

# A dynamic analysis of the relationship between employment transitions and mental health among British men

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NCRM Research Methods Festival, July 2012

# Unemployment and mental health

Previous studies find current/previous employment status and employment transitions are strongly associated with mental health.

- Poorer mental health while individuals are unemployed and economically inactive (Wiggins et al. 2004)
- Previous exposure to unemployment associated with higher risk of onset of depression (Montgomery et al. 1999) and suicide (Lundin et al. 2010)
- Transitions out of (into) employment associated with higher (lower) risk of psychological distress (Thomas et al., 2005, 2007)

# Explanations: causation and/or selection?

- **Causation**
  - Stress of unemployment is damaging to mental health
- **Selection**
  - People in poor health may be at higher risk of unemployment (**direct selection/reverse causality**)
  - Unmeasured factors affecting the risks of both unemployment and poor mental health (**indirect selection**)

# Previous approaches to handle selection

## Direct

- Adjust for prior health
- Model effect of health on unemployment
  - Poor health in childhood increases risk of unemployment (Montgomery et al. 1996)
  - Poor perceived health associated with lower chance of being employed and higher chance of unemployment (Schuring et al. 2007)

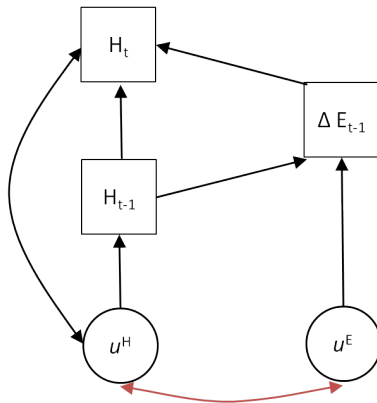
## Indirect

- Adjust for measured confounders, e.g. childhood social circumstances

## Our approach to the selection problem

- Model effect of employment transitions between  $t - 1$  and  $t$  on health at  $t$ , adjusting for health at  $t - 1$
- Simultaneously model effect of health at  $t - 1$  on employment transitions between  $t - 1$  and  $t$
- Allow for unmeasured time-invariant confounders via residual correlation between health and employment transitions

# Model of health and employment transitions



- $H_t$  Health at t  
 $\Delta E_{t-1}$  Change in employment t-1 to t  
 $u^H, u^E$  Unmeasured time-invariant influences

# Dynamic model for effect of employment transitions on mental health

## Random effects model for health at $t \mid t - 1$

$$H_{ti} = \beta_0 + \beta_1 H_{t-1i} + \beta_2 \Delta \mathbf{E}_{t-1i} + u_i^{(H)} + e_{ti}$$

$H_{ti}$	mental health of individual $i$ at time $t$
$\Delta \mathbf{E}_{t-1i}$	change in employment status between $t - 1$ and $t$
$u_i^{(H)}$	individual random effect
$e_{ti}$	time-varying residual

$\beta_2$  are the effects of employment transitions between  $t - 1$  and  $t$  on mental health at  $t$ , adjusted for mental health at  $t - 1$ .

# Dynamic model for effect of health on employment transitions

$E_{ti}$  is employment status at  $t$  (1=employed, 2=economically inactive, 3=unemployed)

$$\pi_{ti}^{(k)} = \Pr(E_{ti} = k).$$

Random effects multinomial logit model for status at  $t \mid t - 1$

$$\begin{aligned} \log \left( \frac{\pi_{ti}^{(k)}}{\pi_{ti}^{(1)}} \right) &= \alpha_0^{(k)} + \alpha_1^{(k)} \mathbf{E}_{t-1i} + \alpha_2^{(k)} H_{t-1i} \\ &+ \alpha_3^{(k)} \mathbf{E}_{t-1i} \times H_{t-1i} + u_i^{(Ek)}, \quad k = 2, 3 \end{aligned}$$

Interactions allow effect of health to vary across employment transitions.



# Joint model for health and employment transitions

Equations for  $H_{ti}$  and  $E_{ti}$  are linked by allowing for correlation between the individual random effects.

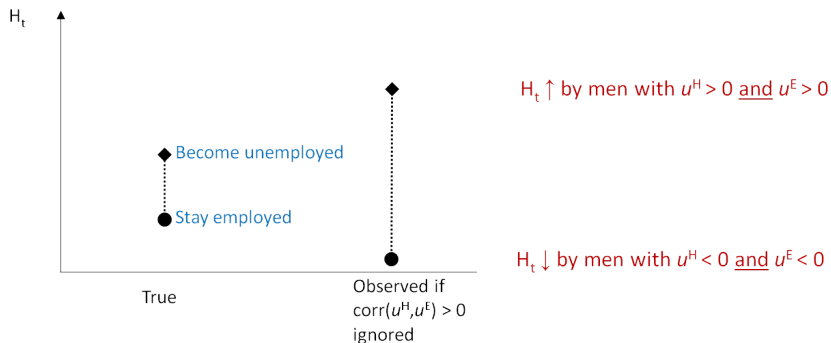
## Residual correlations

$\text{Corr}(u_i^{(H)}, u_i^{(E2)})$  health and moves into economically inactive

$\text{Corr}(u_i^{(H)}, u_i^{(E3)})$  health and moves into unemployment

Expect positive correlations if individuals with tendency towards poorer-than-average health ( $u_i^{(H)} > 0$ ) also have higher risk of moving into unemployment or economic inactivity ( $u_i^{(Ek)} > 0$ ).

