefits – are proportional to the individual's previous labour income, are approved for longer periods and are unrelated to the individual's consumption and wealth. However, individuals whose (labour and non-labour) income and wealth fall below a statutory level are eligible for the means-tested SAB, a form of cash income allowance which is meant to ensure that all households cover necessary living expenses such as food, rent, clothing, medication, etc. (Kruse and Ståhlberg. 2013). Individuals have to apply monthly for SAB and the application process implies a thorough examination of the household's economy. To be eligible, the individual must have exhausted all other income sources (including financial assets) and actively search for work. Unusual expenses require approval in advance. SAB applications are reviewed and approved by the municipal social services.

Annually about four percent of the Swedes receive SAB. Approximately 40 percent of the recipients are below 30 years of age, and almost 60 percent of all SAB households have at least one foreign-born member. The average spell length is about six months, although about 40 percent of households with SAB have spells longer than 10 months. Since the SAB is granted at the municipality level, the benefit rate varies somewhat across geographical areas. The mean monthly SAB is about 7,500 SEK (€750) (Socialstyrelsen 2017). However, a quarter of the recipients receives less than 5,000 SEK (€500) on an annual basis, meaning that the SAB is a complement to other income sources for this group (Dahlberg et al. 2009).

Health care and prescribed pharmaceutical costs

Health care visits and prescribed drugs are heavily subsidized in Sweden. Prescribed drugs are exclusively dispensed by pharmacies. The national health insurance covers all residents and subsidizes outpatient pharmaceutical expenditures exceeding SEK 2,200 (€220) in out-of-pocket payments on a 12-month rolling basis. Above the payment cap, the individual's expenses are fully reimbursed for the remainder of the 12-month insurance period. Similarly, there is a cost ceiling at SEK 1,100 (€110) for health care visits. Importantly, the SAB covers out-of-pocket costs for prescribed drugs as well as GP visits if needed (SOSFS 2013:1).

III. Data and empirical strategy

We construct an individual-level panel dataset for 2006–2012 based on data from three official registers held by Statistics Sweden (the Longitudinal integration database for health insurance and labour market studies; LISA) and the National Board of Health and Welfare (the Prescribed Drug Register; PDR, and the National Patient Register; NPR). The LISA database contains background information such as age, gender, country of birth, family composition, and labour market, social and educational information, for all individuals above 16 years of age registered as residents in Sweden on December 31. LISA also includes

income by source (e.g. wage income, SAB, pensions, unemployment and sickness benefits). The PDR contains detailed information on all dispenses of prescription pharmaceuticals, including the Anatomical Therapeutic Chemical (ATC) classification of the pharmaceutical, while the NPR comprises information about all episodes of inpatient or specialist outpatient care. Our study population comprises an annual population-representative sample of about 140,000 individuals who have been surveyed at least once in 1980–2012 for the Swedish Survey of Living Conditions (SILC/ULF) conducted by Statistics Sweden; in total more than 1,500,000 life-year observations.[3]

Measuring mental health is generally challenging. In order to operationalize mental health in this study, we use information about prescribed psychopharmaceuticals according to the PDR. We classify individuals as struck by mental problems in a given year if they have redeemed prescribed drugs belonging to certain ATC categories at least once during the year. Our most encompassing dependent variable, the dummy variable *psychopharmaca*, equals one if the individual redeemed drugs belonging to any of the three categories *N06A* (antidepressants), *N05B* (anxiolytics), or *N05C* (hypnotics and sedatives). We also study the three ATCs as separate dummy variables.

We estimate variants of a Linear Probability Model (LPM), separately for men and women:

$$drug_{j_{it}} = \alpha * SAB_{it-1} + \beta_1 * BG_{it-1} + \beta_2 * BG_{it-y} + \beta_3 * H_{it-y} + \beta_4 * H_{it-1} + \mu_i + \lambda_t + \varepsilon_{it},$$

