

# CAP 1 February 2018

(21 marks)

Please read the following abstract and tables and answer the questions based on this information and your other knowledge.

## 'Unemployment and psychosocial outcomes to age 30: A fixed-effects regression analysis

*Fergusson D M, McLeod G F, Horwood L J (2014) ANZJP Vol. 48(8) 735–742.*

### ABSTRACT

**Objective:** We aimed to examine the associations between exposure to unemployment and psychosocial outcomes over the period from 16 to 30 years of age.

**Methods:** Data were collected over the course of the Christchurch Health and Development Study, a longitudinal study of 1265 children, born in Christchurch in 1977, who have been studied to age 30. Assessments of unemployment and psychosocial outcomes (mental health, substance abuse/dependence, criminal offending, adverse life events and life satisfaction) were obtained at ages 18, 21, 25 and 30.

**Results:** Prior to adjustment, an increasing duration of unemployment was associated with significant increases in the risk of all psychosocial outcomes. These associations were adjusted for confounding using conditional, fixed-effects regression techniques. The analyses showed significant ( $p < 0.05$ ) or marginally significant ( $p < 0.10$ ) associations between the duration of unemployment and major depression ( $p = 0.05$ ), alcohol abuse/dependence ( $p = 0.043$ ), illicit substance abuse/dependence ( $p = 0.017$ ), property/violent offending ( $p < 0.001$ ), arrests/convictions ( $p = 0.052$ ), serious financial problems ( $p = 0.007$ ) and life satisfaction ( $p = 0.092$ ). To test for reverse causality, the fixed-effects regression models were extended to include lagged, time-dynamic variables representing the respondent's psychosocial burden prior to the experience of unemployment. The findings suggested that the association between unemployment and psychosocial outcomes was likely to involve a causal process in which unemployment led to increased risks of adverse psychosocial outcomes. Effect sizes were estimated using attributable risk; exposure to unemployment accounted for between 4.2 and 14.0% (median 10.8%) of the risk of experiencing the significant psychosocial outcomes.

**Conclusions:** The findings of this study suggest that exposure to unemployment had ...effects on psychosocial adjustment in adolescence and young adulthood.

### Keywords

Unemployment, longitudinal study, fixed-effects regression, psychosocial outcomes.'

**Question 1** (1 mark)

**Based on the abstract and your other knowledge, which option best describes the main objective of this study?**

- A. To confirm unemployment as a cause of psychosocial adversity.
- B. To identify psychosocial outcomes associated with unemployment.
- C. To identify the association between socioeconomic status and mental health outcomes.
- D. To identify the psychosocial causes of unemployment.
- E. To measure the prevalence of unemployment and adverse psychosocial circumstances.

**Answer:** B - To identify psychosocial outcomes associated with unemployment.

**Question 2** (1 mark)

**Based on the abstract and your other knowledge, what does an Odds ratio greater than 1 imply?**

- A. Absolute risk elevation.
- B. Association by inference.
- C. Association without demonstrated causality.
- D. Causative Association.
- E. High correlation.
- F. Significant proportion of variance accounted for.

**Answer:** C – Association without demonstrated causality.

**Question 3** (1 mark)

**Based on the abstract and your other knowledge, which option would be most useful for describing the likelihood that substance use is a problem for the unemployed?**

- A. Absolute Risk reduction.
- B. Analysis of Variance.
- C. Association without demonstrated causality.
- D. Causative Association.
- E. Effect size.
- F. Logistic Regression.
- G. Odds ratio.
- H. Risk ratio.

**Answer:** G - Odds ratio.

**Question 4** (1 mark)

**Based on the abstract and your other knowledge, which option describes the probability that an event will occur in an exposed group compared to a comparison group?**

- A. Absolute Risk reduction.
- B. Analysis of Variance.
- C. Association without demonstrated causality.
- D. Causative Association.
- E. Effect size.
- F. Logistic Regression.
- G. Odds ratio.
- H. Risk ratio.

