

Bidirectional associations between life habits and emotional adjustment in children: A latent profile analysis

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CONTEXT

Context

- Canadian guidelines suggest that an optimal balance of three life habits such as screen time, physical activity and sleep is essential for a healthy development in children (ParticipACTION, 2018).
- Many Canadian children do not follow these guidelines putting them at risk of emotional problems (Biddle & Asare, 2011).
- Previous studies on the subject have been cross-sectional, the direction of the association is still unclear (Biddle & Asare, 2011).
- Moreover, life habits have been studied separately despite the ongoing tendency to promote their balance (ParticipACTION, 2018)

Aims

Our aims were to identify life habits profiles in children. Then, we tested the associations between the life habits profiles and emotional adjustment as predictors and as outcomes.

METHODS

Participants

- Participants came from the Quebec Longitudinal Study of Child Development (QLSCD) conducted by the Institut de la Statistique du Québec (2016).
- Participants were randomly selected from the Quebec birth register of 1997-1998.
- The original sample included 2120 children, our final sample was composed of 1492 children.

Measures

- Life habits (screen time, physical activity and sleep) were reported by the mothers when children were 8 years old.
- Emotional adjustment (emotional problems and anxiety) were reported by the teachers when children were 6 years old and 10 years old.
- Control variables are the child's sex, family structure, family functioning and socioeconomic status.
- Data were collected by questionnaires.

Data analytic procedures

- Life habits profiles were derived with latent profile mixture model analysis (Muthén et Muthén, 2018).
- Multinomial regression were used to test the association between emotional adjustment at age 6 and life habits profiles.
- Covariance analysis (ANCOVA) were used to test the association between life habits profiles and emotional adjustment at age 10.

RESULTS

Life habits profiles identification

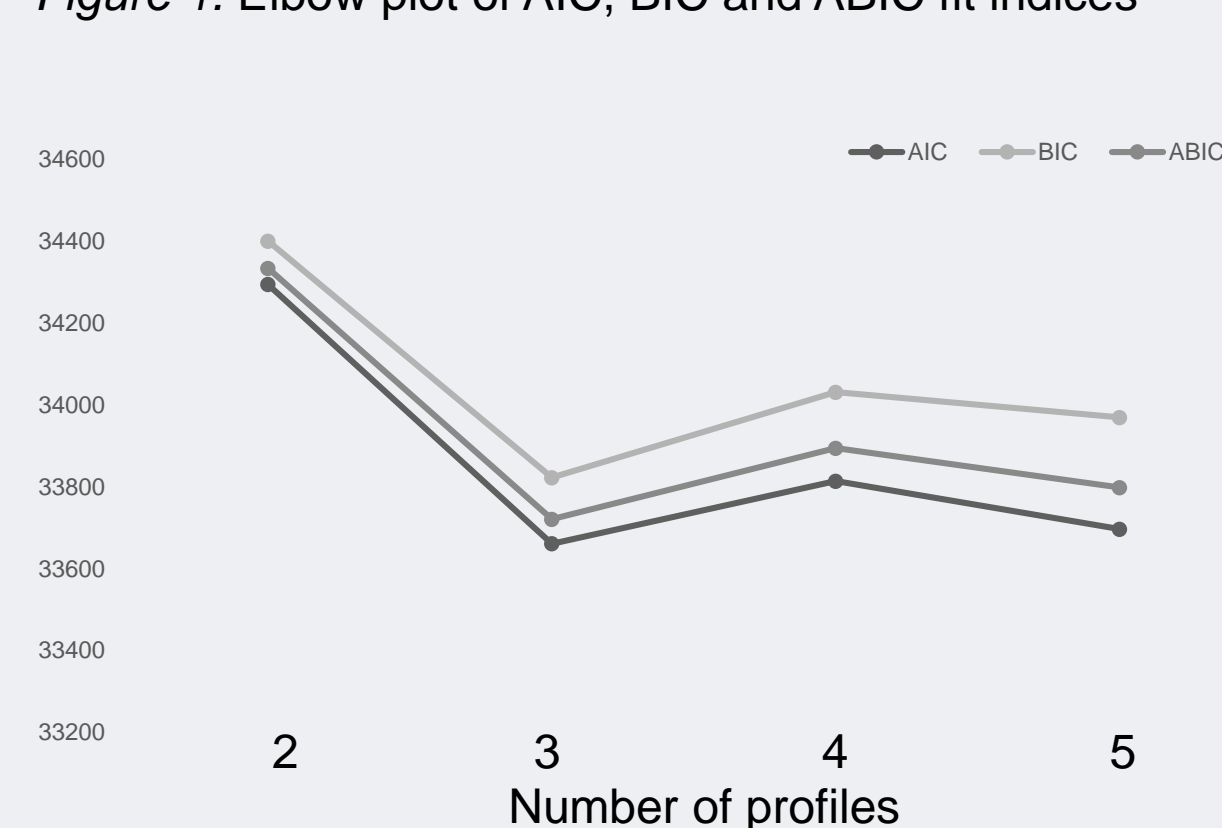
Table 1. Information Criteria and Likelihood Ratio Tests Comparing Models with 2 to 5 Profiles