Our baseline OLS model only includes the dependent variable $drug_{j_{it}}$ (j = *psychopharmaca, N06A*, *N05B*, or *N05C*), measured for individual *i* in year *t*; our main independent variable SAB_{it-1}, a dummy equal to one if the individual received SAB anytime during the preceding year (*t-1*); a vector of calendar year dummies λ_t capturing year-specific fluctuations in the use of psychopharmaca; and ε_{it}, an idiosyncratic error term. We then add four types of covariates to this OLS model. The two sets BG_{it-1} and BG_{it-y} comprise general Background (BG) variables. BG_{it-1} denotes covariates measured in the same year as the SAB status: age group dummies (in 10-year intervals) and dummies for educational attainment, immigrant status and living in a metropolitan area. BG_{it-y} includes covariates measured in earlier years *y*: the natural logarithm of disposable income (in 100s of SEK; we recode the income to 1 for individuals with 0 income), dummies for uptake of parental benefit, old-age pension, single-person households, and households with children in year *t-2*, and dummies for uptake of SAB or unemployment benefit in any of the five years before *t*.

By measuring SAB the year before the (potential) psychopharmaca consumption, we mitigate the problem of reverse causality, i.e. that mental problems precede and induce SAB. To further mitigate the reverse causality problem and to account for confounding factors, we add two sets of health-related covariates, H_{it-y} and H_{it-1}. H_{it-y} includes the following *lagged health* measures: dummies for disability benefit in year *t-2* or sickness benefit in any of the five years prior to *t-1*, and a dummy for hospitalizations with depression as the main diagnosis in any of the 9 years prior to year *t-1*. The health covariate set H_{it-1} includes the same three variables measured in the same year as SAB, i.e., year *t-1* (*current health*). Figure 1 shows the timeline for measurements of the variables in our analyses.

Even after controlling for a wide range of covariates, there may still be unobserved confounders that the OLS models fail to take into account. In particular, the health covariates may be imperfect proxies for mental health: sickness and disability benefits may be granted for other reasons, and hospitalizations for depression only capture very severe cases of depression. For that reason, in the next step we augment our model with individual Fixed Effects (FE), μ_i, thus eliminating the influence of all unobserved confounders that exert a constant influence over time. In other words, the FE model controls for each individual's predisposition for mental problems. This is a strong advantage of the FE model, which is, therefore, our preferred model.

In the analysis, we use LPMs, which allow for straightforward inclusion of individual FE and make the interpretation of interaction terms far easier. Compared to models designed explicitly

[3]The database was created within *The Health Economics Programme of Health, Healthcare and Policy*.

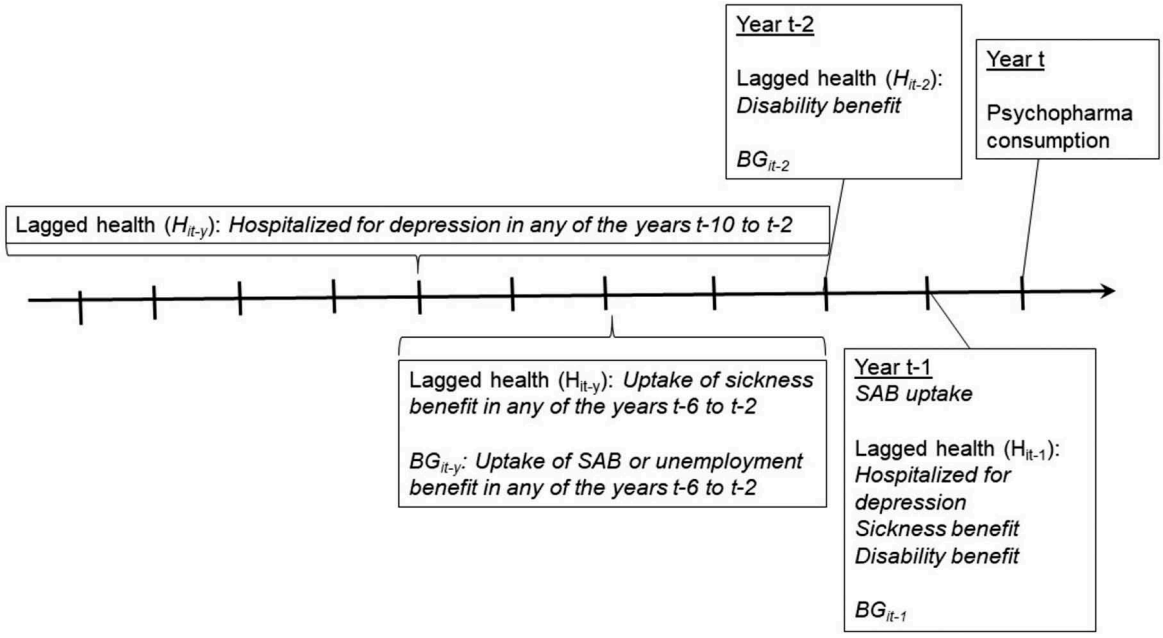

Figure 1. Timeline of variables in model. BG is an acronym for general Background variables.