**Answer: H - Risk ratio.**

**Question 5** (1 mark)

**Based on the abstract and your other knowledge, the mean difference between depression experienced by the unemployed group and the employed group is an example of measuring....**

- A. Absolute Risk reduction.
- B. Analysis of Variance.
- C. Association without demonstrated causality.
- D. Causative Association.
- E. Effect size.
- F. Logistic Regression.
- G. Odds ratio.
- H. Risk ratio.

**Answer: E** - Effect size.

**Question 6** (1 mark)

**Based on the abstract and your other knowledge, the use of the fixed-effects regression models that include variables representing the respondent's psychosocial burden prior to the experience of unemployment allows what type of inferences to be made?**

- A. Absolute Risk reduction.
- B. Analysis of Variance.
- C. Association without demonstrated causality.
- D. Causative Association.
- E. Effect size.
- F. Logistic Regression.
- G. Odds ratio.
- H. Risk ratio.

**Answer: D** - Causative Association.

**Question 7** (1 mark)

**Based on the abstract and your other knowledge, which option represents a type of random error?**

- A. Biological variation.
- B. Confounding variable.
- C. Misclassification of data.
- D. Non Blinded Interviewers.
- E. Regression to the Mean.
- F. Use of selection criteria.
- G. Use of volunteer subjects.

**Answer: A** - Biological variation.



**Question 8** (1 mark)

**Based on the abstract and your other knowledge, which option represents a threat to external validity?**

- A. Biological variation.
- B. Confounding variable.
- C. Misclassification of data.
- D. Non Blinded Interviewers.
- E. Regression to the Mean.
- F. Use of selection criteria.
- G. Use of volunteer subjects.

**Answer: G** – Use of volunteer subjects.

### Question 9 (1 mark)

Based on the quote below, the abstract, Table 3 and your other knowledge, which option best describes the relationship between property and violent offending and duration of unemployment?

‘..the associations between duration of unemployment and adverse psychosocial problems at time  $t$  were adjusted for lagged measures of prior history of psychosocial problems at time  $t-1$ . Table 3 shows the estimated associations between unemployment and adverse psychosocial outcomes after adjustment for lagged measures of these variables.’

**Table 3.** Estimated effects of duration of unemployment on psychosocial outcomes from conditional, fixed-effects regression models controlling for lagged measures of psychosocial outcomes.

Outcomes	Person-years	B (SE)	OR (95% CI)	$p$
<b>Mental health</b>				
Major depression	3872	0.234 (0.088)	1.26 (1.06–1.50)	0.008
Anxiety disorder	3869	0.142 (0.092)	1.15 (0.96–1.38)	0.124
Suicidal thoughts/attempts	3872	0.174 (0.119)	1.19 (0.94–1.50)	0.143
<b>Substance abuse/dependence</b>				
Alcohol abuse/dependence	3872	0.192 (0.087)	1.21 (1.02–1.44)	0.027
Illicit substance abuse/dependence	3869	0.378 (0.212)	1.45 (0.91–2.34)	0.117
<b>Criminal offending</b>				
Property and violent offending	3864	0.436 (0.102)	1.55 (1.27–1.89)	< 0.001
Arrest/conviction	3954	0.313 (0.159)	1.37 (1.00–1.87)	0.049
<b>Adverse life events</b>				
Serious financial problems	3951	0.318 (0.108)	1.37 (1.11–1.70)	0.003
Interpersonal/relationship difficulties	3954	0.134 (0.078)	1.14 (0.98–1.33)	0.085
<b>Life satisfaction</b>	3952	0.101 (0.080)	1.11 (0.95–1.29)	0.206

- A. Causative.
- B. Independent.
- C. Inferred.
- D. Non independent.
- E. Not substantiated.
- F. Related to confounding variables.
- G. Time lagged.