	AIC	BIC	ABIC	LMR	VLMR
Number of profiles					
2	34294.22	34400.35	34333.65	923.76***	10.70***
3	33660.63	33822.35	33720.70	647.25***	39.95***
4	33813.60	34030.92	33894.33	189.53***	23.54***
5	33696.48	33969.38	33797.86	-10.52***	137.36***

Notes. *** $p < 0.001$, ** $p < 0.010$, * $p < 0.050$, AIC = Akaike's Information Criterion, BIC = Schwarz's Bayesian Information Criterion, ABIC = Sample-Size Adjusted BIC, LMR = Lo-Mendell-Rubin Adjusted Test, VLMR = Vuong-Lo-Mendell-Rubin Adjusted Likelihood Ratio Test.

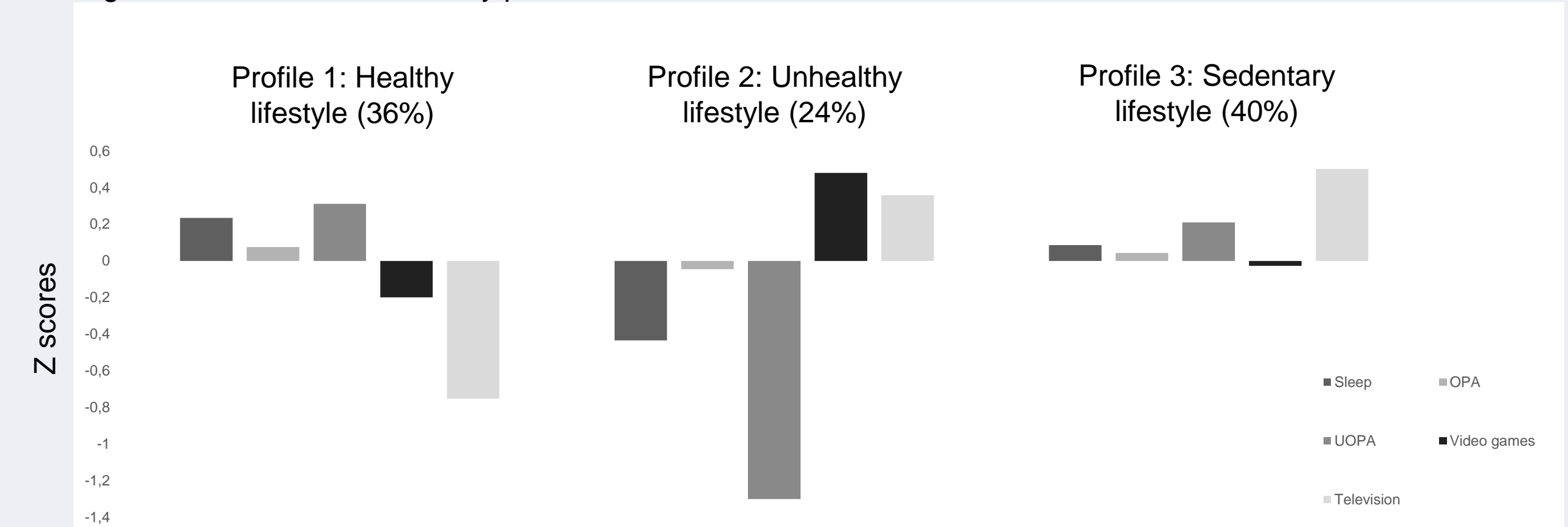
- The models did not converge over five profiles.
- A solution of three profiles was selected according to the fit indices (Table 1) and the elbow plot (Figure 1).

Figure 1. Elbow plot of AIC, BIC and ABIC fit indices



- The healthy lifestyle profile includes children who practice more unorganized physical activity and watch less television (Figure 2).
- The unhealthy lifestyle profile includes children who sleep less, do less unorganized physical activity, play more video games and watch more television (Figure 2).
- The sedentary lifestyle profile includes children who watch more television (Figure 2).