for binary dependent variables (such as logit or probit), the main disadvantage of LPM is that it may produce predictions outside the [0, 1] interval. As our main interest lies in inferences rather than in predictions, this argument is, however, less relevant (James et al. 2013). Standard errors are clustered at the individual level.

Descriptive statistics

Table 1 presents descriptive statistics (weighted by the number of panel appearances) by gender. The share of SAB recipients in our sample is 2 percent for both genders in each year. This is half the share for the full Swedish population, reflecting the age structure of our sample, which consists of repeated cross-sections. Five percent of our sample has received SAB at least once during the past half-decade. Regarding psychopharmaceutic consumption, 29 percent of all women have used drugs belonging to any of the three studied ATC categories in a given year, compared to 16 percent of all men. Looking into the different drug types, we observe that hypnotics (N05C) is most common (17/10 percent of women/men), followed by antidepressants (N06A; 15/8 percent) and anxiolytics (N05B; 10/6 percent). Our sample approximates the psychotropic drug use pattern for the whole Swedish population pretty well (National Board of Health and Welfare: http://www.socialstyrelsen.se/statistik/statistikdatabas/lakemedel). We further note that the higher prevalence of mental illness among women is also visible in their higher risk of the previous hospitalization with depression as the main diagnosis. Notably, though, hospitalizations with this diagnosis are very rare for both genders.

IV. Results

Tables 2 and 3 show the estimates for women and men, respectively. In both tables, Panel A contains the estimates of *psychopharmaca*; column 1 shows the baseline OLS specification, column 2 shows the OLS specification with covariates, and column 3 shows the FE specification. Panel B presents the results of separate analyses of the three drug types *N06A* (antidepressants, column 1), *N05B* (anxiolytics, column 2) and *N05C* (hypnotics and sedatives, column 3); in all cases including covariates and individual FE.

Using our most elaborate OLS specification (Table 2, Panel A, column 2), we find a strongly significant estimate which indicates that women currently on SAB are exposed to a 6 percentage point increase in the risk of using psychopharmaca the next year. This result corresponds to a 21 percent increase in relation to the baseline risk of 29 percent, i.e. (0.062/0.29)*100. SAB is associated with later mental health problems also for men. Accounting

Table 1. Descriptive statistics.

	Women		Men		Women//Men	
	mean	sd	mean	sd	min	max
psychopharmaca(t)	0.29	0.45	0.16	0.37	0	1
N06A(t)	0.15	0.36	0.08	0.27	0	1
N05B(t)	0.10	0.30	0.05	0.23	0	1
N05C(t)	0.17	0.38	0.10	0.29	0	1
psychopharmaca(t-1)	0.28	0.45	0.15	0.36	0	1
SAB(t-1)	0.02	0.14	0.02	0.15	0	1
SAB(t-6)	0.05	0.22	0.05	0.22	0	1
unempl. benefit(t-6)	0.11	0.32	0.11	0.31	0	1
old-age pension(t-2)	0.47	0.50	0.43	0.50	0	1
parental benefit (t-2)	0.09	0.29	0.08	0.27	0	1
log disp. income(t-2)	7.98	0.71	8.11	0.74	0	14.92//14.26
disp income(t-2)	3741	8313	4173	5888	0	3,017,164//1,563,376
primary educ(t-1)	0.29	0.45	0.28	0.45	0	1
secondary educ(t-1)	0.42	0.49	0.44	0.50	0	1
tertiary educ(t-1)	0.29	0.45	0.27	0.44	0	1
hospital depression(t-12)	0.00	0.05	0.00	0.04	0	1
sickness benefit(t-12)	0.08	0.28	0.06	0.23	0	1
disability benefit(t-12)	0.09	0.29	0.06	0.23	0	1
hospital depression(t-10)	0.01	0.11	0.01	0.09	0	1
sickness benefit(t-6)	0.27	0.44	0.20	0.40	0	1
disability benefit(t-2)	0.10	0.30	0.06	0.24	0	1
age(t-1)	60.59	16.68	58.62	16.31	16	106//104
single household(t-2)	0.50	0.50	0.41	0.49	0	1
children 0–17 yrs (t-2)	0.34	0.78	0.36	0.80	0	11//9
foreign born(t-1)	0.13	0.33	0.12	0.33	0	1
parents non-Swed. citizens(t-1)	0.02	0.15	0.02	0.15	0	1
metropolitan area(t-1)	0.31	0.46	0.31	0.46	0	1
N	839,593		708,646			