# Impact of selection on effect of becoming unemployed



**Note:** Higher  $H_t$  indicates poorer mental health

## Initial Conditions

A problem when start of measurement does not coincide with start of process under study. Denote by  $y_t$  either outcome (health or employment) at  $t$ .

- Unmeasured time-invariant factors influencing  $y_t$  at  $t > 1$  also likely to influence  $y_1$ , leading to correlation between  $y_1$  and individual random effects
- Can show that in a 1st order autoregressive model, the dependence of  $y_t$  on previous  $y$  operates entirely through  $y_1$
- A solution is to specify a model for  $y_1$  and estimate jointly with model for  $y_2, \dots, y_T$

# Data and measures

- British household panel survey, waves 1-18 (1991-2009)
- Men of working age (16-64), after first leaving full-time education
- 12,662 men observed for 79,022 person years
- **Mental health:** GHQ-12 anxiety and depression scale (0-36)
- **Employment status:** employed, economically inactive, unemployed
- **Covariates:** age, partnership status, presence and age of children, household occupation class, LAD employment rate

# Transition probabilities given employment state at $t - 1$

<b>Transition</b>	<b>Percent</b>
Employed at $t - 1$	( $n = 52,372$ )
E $\rightarrow$ E	95.3
E $\rightarrow$ EI	2.4
E $\rightarrow$ UE	2.4
Economically inactive at $t - 1$	( $n = 10,879$ )
EI $\rightarrow$ E	14.5
EI $\rightarrow$ EI	79.0
EI $\rightarrow$ UE	6.5
Unemployed at $t - 1$	( $n = 3,867$ )
UE $\rightarrow$ E	36.5
UE $\rightarrow$ EI	17.5
UE $\rightarrow$ UE	46.0

**E** Employed, **EI** Economically Inactive, **UE** Unemployed

# Estimated residual correlation matrix from joint model

All correlations significant at  $< 1\%$  level.

	GHQ	EI vs E	UE vs E
GHQ	1		
EI vs E	0.293	1	
UE vs E	0.289	0.564	1

**E** = employed, **EI** = economically inactive, **UE** = unemployed

- Men with tendency towards depression (high GHQ) tend to have higher chances of economic inactivity and unemployment
- Positive residual correlation between risks of economic inactivity and unemployment

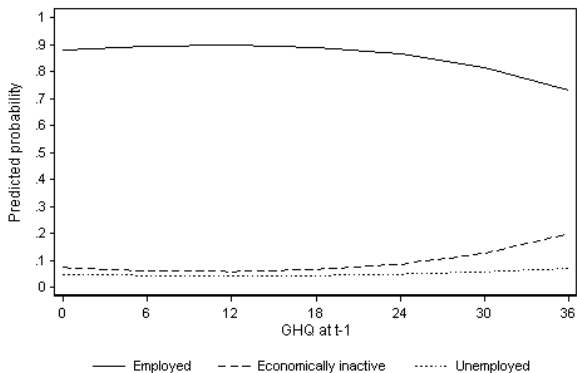
# Estimated effects of employment transitions on GHQ

Transition $t - 1$ to $t$	Unadjusted $\text{Corr}(u_i^{(H)}, u_i^{(Ek)}) = 0$	Adjusted $\text{Corr}(u_i^{(H)}, u_i^{(Ek)}) \neq 0$
E $\rightarrow$ E	0	0
E $\rightarrow$ EI	0.86**	0.65**
E $\rightarrow$ UE	2.51**	2.26**
EI $\rightarrow$ E	-0.64**	-0.82**
EI $\rightarrow$ EI	0.54**	0.14*
EI $\rightarrow$ UE	1.18**	0.68**
UE $\rightarrow$ E	-1.14**	-1.37**
UE $\rightarrow$ EI	1.34**	0.82**
UE $\rightarrow$ UE	0.88**	0.35**

**E** Employed, **EI** Economically Inactive, **UE** Unemployed

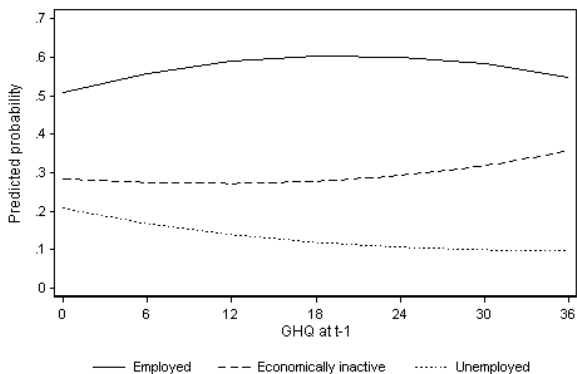
\*\*  $p < 0.01$ , \*  $p < 0.05$

# Effects of GHQ on probability of transitions from employment





# Effects of GHQ on probability of transitions from unemployment



# Conclusions

- Weak evidence of direct selection (GHQ  $\rightarrow$  employment transitions)
- Stronger evidence of indirect selection (on time-invariant unmeasured characteristics)
- But there remains a strong effect of employment transitions on subsequent GHQ (adjusting for prior GHQ)
  - Although cannot rule out selection on *time-varying* unmeasured factors influencing GHQ and employment

## Further work

- Mediating effect of financial circumstances (Thomas et al. 2007)
- Interaction between employment transitions and socio-economic position (e.g. Wiggins et al. 2004)
- Effects of repeated transitions (e.g. Booker and Sacker 2011)

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