

POST-PRINT

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Reply: Smoking and mental health in young women – challenges in interpretation: a reply

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We welcome the opportunity to discuss the concerns raised by Gariépy *et al.* (2012) on the interpretation of our data on the relationships between smoking and mental health in young women. Gariépy *et al.* suggest that by excluding women who have ever been pregnant in our analysis, we limited the generalizability of our findings. The results were much the same when we re-ran the analyses on the full sample of women. It was still the case that young women who smoked at earlier waves had significantly higher odds of poor mental health at later waves (see Appendix 1), and young women with poor mental health at previous waves had significantly higher odds of smoking at later waves (see Appendix 2). As in our previous analyses, the strength of the association increased with the number of cigarettes smoked per day (CPD).

Second, Gariépy *et al.* argued that it was difficult to assess the potential for bias in our study because we did not provide data on the women with missing data on smoking or mental health status. Only a very small number of women had this missing data (Leung *et al.* 2012, Fig. 1) and their exclusion is unlikely to have had a substantial impact on our results. These excluded women were more likely to have lower education, to have been born in a non-English-speaking country, and to have more difficulties managing their income (Young *et al.* 2006). These variables have previously been shown to be associated with both smoking and poor mental health. In addition, the women with missing data were more likely to be smokers and have poor mental health. Therefore, as we argued in our discussion, any missing data are more likely to have biased our findings in the direction of underestimating the strength of the association between smoking and poor mental health.

Third, Gariépy *et al.* questioned our treatment of an ordinal measure of smoking as an interval variable in the structural equation models. They suggested that a categorical ordinal definition of smoker types would have been better. We can confirm that smoker type was analysed as an ordinal categorical variable in our structural equation models. Using Amos 17.0 software, we coded the smoking status variables as an ordered-categorical variable and fitted the model using Bayesian estimation. In addition, we presented the results from the generalized estimated equation models to show that the relationship between smoking and poor mental health increased with increasing level of smoking. When all paths were entered simultaneously in a single model, smoking was associated with poor mental health, and poor mental health was associated with smoking.

Fourth, Gariépy *et al.* also commented on the challenges in untangling the temporal order of the relationship between prior mental health problems and the risk of being a former smoker. We concur with the comment that this is a limitation of our data. We have attempted to address this issue in model 4 in each of Tables 2 and 3. The findings support our interpretation that the association is bi-directional.

Last, Gariépy *et al.* correctly identified several misprints in Table 2, where some odds ratios appeared incorrectly and the reference value was 10.00 instead of 1.00. It appears that in the first eight rows, ‘1.**’ has been misprinted as ‘10.**’. For example, the odds ratio for poor mental health (according to the Mental Health Index from the SF-36) for ex-smokers should be 1.21 (not 10.21). None of the odds ratios presented in Table 2 should be over 10.00. Please see Appendix 3 for the corrected values.

Appendix 1

Smoking status (predictor) at	Poor mental health (outcome) at waves 2.3.4.5 (good as
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waves 1,2,3,4 (never as reference)	reference)	
	OR	95% CI
Never	1.00	
Ex-smoker	1.19	1.09-1.30
Smoke <10 cpd	1.25	1.13-1.39
Smoke 10-19 cpd	1.54	1.37-1.73
Smoke 20+ cpd	1.97	1.70-2.27

Longitudinal analysis of smoking status predicting subsequent mental health status using generalized estimated equation analysis for all young women participating in the Australian Longitudinal Study on Women's Health with and without any experience of pregnancy

OR, Odds ratio; CI, confidence interval; CPD, cigarettes per day.

Mental health status was measured by the SF-36 Mental Health Index, ≤ 52 as poor.

Appendix 2

Poor mental health status at waves 1, 2, 3, 4	Smoking status (outcome) at waves 2, 3, 4, 5 (never smoker as reference)							
	Ex-smoker		Smoke <10 CPD		Smoke 10–19 CPD		Smoke ≥ 20 CPD	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Poor MHI status (≤ 52)	1.07	1.03–1.12	1.22	1.16–1.28	1.26	1.20–1.32	1.55	1.45–1.67

Longitudinal analysis of mental health status predicting subsequent smoking status using generalized estimated equation analysis for all young women participating in the Australian Longitudinal Study on Women's Health with and without any experience of pregnancy

OR, Odds ratio; CI, confidence intervals; CPD, cigarettes per day.

Mental health status was measured by the SF-36 Mental Health Index (MHI), ≤ 52 as poor.

Appendix 3

Smoking status (predictor) at waves 1, 2, 3, 4 (never as reference)	Poor mental health (outcome) at waves 2, 3, 4, 5 (good as reference)			
	MHI \leq 52		CES-D \geq 10	
	OR	(95% CI)	OR	(95% CI)
Model 1: Unadjusted				
Never	1.00		1.00	
Ex-smoker	1.21	(1.06–1.39)	1.25	(1.11–1.41)
Smoke <10 CPD	1.23	(1.07–1.41)	1.21	(1.07–1.37)
Smoke 10–19 CPD	1.29	(1.05–1.58)	1.35	(1.12–1.61)
Smoke \geq 20 CPD	1.62	(1.24–2.11)	1.59	(1.26–2.00)
Model 2: Adjusted for covariates				
Never	1.00		1.00	
Ex-smoker	1.26	(0.94–1.70)	1.20	(0.91–1.60)
Smoke <10 CPD	1.28	(0.98–1.68)	1.33	(1.04–1.71)
Smoke 10–19 CPD	1.29	(0.99–1.69)	1.26	(0.99–1.61)
Smoke \geq 20 CPD	1.55	(1.20–1.99)	1.58	(1.25–1.99)
Model 3: Adjusted for mental health status at waves 1, 2, 3, 4				
Never	1.00		1.00	
Ex-smoker	1.21	(1.06–1.38)	1.10	(0.94–1.29)
Smoke <10 CPD	1.16	(1.01–1.33)	1.06	(0.89–1.26)
Smoke 10–19 CPD	1.20	(0.99–1.47)	1.05	(0.82–1.35)
Smoke \geq 20 CPD	1.45	(1.12–1.88)	1.16	(0.85–1.59)
Model 4: Including only participants with good mental health status at baseline wave				
Never	1.00		1.00	
Ex-smoker	1.23	(1.04–1.47)	1.31	(1.14–1.52)
Smoke <10 CPD	1.15	(0.96–1.38)	1.22	(1.05–1.42)
Smoke 10–19 CPD	1.24	(0.95–1.61)	1.33	(1.06–1.67)
Smoke \geq 20 CPD	1.67	(1.17–2.39)	1.54	(1.14–2.08)

Longitudinal analysis of smoking status predicting subsequent mental health status using generalized estimated equation models

MHI, Mental Health Index; CESD, Center for Epidemiologic Studies Depression Scale; OR, Odds ratio; CI, confidence intervals; CPD, cigarettes per day.

Covariates included marital status, education level, and employment status.

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