Note: Variables with t-6 and t-10, respectively, refer to conditions appearing in at least one year in the 6-year or 10-year period before *t*.

Table 2. Psychopharmaceutic use and SAB. Women.

	OLS (1)	OLS (2)	Individual FE (3)
Panel A. Use of any psychopharmaceutic drug			
SAB(t-1)	0.0693***	0.0619***	0.0049
	−0.0062	−0.0054	−0.0037
constant	0.2940***	0.1521***	0.2983***
	−0.0011	−0.0124	−0.0113
R-squared	0.000463	0.130702	0.009438
N	839,593	839,593	839,593
		Individual FE	
	(1) N06A	(2) N05B	(3) N05C
Panel B. Use of separate drug types			
SAB(t-1)	0.0048	0.0029	0.0053*
	−0.0034	−0.0031	−0.0031
Constant	0.1431***	0.1282***	0.2073***
	−0.0096	−0.0081	−0.0087
R-squared	0.007862	0.003797	0.004672
N	839,593	839,593	839,593

Note: The outcome variable in Panel A, Psychopharmaca use, indicates individuals who used any of the following drug types in period t: N06A (antidepressants), N05B (anxiolytics) or N05C (hypnotics and sedatives). The outcome variables in Panel B indicate individuals who used N06A (antidepressants), N05B (anxiolytics) or N05C (hypnotics and sedatives) in period t. The independent variable of main interest, SAB(t-1), indicates individuals who received Social Assistance Benefit (SAB) in period *t-1*. Column 1 shows regression results of the OLS baseline model, column 2 the full OLS model including covariates and column 3 the results of the FE model with covariates. Age and year fixed effects are included in both models of columns 2 and 3 but supressed in the table. All models in Panel B include covariates and individual fixed effects. Age and year fixed effects are included in all models in Panel B but suppressed in the table. Standard errors clustered by individual in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

for background and health factors (Table 3, Panel A, column 2), the analysis shows that men receiving SAB face a strongly significant 7 percentage point increase in the risk of using any psychopharmaca, a result that corresponds to a 44 percent increase from the baseline risk of 16 percent.

A comparison of columns 1 and 2 of Tables 2–3 shows that the included covariates have relatively little impact on the estimates. This result suggests that these health variables may not be sufficiently strongly related to individual disposition for mental illness to guard against this confounding factor. The health-related variable most closely related to current mental problems is hospitalization for depression, a variable that by itself captures a tiny share of the population. The other two health control variables, receipt of sickness or disability benefits, are quite general and capture all sorts of health problems, thus potentially not specific enough to discriminate between mental and somatic health problems. Indeed, we find markedly weaker OLS correlations when we include controls for earlier consumption of any of the three psychopharmaca types (see online Appendix Table A2).[4]

[4]We are reluctant to include these lagged dependent variables in the FE models, due to the risk of Nickell bias (Angrist and Pischke 2009).

Table 3. Psychopharmaceutic use and SAB. Men.

	OLS (1)	OLS (2)	Individual FE (3)
Panel A. Use of psychopharmaca			
SAB(t-1)	0.1060***	0.0728***	0.0145***
	−0.0061	−0.0053	−0.0037
constant	0.1669***	0.0821***	0.1989***
	−0.001	−0.0096	−0.0092
R-squared	0.001696	0.108794	0.011553
N	708,646	708,646	708,646
		Individual FE	
	(1) N06A	(2) N05B	(3) N05C
Panel B. Use of separate drug types			
SAB(t-1)	0.0085***	0.0003	0.0057*
	−0.0031	−0.0029	−0.0031
constant	0.0818***	0.0802***	0.1265***
	−0.0073	−0.0066	−0.0072
R-squared	0.007965	0.004154	0.006429
N	708,646	708,646	708,646

