SEM describing association between depression (aged 12) and school experience (aged 14)

Model specification

Measurement component

The measurement component is taken from the factor analysis in Kidger et al. (2015). To recap they identified three school experience factors at age 14:

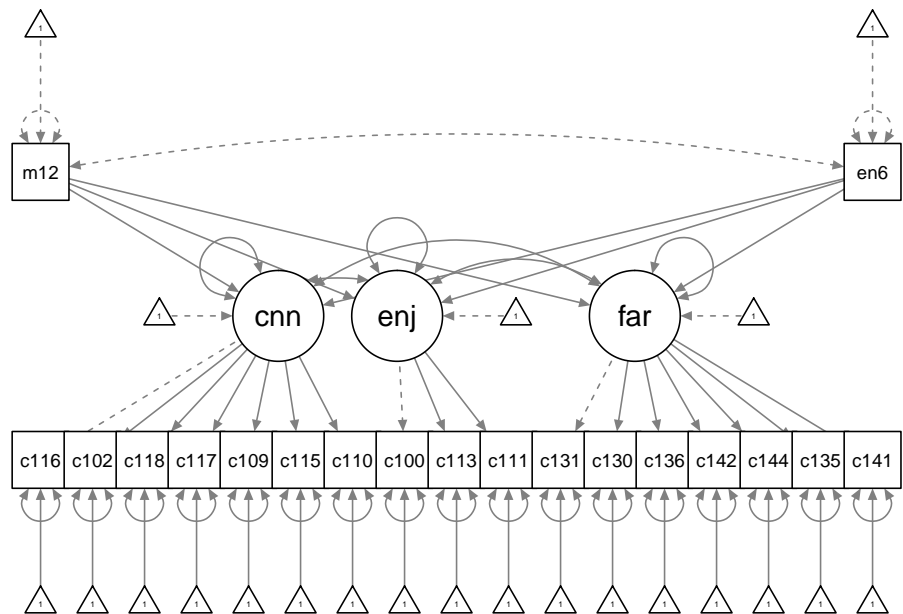(1) Connectedness
(2) Enjoyment
(3) Sense of fairness

In the appendix to their 2015 paper they only listed the ALSPAC variables with factor loadings >0.6 (which are the variables I've used in this model). Presumably we could ask them for the full list.

Structural component

I fitted four models of increasing complexity:

(1) The simplest model, regressing the three school enjoyment factors on MFQ score at 12.
(2) Model 1, but also controlling for the effect of school enjoyment at age 6
(3) Model 2, including additional covariates (maternal education, maternal smoking in pregnancy, maternal post-natal depression and child sex)
(4) Model 3, but stratified by sex

Below is a diagram of Model 2:

Results

Measurement component

The model converged fine. Model fit looks about acceptable (Table 1), though it wasn't possible to directly compare to the Heron/Kidger model as they didn't report the fit statistics for the three-factor model.

Table 1: Model fit statistics (n=6712)

Chi-squared	2828.872
Degrees of freedom	130.000
P-value	0.000
RMSEA	0.056
SRMR	0.045
CFI	0.906
TLI	0.890

Table 2 shows the items loadings which all look reasonable. Table 3 shows a moderate correlation between the three factors.

Table 2: Item/factor loadings (n=6712)

Connectedness

ccr116	A1q: Respondent's school is a place where they get on we
ccr102	A1c: Respondent's school is a place where other pupils ac
ccr118	A1s: Respondent's school is a place where other pupils are
ccr117	A1r: Respondent's school is a place where people can dep
ccr109	A1j: Respondent's school is a place where people trust the
ccr115	A1p: Respondent's school is a place where they know peo
ccr110	A1k: Respondent's school is a place where they have a lot

Enjoyment

ccr100	A1a: Respondent's school is a place where they really like
ccr113	A1n: Respondent's school is a place where they get excite
ccr111	A1l: Respondent's school is a place where they enjoy what

Sense of fairness

ccr131	A2b: Respondent's teachers make it clear how they shoul
ccr130	A2a: Respondent's teachers take action when they see an
ccr136	A2g: Respondent's teachers keep the class in order
ccr142	A2m: Respondent's teachers at school treats pupils with re
ccr144	A2o: Respondent's teachers at school believe that all pupi
ccr135	A2f: Respondent's make sure that any homework set is co
ccr141	A2l: Respondent's teachers praise them when they do sc

Table 3: Correlations between school experience factors (n=6712)

Factor 1	Factor 2	Correlation	Std.Err
connect	enjoy	0.533	0.005
connect	fair	0.506	0.003
enjoy	fair	0.592	0.005

Structural component

Here are the regression results. Interestingly depression at age 12 is associated with all three school enjoyment factors at age 14, both in the completely unadjusted model (Table 4), and when adjusted for school enjoyment at age 6 (Table 5). There was minimal change to the magnitude of association once controlling for enjoyment at age 6.