**Answer: D - Non independent.**

## Question 10 (1 mark)

Based on the quote below, the abstract, Table 3 and your other knowledge, which option best describes the relationship between illicit substance use and duration of unemployment?

‘..the associations between duration of unemployment and adverse psychosocial problems at time  $t$  were adjusted for lagged measures of prior history of psychosocial problems at time  $t-1$ . Table 3 shows the estimated associations between unemployment and adverse psychosocial outcomes after adjustment for lagged measures of these variables.’

**Table 3.** Estimated effects of duration of unemployment on psychosocial outcomes from conditional, fixed-effects regression models controlling for lagged measures of psychosocial outcomes.

Outcomes	Person-years	B (SE)	OR (95% CI)	$p$
<b>Mental health</b>				
Major depression	3872	0.234 (0.088)	1.26 (1.06–1.50)	0.008
Anxiety disorder	3869	0.142 (0.092)	1.15 (0.96–1.38)	0.124
Suicidal thoughts/attempts	3872	0.174 (0.119)	1.19 (0.94–1.50)	0.143
<b>Substance abuse/dependence</b>				
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<b>Adverse life events</b>				
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<b>Life satisfaction</b>	3952	0.101 (0.080)	1.11 (0.95–1.29)	0.206

- A. Causative.
- B. Independent.
- C. Inferred.
- D. Non independent.
- E. Not substantiated.
- F. Related to confounding variables.
- G. Time lagged.

**Answer: E** - Not substantiated.

## Question 11 (1 mark)

Based on the quote below, the abstract, Table 3 and your other knowledge, which option best describes the relationship between suicidal thoughts/attempts and duration of unemployment?

'..the associations between duration of unemployment and adverse psychosocial problems at time  $t$  were adjusted for lagged measures of prior history of psychosocial problems at time  $t-1$ . Table 3 shows the estimated associations between unemployment and adverse psychosocial outcomes after adjustment for lagged measures of these variables.'

**Table 3.** Estimated effects of duration of unemployment on psychosocial outcomes from conditional, fixed-effects regression models controlling for lagged measures of psychosocial outcomes.

Outcomes	Person-years	B (SE)	OR (95% CI)	$p$
<b>Mental health</b>				
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<b>Criminal offending</b>				
Property and violent offending	3864	0.436 (0.102)	1.55 (1.27–1.89)	< 0.001
Arrest/conviction	3954	0.313 (0.159)	1.37 (1.00–1.87)	0.049
<b>Adverse life events</b>				
Serious financial problems	3951	0.318 (0.108)	1.37 (1.11–1.70)	0.003
Interpersonal/relationship difficulties	3954	0.134 (0.078)	1.14 (0.98–1.33)	0.085
<b>Life satisfaction</b>	3952	0.101 (0.080)	1.11 (0.95–1.29)	0.206

- A. Causative.
- B. Independent.
- C. Inferred.
- D. Non independent.
- E. Not substantiated.
- F. Related to confounding variables.
- G. Time lagged.

**Answer:** E - Not substantiated.

## Question 12 (1 mark)

Based on the abstract, Table 3 and your other knowledge, which psychosocial outcome retained a significant association with duration of unemployment after adjustment for possible confounding?

**Table 3.** Estimated effects of duration of unemployment on psychosocial outcomes from conditional, fixed-effects regression models controlling for lagged measures of psychosocial outcomes.

Outcomes	Person-years	B (SE)	OR (95% CI)	p
<b>Mental health</b>				
Major depression	3872	0.234 (0.088)	1.26 (1.06–1.50)	0.008
Anxiety disorder	3869	0.142 (0.092)	1.15 (0.96–1.38)	0.124
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<b>Adverse life events</b>				
Serious financial problems	3951	0.318 (0.108)	1.37 (1.11–1.70)	0.003
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<b>Life satisfaction</b>	3952	0.101 (0.080)	1.11 (0.95–1.29)	0.206

- A. Anxiety Disorder.
- B. Arrest/convictions.
- C. Interpersonal/relationship difficulties.
- D. Life satisfaction.
- E. Serious financial problems.
- F. Suicidal thoughts/attempts.