Figure 2. Life habits Z scores by profiles



Notes. OPA = Organized physical activity, UOPA = Unorganized physical activity.

Table 2. Association between emotional problems and anxiety at age 6 and life habits profiles at age 8

Predictors	Profile of reference = Healthy Lifestyle			
	Unhealthy lifestyle		Sedentary lifestyle	
	Coefficient(SE)	OR	Coefficient(SE)	OR
Emotional problems	-0.001(0.003)	0.999(-0.008; 0.005)	-0.002(0.003)	0.998(-0.007; 0.003)
Anxiety	0.005(0.004)	1.005(0.003; 0.013)	0.000(0.003)	1(-0.007; 0.006)
Sex	0.007(0.005)	1.007(0.002; 0.016)	-0.004(0.004)	0.996(-0.012; 0.005)
Family functioning	0.002(0.004)	1.002(0.006; 0.009)	0.000(0.003)	1(-0.005; 0.006)
Income	-0.001(0.004)	0.999(0.008; 0.006)	-0.007(0.003)*	0.993(-0.013; -0.001)*
Family structure	-0.005(0.004)	0.995(0.013; 0.003)	-0.006(0.003)	0.994(-0.012; 0.000)

Notes. * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$

Table 3. Association between the life habits profiles at age 8 and subsequent emotional problems and anxiety at age 10

	Unstandardized mean difference	
	Emotional problems	Anxiety
Healthy lifestyle vs unhealthy lifestyle	-1.540(-2.098; -0.982)***	-5.134(-11.208; 0.939)
Healthy lifestyle vs sedentary lifestyle	-0.037(-0.322; 0.249)888	-0.698(-2.813; 1.418)
Unhealthy lifestyle vs sedentary lifestyle	1.504(0.953; 2.054)***	4.437(-2.223; 11.096)

Notes. * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$

DISCUSSION

- Three life habits profiles emerged from our sample: (1) healthy lifestyle 36%, (2) unhealthy lifestyle 24% and (3) sedentary lifestyle 40%.
- Almost a fourth of the children in our sample had unhealthy life habits regarding sleep, physical activity and screen time putting them at risk of physical and psychological problems (ParticipACTION, 2018).
- Inconsistent with previous literature, children with more emotional problems and anxiety at age 6 did not predict their subsequent profile membership at age 8 (Ames et al., 2018; Grontved et al., 2015).
- The discrepancy in the results could be due to the age of our sample when emotional problems and anxiety were measured. These problems are more prevalent in adolescents than in children (Piché et al., 2017). At age 6, these problems may have not emerged yet.
- Consistent with previous literature, children in the unhealthy lifestyle profile at age 8 had more emotional problems at age 10 than those in the other profiles (Biddle & Asare, 2011; Smaldone et al., 2007).
- Therefore, a mix of lack of sleep, less physical activity and more screen time put children at risk for subsequent emotional maladjustment.
- Inconsistent with previous literature, the profiles membership at age 8 did not predict anxiety at age 10 (Biddle & Asare, 2011; Maras et al., 2015).
- Considering that the unhealthy lifestyle profile is characterized by symptoms of emotional problems such as sleep disturbance, loss of motivation and energy (American Psychiatric Association, 2013), it is possible that having that lifestyle put the children at increased risk to develop these specific problems.

Limits

- Information about the frequency of organized and unorganized physical activity participation lacked precision. A better appraisal of physical activity participation would have reinforced our conclusions.
- Attrition was elevated in our sample, although the use of full information maximum likelihood estimation and multiple imputations should have corrected the risk of bias.

Implications

- Almost one fourth of Quebec children have an unhealthy lifestyle putting them at risk of physical and psychological problems. Efforts should be done to screen these children and give them help to modify their lifestyle.
- Because life habits at a young age are mostly driven by parents, they should be informed of the risks of such lifestyle in children and accompanied to change it.
- Children with unhealthy lifestyles should also be screened for emotional problems. Psychological help should be provided if needed.

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Associations between emotional adjustment and profiles membership

- No predictors at age 6 were significantly associated with the subsequent life habits profiles at age 8 (Table 2).
- Children in the unhealthy lifestyle profile had significantly more emotional problems at age 10 than the children in the healthy lifestyle profile and the sedentary lifestyle profile (Table 3 and Figure 3).
- No other associations between the profiles membership at age 8 and subsequent emotional problems at age 10 were significant (Table 3).
- Profiles membership at age 8 did not predict subsequent anxiety at age 10.

Figure 3. Emotional problems and anxiety at age 10 by profile