Note: The outcome variable in Panel A, Psychopharmaca use, indicates individuals who used any of the following drug types in period t: N06A (antidepressants), N05B (anxiolytics) or N05C (hypnotics and sedatives). The outcome variables in Panel B indicate individuals who used N06A (antidepressants), N05B (anxiolytics) or N05C (hypnotics and sedatives) in period t. The independent variable of main interest, SAB(t-1), indicates individuals who received Social Assistance Benefit (SAB) in period *t-1*. Column 1 shows regression results of the OLS baseline model, column 2 the full OLS model including covariates and column 3 the results of the FE model with covariates. Age and year fixed effects are included in both models of columns 2 and 3 but supressed in the table. All models in Panel B include covariates and individual fixed effects. Age and year fixed effects are included in all models in Panel B but suppressed in the table. Standard errors clustered by individual in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

The FE estimations for *psychopharmaca* clearly differ from the OLS estimations. For women (Table 2, column 3), estimates of SAB are relatively small and insignificant. The overall pattern of markedly smaller FE estimates is also visible for men (Table 3, column 3), but for this group the estimate on SAB is significant and of greater magnitude as compared to women. The FE model for men suggests that SAB increases the risk of consuming any of the three psychopharmaca types by roughly 1.5 percentage points (a 10 percent increase). By excluding the individual-level covariates from the FE model (results not shown), we note that these control variables play a limited role in the FE model. This result further indicates that individual-specific predisposition drives most of the variation in mental illness.

Analysing drug types separately, we observe only one significant (at the 10 percent level) finding for women: the risk of using *N05C* (hypnotics and sedatives) is 0.5 percentage point higher for SAB beneficiearies (Table 2, Panel B, column 3). This 3 percent increase from the baseline risk only corresponds to a small fraction of the 21 percent increase noted in the OLS model. Thus, even our most elaborate OLS estimate mainly reflects that women with a predisposition for mental illness also have a higher risk for SAB uptake. Examining each of the three drug categories for men (Table 3, Panel B), we find virtually no association between SAB uptake and later use of *N05B* (anxiolytics), while men on SAB face a 0.9 percentage point (11 percent) increase in the risk of using *N06A* (antidepressants) and a 0.6 percentage point (6 percent) increase in the risk of using *N05C* (hypnotics and sedatives).

Sensitivity analyses

Although the FE estimations go a long way to reduce the influence of unobservable factors that may relate to both SAB and mental health, they do not control for time-variant unobservable factors. Instrumental variables might deal with the remaining selection bias, but we fail to find a convincing instrument for the uptake of SAB.[5] As an alternative robustness exercise, we conduct a bounds analysis presented in Table 4. Oster (2019) derives an expression for the degree of selection on unobservables relative to the selection on observables that would be required to dismiss the whole SAB estimate as driven by selection. For our main FE specification, we find that even a tiny amount of selection of unobservables would be sufficient to nullify the (already small) estimate for women. For

Table 4. Proportional selection required to nullify result (Oster 2019).

	Women	Men
delta	−.0748624	−.4332613
R^2max	.2798369	.3018242

Note: The table shows the estimated delta, i.e., the degree of proportional selection required to establish that main result is completely driven by selection (Oster 2019). The delta is derived under the assumption that the highest attainable R^2 (R^2max) equals 1 minus the total variation in psychopharmaca use explained by individual fixed effects.

[5]We investigated the possibility of using the municipality-and-year specific share of social assistance benefit (SAB) recipients as an instrument. The variable is strongly correlated to the endogenous variable (the individual-level dummy for SAB uptake), but the reduced form (i.e. the regression of mental health outcomes on the instrument) is insignificant and, for men, of a counter-intuitive sign. According to Angrist and Krueger (2001), an insignificant reduced form suggests that there either is no causal effect or that the instruments are too weak to detect it; in our case, the strong first stage suggests that the former interpretation is correct.

men, however, unobservable time-variant features would have to be almost half as important as the observables to nullify the estimate. Given that our set of control variables captures many of the most obvious confounders, we thus believe that it is fairly convincing that our FE estimate for men at least partly captures a causal effect of SAB.