**Answer: E** - Serious financial problems.

### Question 13 (1 mark)

Based on the abstract, Table 3 and your other knowledge, which option best describes the estimated reduction in each adverse psychosocial outcome if unemployment was eliminated from the population?

**Table 3.** Estimated effects of duration of unemployment on psychosocial outcomes from conditional, fixed-effects regression models controlling for lagged measures of psychosocial outcomes.

Outcomes	Person-years	B (SE)	OR (95% CI)	p
<b>Mental health</b>				
Major depression	3872	0.234 (0.088)	1.26 (1.06–1.50)	0.008
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Illicit substance abuse/dependence	3869	0.378 (0.212)	1.45 (0.91–2.34)	0.117
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<b>Adverse life events</b>				
Serious financial problems	3951	0.318 (0.108)	1.37 (1.11–1.70)	0.003
Interpersonal/relationship difficulties	3954	0.134 (0.078)	1.14 (0.98–1.33)	0.085
<b>Life satisfaction</b>	3952	0.101 (0.080)	1.11 (0.95–1.29)	0.206

- A. Attributable risk.
- B. Confidence interval.
- C. Estimated regression coefficient.
- D. Logistic regression.
- E. Odds ratio.
- F. P value.
- G. Standard error.

**Answer:** A - Attributable risk.

## Question 14 (1 mark)

Based on the abstract, Table 3 and your other knowledge, which option best describes the strength of the association between duration of unemployment and psychosocial outcomes?

**Table 3.** Estimated effects of duration of unemployment on psychosocial outcomes from conditional, fixed-effects regression models controlling for lagged measures of psychosocial outcomes.

Outcomes	Person-years	B (SE)	OR (95% CI)	p
<b>Mental health</b>				
Major depression	3872	0.234 (0.088)	1.26 (1.06–1.50)	0.008
Anxiety disorder	3869	0.142 (0.092)	1.15 (0.96–1.38)	0.124
Suicidal thoughts/attempts	3872	0.174 (0.119)	1.19 (0.94–1.50)	0.143
<b>Substance abuse/dependence</b>				
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Illicit substance abuse/dependence	3869	0.378 (0.212)	1.45 (0.91–2.34)	0.117
<b>Criminal offending</b>				
Property and violent offending	3864	0.436 (0.102)	1.55 (1.27–1.89)	< 0.001
Arrest/conviction	3954	0.313 (0.159)	1.37 (1.00–1.87)	0.049
<b>Adverse life events</b>				
Serious financial problems	3951	0.318 (0.108)	1.37 (1.11–1.70)	0.003
Interpersonal/relationship difficulties	3954	0.134 (0.078)	1.14 (0.98–1.33)	0.085
<b>Life satisfaction</b>	3952	0.101 (0.080)	1.11 (0.95–1.29)	0.206

- A. Attributable risk.
- B. Confidence interval.
- C. Estimated regression coefficient.
- D. Logistic regression.
- E. Odds ratio.
- F. P value.
- G. Standard error.

**Answer: E - Odds ratio.**

### Question 15 (1 mark)

**Based on the study quotes below and your other knowledge, what type of bias is addressed by assessing the concordance between the most recent results and data obtained from the study cohort samples across prior time intervals?**

*'Sample size.* The present analysis is based on 1056 sample members observed on at least one occasion from 18 to 30 years. However, not all participants were assessed at each age. The number of observations available for each assessment was: 1025 (18 years); 1011 (21 years); 1003 (25 years); 987 (30 years).'

'Fixed-effects regression models provide a technique for adjusting an association between a time dependent outcome  $Y_t$  (e.g. crime) and a time-dependent predictor  $X_t$  (e.g. unemployment) for non-observed fixed factors  $\alpha$ , providing that the factors  $\alpha$  exert a fixed and constant effect on the outcomes.'