Table 4: Unadjusted effect of depression age 12 on school experience age 14 (Model 1; n=6712)

	Connectedn...
	mfqtot12
	Enjoyment ~
	mfqtot12
	Fairness ~
	mfqtot12

Table 5: Depression aged 12 –> school experience aged 14, adjusted for school enjoyment aged 6

		Beta	Std.Err
	Connectedness ~		
	mfqtot12	-0.229	0.002
	enjsch6	0.086	0.016
(Model 2; n=3891)	Enjoyment ~		
	mfqtot12	-0.160	0.003
	enjsch6	0.161	0.020
	Fairness ~		
	mfqtot12	-0.169	0.002
	enjsch6	0.107	0.014

Next we can see the regression coefficients adjusting for maternal education, maternal smoking in pregnancy and post-natal depression (Table 6). Being female is associated with higher connectedness and enjoyment at 14, but not with any difference in sense of fairness. The effect of depression on school experience at 14 does not appear to be attenuated by including these covariates.

Table 6: Depression aged 12 --> school experience aged 14, adjusted for other risk factors (Model 3; n=3527)

	Beta	Std.Err	P-value
Connectedness ~			
mfqtot12	-0.241	0.002	0.000
enjsch6	0.081	0.016	0.000
mated	0.014	0.017	0.479
smokepreg	-0.004	0.025	0.854
postdep	-0.021	0.032	0.295
sex	0.104	0.017	0.000
Enjoyment ~			
mfqtot12	-0.176	0.003	0.000
enjsch6	0.157	0.021	0.000
mated	0.101	0.022	0.000
smokepreg	-0.004	0.031	0.874
postdep	-0.003	0.040	0.891
sex	0.061	0.022	0.004
Fairness ~			
mfqtot12	-0.166	0.002	0.000
enjsch6	0.113	0.015	0.000
mated	0.053	0.016	0.010
smokepreg	-0.048	0.023	0.025
postdep	-0.015	0.029	0.457
sex	0.002	0.016	0.932

Finally I re-ran the fully adjusted model stratified by sex (Tables 7 & 8). It is quite a lot of output to inter-pret, but what I take from this is there don't appear to be particularly notable differences between sexes in the strength of the relationship between depression and school enjoyment. This is just eye-balling though, we could test this statistically.

	Beta
Connectedness ~	
mfqtot12	-0.258
enjsch6	0.099
mated	0.027
smokepreg	-0.012
postdep	0.024
Enjoyment ~	
mfqtot12	-0.212
enjsch6	0.182
mated	0.098
smokepreg	-0.011
postdep	0.038
Fairness ~	
mfqtot12	-0.135
enjsch6	0.162
mated	0.052
smokepreg	-0.045
postdep	0.034

Table 7: Adjusted model - Males (Model 4a; n=1693)

Table 8: Adjusted model - Females (Model 4b; n=1834)

	Beta	Std.Err	P-value
Connectedness ~			
mfqtot12	-0.236	0.003	0.000
enjsch6	0.061	0.027	0.025
mated	0.003	0.024	0.914
smokepreg	-0.003	0.035	0.908
postdep	-0.058	0.047	0.034
Enjoyment ~			
mfqtot12	-0.154	0.003	0.000
enjsch6	0.123	0.031	0.000
mated	0.102	0.028	0.000
smokepreg	-0.004	0.041	0.893
postdep	-0.039	0.054	0.174
Fairness ~			
mfqtot12	-0.188	0.003	0.000
enjsch6	0.064	0.023	0.020
mated	0.056	0.021	0.041
smokepreg	-0.051	0.030	0.074
postdep	-0.054	0.040	0.053