The main analysis does not include *current* disposable income, only income measured in *t-2*. The reason why we exclude current income is the fact that SAB feeds directly into the measure, meaning that it may lead to post-treatment bias (Angrist and Pischke 2009). To examine whether the noted SAB association includes the effect of a fall in income, we estimate a version of the FE model that includes current income among the covariates. The results (available on request) are similar to the main analysis, suggesting that the income loss per se is not mediating the SAB-mental health association. The institutional context may contribute to this finding, in particular, the fact that SAB covers the direct costs of healthcare and pharmaceuticals related to mental illness.

It is possible that the connection between SAB and mental health is non-linear in income, implying that rich and poor households may respond differently to financial difficulties. We estimate two FE models where we substitute the continuous income measure for a dummy indicating, first, individuals belonging to the lowest decile of the income distribution (in year *t-2*), and, second, individuals belonging to the 5% with the lowest income. In two models, we interact each of these low-income dummies with the receipt of SAB. As seen from Table 5, the interactions between SAB(*t-1*) and the low-income dummies are insignificant for both women and men, indicating that the experiences of SAB for individuals with the lowest incomes do not deviate from those for individuals with higher income. Thus, we find no evidence for a heterogeneous association between SAB and mental health in the lowest part of the income distribution.

A strand of psychological and sociological research suggests that a psychosocial pathway, including stress, guilt, and shame, mediates the relationship between SAB and mental health. Studies find that for middle-class people more than working-class people, SAB uptake is a circumstance that needs to be concealed from others (McFadyen 1995; Starrin, Blomkvist, and Janson 2003). Thus, SAB may be more shameful and associated with more stigma for high-skilled individuals than for low-skilled individuals. Similar findings exist for unemployment and unemployment benefits: e.g. sociological research provides evidence from interviews with individuals residing in middle-class areas who avoided telling anyone outside their family about their unemployment (Warren 1986; Starrin, Jönsson, and Rantakeisu 2001). The loss of status is particularly tangible for groups in the middle and upper-middle classes, e.g. managers (see Newman, 1999).

While the administrative registers do not allow for a direct test of the psychological pathway, we can examine the educational gradient in the link between SAB and mental health to see if the relationship appears in certain strata. In this heterogeneity analysis, we study the SAB association separately for groups having completed primary, secondary or tertiary education, using the full specification model and accounting for individual fixed effects. Panel A of Table 6 suggests that

Table 5. Psychopharmaceutic use and SAB. Test for non-linearity in income.

	Women (1)	Men (2)
Panel A. Interaction w. dummy for disposable income in the lowest decile.		
SAB(t-1)	0.0041	0.0152***
	(−0.0038)	(−0.0039)
SAB(t-1)*d10	0.0052	−0.0028
	(−0.0088)	(−0.0076)
d10	0.0031	0.0017
	(−0.0019)	(−0.0022)
constant	0.2937***	0.1898***
	(−0.0083)	(−0.0066)
R-squared	0.009445	0.01155
N	839,593	708,646
Panel B. Interaction w. dummy for disposable income in the 5th percentile or lower.		
SAB(t-1)	0.0037	0.0143***
	(−0.0038)	(−0.0038)
SAB(t-1)*d5	0.0126	0.0023
	(−0.0105)	(−0.0084)
d5	0.0038	−0.004
	(−0.0023)	(−0.0026)
constant	0.2939***	0.1900***
	(−0.0083)	(−0.0066)
R-squared	0.009448	0.011553
N	839,593	708,646

Note: FE models with covariates. The outcome variable, Psychopharmaca use, indicates individuals who used any of the following drug types in period t: N06A (antidepressants), N05B (anxiolytics) or N05C (hypnotics and sedatives). The independent variable of main interest, SAB(t-1), indicates individuals who received Social Assistance Benefit (SAB) in period t-1. Panel A (Panel B) shows the estimation results of the specification where SAB(t-1) is interacted with the variable d10 (d5), an indicator taking the value 1 if individual disposable income at t-1 is at or below the 10th (5th) percentile of the income distribution, otherwise 0. Column 1 shows regression results for women, column 2 for men. Age and year fixed effects are included in all models but suppressed in the table. Standard errors clustered by individual in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 6. Psychopharmaceutic use and SAB, by highest educational attainment and by working age.