- A. Attribution bias.
- B. Attrition bias.
- C. Citation bias.
- D. Confounding variables bias.
- E. Observer bias.
- F. Publication bias.

**Answer:** B - Attrition bias.



### Question 16 (1 mark)

**Based on the study quotes below and your other knowledge, what type of bias is addressed by using the fixed effects regression models?**

*'Sample size.* The present analysis is based on 1056 sample members observed on at least one occasion from 18 to 30 years. However, not all participants were assessed at each age. The number of observations available for each assessment was: 1025 (18 years); 1011 (21 years); 1003 (25 years); 987 (30 years).'

'Fixed-effects regression models provide a technique for adjusting an association between a time dependent outcome  $Y_t$  (e.g. crime) and a time-dependent predictor  $X_t$  (e.g. unemployment) for non-observed fixed factors  $\alpha$ , providing that the factors  $\alpha$  exert a fixed and constant effect on the outcomes.'

- A. Attribution bias.
- B. Attrition bias.
- C. Citation bias.
- D. Confounding variables bias.
- E. Observer bias.
- F. Publication bias.

**Answer:** D - Confounding variables bias.

### Question 17 (1 mark)

**Based on the study quotes below and your other knowledge, what type of bias is likely to be most problematic to the data validity when retrospective self report data is used?**

*'Sample size.* The present analysis is based on 1056 sample members observed on at least one occasion from 18 to 30 years. However, not all participants were assessed at each age. The number of observations available for each assessment was: 1025 (18 years); 1011 (21 years); 1003 (25 years); 987 (30 years).'

*'Fixed-effects regression models provide a technique for adjusting an association between a time dependent outcome  $Y_t$  (e.g. crime) and a time-dependent predictor  $X_t$  (e.g. unemployment) for non-observed fixed factors  $\alpha$ , providing that the factors  $\alpha$  exert a fixed and constant effect on the outcomes.'*

- A. Attribution bias.
- B. Attrition bias.
- C. Citation bias.
- D. Confounding variables bias.
- E. Observer bias.
- F. Publication bias.

**Answer:** A - Attribution bias.

## Question 18 (2 marks)

Based on the abstract and the reported Attributable Risk in Table 2, which statement regarding the relationship of duration of unemployment to other variables is most correct?

**Table 2.** Estimated effects of duration of unemployment on psychosocial outcomes before and after adjustment for confounding by non-observed fixed factors.<sup>a</sup>

Outcomes	Unadjusted			Adjusted for non-observed fixed factors			
	B (SE)	OR (95% CI)	p	B (SE)	OR (95% CI)	p	AR (%) <sup>b</sup>
<b>Mental health</b>							
Major depression	0.215 (0.050)	1.23 (1.12–1.35)	< 0.001	0.158 (0.081)	1.17 (1.00–1.37)	0.050	5.6
Anxiety disorder	0.140 (0.054)	1.15 (1.03–1.28)	0.009	0.096 (0.084)	1.10 (0.93–1.29)	0.252	–
Suicidal thoughts/attempts	0.276 (0.072)	1.32 (1.14–1.52)	< 0.001	0.102 (0.106)	1.10 (0.90–1.36)	0.339	–
<b>Substance abuse/dependence</b>							
Alcohol abuse/dependence	0.312 (0.051)	1.37 (1.24–1.51)	< 0.001	0.168 (0.083)	1.18 (1.01–1.39)	0.043	6.9
Illicit substance abuse/dependence	0.463 (0.059)	1.59 (1.42–1.78)	< 0.001	0.238 (0.099)	1.26 (1.04–1.54)	0.017	10.8
<b>Criminal offending</b>							
Property and violent offending	0.442 (0.053)	1.56 (1.40–1.72)	< 0.001	0.376 (0.090)	1.45 (1.22–1.74)	< 0.001	14.0
Arrest/conviction	0.661 (0.080)	1.94 (1.65–2.66)	< 0.001	0.269 (0.139)	1.30 (1.00–1.72)	0.052	13.2
<b>Adverse life events</b>							
Serious financial problems	0.529 (0.059)	1.69 (1.51–1.90)	< 0.001	0.255 (0.094)	1.29 (1.07–1.55)	0.007	10.7
Interpersonal/relationship difficulties	0.185 (0.046)	1.20 (1.09–1.31)	< 0.001	0.059 (0.069)	1.06 (0.93–1.21)	0.391	–
<b>Life satisfaction</b>							
	0.252 (0.046)	1.28 (1.06–1.40)	< 0.001	0.122 (0.072)	1.13 (0.98–1.30)	0.092	4.2