	Prim. educ. (1)	Sec. educ. (2)	Tert. educ. (3)	Working age (4)
Panel A. Women.				
SAB(t-1)	0.0045	0.0001	0.0134	0.0066
	(0.0069)	(0.0053)	(0.0086)	(0.0043)
R-squared	0.013780	0.008046	0.007509	0.005311
N	251,264	350,720	237,609	445,979
Panel B. Men.				
SAB(t-1)	0.0096	0.0142***	0.0231***	0.0158***
	(0.0068)	(0.0053)	(0.0080)	(0.0043)
R-squared	0.018331	0.009581	0.008081	0.004444
N	205,395	312,472	190,779	401,847

Note: The table shows the estimates from individual fixed effects regressions for women (Panel A) and men (Panel B). All models include the full set of covariates, including age and year fixed effects. The outcome variable, Psychopharmaca use, indicates individuals who used any of the following drug types in period t: N06A (antidepressants), N05B (anxiolytics) or N05C (hypnotics and sedatives). The independent variable of main interest, SAB (t-1), indicates individuals who received Social Assistance Benefit (SAB) in period t-1. The regression results are shown for women/men with at most primary education (column 1), secondary education (column 2), and tertiary education (column 3) and for individuals of working age, restricted to ages 25–64 (column 4). Standard errors clustered by individual in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

there is no evidence of an educational gradient for women. By contrast, Panel B reveals that SAB is not associated with an elevated risk for psychopharmaca consumption among men with at most primary education, but positively related to psychopharmaca use for men with higher educational attainment. Men with at most secondary education who receive SAB face an over 1 percentage point larger risk of using any of the three psychopharmaca types. This result corresponds to a 9 percent increase compared to the 15 percent baseline risk of psychopharmaca consumption for men with secondary education. Men with tertiary education who receive SAB are exposed to an over 2 percentage point increase in the risk of using psychopharmaca. Compared to the 14 percent baseline risk for men with tertiary education, SAB uptake implies a 17 percent increase in the risk of using any psychopharmaca.

The age profile of our sample spans from teenagers to pensioners. We study in detail the working-age individuals between 25 and 64 years. The reasons to focus on this group are that pensioners can apply for an elderly-specific SAB, and that 16- to 19-year-olds may suffer from mental health problems but often live with their parents and therefore not apply for SAB. By setting the minimum age to 25, we exclude university students, who have particular living conditions; income around subsistence level is expected during the student period, and SAB applications during the summer break are relatively common. Re-running FE regressions for working-age individuals, we find, by and large, a reproduction of our main results (Table 6, Panels A and B, column 4).

The association we observe between SAB and psychopharmaca use may be driven by individuals with long-term issues related to both economic circumstances and mental health may contribute the most to the association we observe between SAB and psychopharmaca use. We investigate whether any persistence in SAB uptake or mental illness further by running FE regressions on a restricted sample of individuals who have *not* received SAB or used psychopharmaca in any of the past two years. Table 7 shows that the relationship between SAB and pharmaceutical consumption is statistically insignificant for women, but positive and significant for men also in this subsample. For both genders, the magnitude of the association is larger than for the total sample. For example, the risk of using any type of psychopharmaca increases to 2.2 percentage points for men on SAB (compared to 1.5 percentage in the baseline) (see Table 7, Panel B, column 1). This finding indicates that the first experience of financial difficulties is particularly harmful to one's mental health.

Table 7. Psychopharmaceutic use and SAB, restricted sample.

	Psychopharmaca use (1)	N06A (2)	N05B (3)	N05C (4)
Panel A. Women.				
SAB(t-1)	0.0101	0.0041	0.0078*	−0.0002
	−0.0064	−0.0048	−0.0043	−0.0042
R-squared	0.026629	0.014516	0.008602	0.013672
N	572,668	572,668	572,668	572,668
Panel B. Men.				
SAB(t-1)	0.0218***	0.0147***	0.0037	0.0088**
	−0.0056	−0.0041	−0.0034	−0.004
R-squared	0.022986	0.011887	0.007953	0.01298
N	574,307	574,307	574,307	574,307