OR = Odds Ratio  
SE = Standard Error  
AR = Attributable Risk

- A. Contributed substantially to life dissatisfaction.
- B. Had a profound effect on mental health.
- C. Had a small effect on mental health.
- D. Had no association with criminal offending.
- E. Was associated with interpersonal relationship problems.

**Answer: C** - Had a small effect on mental health.

## Question 19 (2 marks)

Based on the abstract, Table 2 and your other knowledge, which statement regarding the implications of this study is most correct?

**Table 2.** Estimated effects of duration of unemployment on psychosocial outcomes before and after adjustment for confounding by non-observed fixed factors.<sup>a</sup>

Outcomes	Unadjusted			Adjusted for non-observed fixed factors			
	B (SE)	OR (95% CI)	p	B (SE)	OR (95% CI)	p	AR (%) <sup>b</sup>
<b>Mental health</b>							
Major depression	0.215 (0.050)	1.23 (1.12–1.35)	< 0.001	0.158 (0.081)	1.17 (1.00–1.37)	0.050	5.6
Anxiety disorder	0.140 (0.054)	1.15 (1.03–1.28)	0.009	0.096 (0.084)	1.10 (0.93–1.29)	0.252	–
Suicidal thoughts/attempts	0.276 (0.072)	1.32 (1.14–1.52)	< 0.001	0.102 (0.106)	1.10 (0.90–1.36)	0.339	–
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Alcohol abuse/dependence	0.312 (0.051)	1.37 (1.24–1.51)	< 0.001	0.168 (0.083)	1.18 (1.01–1.39)	0.043	6.9
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Property and violent offending	0.442 (0.053)	1.56 (1.40–1.72)	< 0.001	0.376 (0.090)	1.45 (1.22–1.74)	< 0.001	14.0
Arrest/conviction	0.661 (0.080)	1.94 (1.65–2.66)	< 0.001	0.269 (0.139)	1.30 (1.00–1.72)	0.052	13.2
<b>Adverse life events</b>							
Serious financial problems	0.529 (0.059)	1.69 (1.51–1.90)	< 0.001	0.255 (0.094)	1.29 (1.07–1.55)	0.007	10.7
Interpersonal/relationship difficulties	0.185 (0.046)	1.20 (1.09–1.31)	< 0.001	0.059 (0.069)	1.06 (0.93–1.21)	0.391	–
<b>Life satisfaction</b>	0.252 (0.046)	1.28 (1.06–1.40)	< 0.001	0.122 (0.072)	1.13 (0.98–1.30)	0.092	4.2

OR = Odds Ratio  
SE = Standard Error  
AR = Attributable Risk

- The unemployed population should be actively targeted for rehabilitation to reduce the population burden of mental health disorders.
- Unemployment has a significant effect on population wellbeing.
- Unemployment is an important cause of Major Depression.
- Unemployment is unlikely to be causally related to adverse psychological outcomes.
- Unemployment makes a small contribution to a range of adverse psychosocial outcomes.

**Answer: E** - Unemployment makes a small contribution to a range of adverse psychosocial outcomes.