Note: The restricted sample contains individuals with no use of psychopharmaca or SAB in the two previous years. Full covariates models, with individual fixed effects. The outcome variable Psychopharmaca use (column 1) indicates individuals who used any of the following drug types in period t: N06A (antidepressants), N05B (anxiolytics) or N05C (hypnotics and sedatives). The outcome variables N06A, N05B and N05C (columns 2–4) indicate individuals who used each drug type in period t. The independent variable SAB(t-1) indicates individuals who received Social Assistance Benefit (SAB) in period t-1. Panel A shows regression results for women, Panel B for men. Age and year fixed effects are included in all models but suppressed in the table. Standard errors clustered by individual in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

V. Discussion

Examining individual-level panel data on Social Assistance Benefit (SAB) and information on later consumption of antidepressants, anxiolytics, or hypnotics and sedatives, we observe that the widely reported social gradient in mental health to a large extent appears to be driven by individual-specific pre-disposing factors. In so far as that there is still a SAB-mental illness relationship after accounting for individual fixed effects (FE), it appears to be driven by highly educated individuals, in particular men. We find no support for low material standards as a direct mechanism through which SAB affects individual health (cf. Rodriguez, Lasch, and Mead 1997). Instead, our results indicate a more indirect, psychosocial mechanism. Thus, for highly educated men, it may make sense to speak of SAB as a trigger of mental illness, but not for men with lower education. One rationale of this result may be that the resort to SAB may be particularly stigmatizing for individuals with higher initial socioeconomic positions, who in general run a much lower risk of SAB than less educated individuals do. Relating to the literature on economic insecurity (Rohde, 2016), the low-educated individuals for whom the SAB status varies over time are constantly in an insecure situation, meaning that SAB per se is not especially dramatic for them. For more highly educated individuals, who are less likely to be in an insecure situation in the first place, the contrast between SAB and non-SAB periods may be greater. We also find that differences in earlier exposure to vulnerable conditions align with a story where shame and guilt are possible mechanisms. Males who receive SAB for the first time and who are relatively healthy experience a larger risk of mental health reduction when applying for and receiving means-tested social assistance than males who already have a history of SAB and/or psychopharmaceutic use.

A strength of our analysis relative to previous studies is that register data on pharmaceutical consumption is not affected by recall bias and that the data allows us to go beyond the study of self-reported mental problems. Although mental problems *per se* are subjective experiences, subjective reports may include mental problems that are not severe enough to motivate public health interventions. Our register data only captures mental problems justifying medical prescriptions according to a medical professional. A limitation of our analysis is that the prescribed drug register only records redeemed prescriptions. However, as expenses for prescribed drugs are always reimbursed by SAB, and as the annual cap for out-of-pocket payments is rather low, we believe that failure to redeem prescriptions is not a big problem for our analysis.

As in all observational studies, unobserved factors may produce spurious relationships; in this case between SAB and mental problems. We try to handle this issue using individual FE and an elaborate time series structure of the model, but our approach does not account for time-variant shocks affecting both the individual's susceptibility to mental problems and the SAB risk. Notably though, as the correlation between SAB and mental problems turns out to be very weak (in the short run) for a majority of the population, there is not much scope for spuriousness. In relation to the use of individual FE, it should be highlighted that our analyses are inherently short-term. It is possible that SAB has a causal impact on mental health in the longer run, even for women and men with shorter education.

In terms of representativeness, one may recall that SAB uptake is rarer, and psychopharmaca consumption more common, in our sample compared to the full population. This is due to the structure of our sample, which consists of repeated annual cross-sections of the Swedish population from 1980 onwards, implying an older average age than in the full population. Although this may restrict the possibilities to generalize, one should note that the most severe restriction of generalizability arises when we include individual FE, which essentially implies that we compare each individual with him- or herself over time. This is thus a restriction we share with most state-of-the-art research in economics and the social sciences.

VI. Conclusions

Poor mental health is the leading cause of disability in the world and associates with major impacts on individual well-being as well as economic costs. Research has directed attention to the association between SES and mental health, but there is still

limited quantitative evidence on the relationship between welfare dependency and mental wellbeing.

Using longitudinal register data on SAB uptake and pharmaceutical consumption, we find that a large part of the association between uptake of SAB and mental health reflects correlations and stems from selection or predisposition. This holds especially true for women, while there is some stronger evidence of a causal effect of SAB uptake on mental ill-health among men. The latter relationship appears to be driven by highly educated men, who may be more prone to experience feelings of shame and guilt in relation to the experience of applying for and receiving means-tested social assistance.

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