

ORIGINAL ARTICLE

Health of children working in small urban industrial shops

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Aims: To explore associations between work status and multidimensional health indices in a sample of urban Lebanese children.

Methods: A cross-sectional survey was used to compare 78 male children (aged 10–17 years) working full time in small industrial shops, and a comparison group of 60 non-working male schoolchildren. All children lived and worked or studied in the poor neighbourhoods of three main Lebanese cities.

Results: Working children reported frequent abuses. They smoked and dated more than the comparison group. They also reported a higher number of injuries (last 12 months) and recent skin, eye, and ear complaints (last two weeks). Physical examination revealed more changes in their skin and nails, but no differences in height or weight compared to non-working group. A higher blood lead concentration was detected among working children, but no differences in haemoglobin and ferritin. No differences were noted between the two groups of children regarding anxiety, hopelessness, and self-esteem. The drawings of the working children, however, revealed a higher tendency to place themselves outside home and a wider deficit in developmental age when compared to non-working children.

Conclusion: Significant differences were found between working and non-working children with respect to physical and social health parameters, but differences were less with regard to mental health. Future research should focus on (1) more sensitive and early predictors of health effects, and (2) long term health effects. The generality of findings to other work settings in the developing world should also be tested.

More than 200 million children less than 14 years of age work worldwide, many of whom are employed in hazardous occupations and are doing the same type of work as adults.¹ Children's increased vulnerability puts them at a high risk of work related health problems.^{2,3} Nevertheless, the health of working children is still an under-researched topic,⁴ probably because child labour in its harshest forms is mostly limited to developing countries. Most of the published research from more developed countries reports a high rate of work related injuries among children working in agricultural work and retail services, including fast-food chains.^{3,5,6}

Child labour in Lebanon, a small service oriented country, may be less devastating than in other developing countries. A national survey reported that 1.8% of the 10–14 year old children and 11.3% of those aged 15–18 years work.⁷ However, child labour in Lebanon is not equally distributed, but clearly associated with the poor outskirts of cities and the underdeveloped peripheral regions of the country.⁷ The national survey also revealed that the preponderance of child labourers are boys who are employed in small industrial shops.⁷

The present study is motivated by prior research in Lebanon which revealed the general inadequacy of health and safety conditions at work,⁸ and the limited access of children to health care in poor neighbourhoods. The study examines associations between multidimensional indices of health (physical, social-emotional, mental) and child labour in Lebanon, by comparing children working in small industrial shops with non-working children. We hypothesised that working children will be disadvantaged in all health dimensions.

METHODS

Study population

The study population was limited to 10–17 year old boys living in urban areas and working in a variety of small industrial shops (for example, mechanics, carpentry, autobody

repair, spray painting). Several districts within the cities of Tripoli (north of Lebanon), Saida (south of Lebanon), and Beirut (the capital) were purposively targeted because of the presence of clusters of small industrial shops, and a high proportion of working children.

Study sample

Terre des Hommes, an international non-governmental organisation (in collaboration with UNICEF and the Lebanese Ministry of Education) manages vocational and social programmes for working and non-working children in the study areas. The programmes mainly target children working in jobs assumed to be more hazardous to safety and health. The organisation provided a list of all working children enrolled in the training programme, together with information on age, sex, and type of work performed. Children's participation in the vocational programme was conditional on parents' or guardians' approval. All 10–17 year old boys employed in industrial shops were identified. The families of eligible children were contacted in person, and informed consent was conducted for participation in the study. All identified working children participated in the study. A comparison group of children of the same age group was recruited from students attending schools in the same areas. Schoolchildren in the comparison group were informed of the study through their schools or the social programme. School administrators also helped in securing the approval of the parents/guardians. The comparison group was a volunteer convenience sample, and response rate could not be computed.

Children were invited to present at a specified time and date to the vocational centre of their area of residence. Those who so presented were again informed of the study and asked to write or sign their name on an informed consent form. Subjects were then interviewed by trained first year medical students and examined by one of two senior family

Abbreviations: CI, confidence interval; Hb, haemoglobin; LL, Lebanese pounds; OR, odds ratio; Pb-B, blood lead concentration

Main messages

- Children working in urban industrial shops are socially disadvantaged.
- Working and non-working children had significant differences in physical and social health parameters, but less in mental health.
- Working in small industrial shops predisposes the child to unhealthy lifestyles.
- The non-working children most probably perceive themselves as temporary students who will soon join the labour force.

physicians, who also drew blood samples. Monetary compensation was given to all participating children to cover transportation and one day's work equivalence.

Data collection

All interviews and examinations were conducted in 1997, following approval by a national committee on child labour, under the Ministry of Social Affairs. Separate stations for general interview, mental health assessment, physical examination, and blood drawing were set in each centre. Children rotated between the different stations in any order. Except for those at the general interview station, all interviewers and the physicians were blinded to the work status of the child.

General interview

A standardised questionnaire was used that inquired about the sociodemographic background of the child, his schooling, nutrition (intake of fruit, vegetables, milk, caffeine), social habits (smoking, alcohol intake, dating), acute and chronic health problems, and use of health services. Working children were asked about their workplace, employer, and the use of their salaries.

Mental health assessment

Mental health was assessed using three validated questionnaires translated into Arabic: the Children's Manifest Anxiety Questionnaire,⁹ the Hopelessness Scale,¹¹ and the Self-Esteem Inventory.¹² The first two were translated and back translated before a final version was used in this study, while the third was already used in Arabic.

The Children's Manifest Anxiety Questionnaire⁹ includes 37 questions—28 anxiety items and 9 lie items, to which the child answers by either yes or no. The construct, content, and criterion related validity of the scale are well established.¹³ It has a reliability of around 0.83 and can be used readily at grade 3 or above.¹⁰ A higher score (maximum 28) indicates higher anxiety.

The Hopelessness Scale for Children¹¹ includes 17 items, to each of which the child has to indicate if it is true or not (internal consistency 0.75, $p < 0.001$). Test-retest reliability and concurrent validity are established.¹⁴ Performance on this scale is negatively correlated with self-esteem and positively correlated with depression.¹¹ The readability of the items corresponded to an upper first or lower second grade level. A higher score (maximum 17) indicates greater hopelessness or "negative expectancies for the future".¹¹

The Self-Esteem Inventory¹² consisted of 29 statements to which the child had to answer yes or no. A higher score (maximum 29) indicates a higher self-esteem. This is a shorter form of an original 50 item scale, with a test-retest reliability of 0.88 over five weeks,¹² and a well established convergent and discriminant validity.¹⁵

Policy implications

- Health and safety conditions at work should be improved, and physical and mental health of working children routinely evaluated.
- Awareness campaigns to reduce exposure of working children to risky social behaviours should be initiated.
- There should be control of school dropouts and provision of properly supervised technical training for children who elect to leave school.

For each of the three scales, mean scores with standard deviation (SD) were computed. Scores were also grouped into four quartiles, using cut-off points determined for the whole study sample.

Children were also provided with a white sheet of paper and a pencil and were asked to draw themselves inside their homes. One of the authors (JU), who was blinded to the status of the child, scored each drawing based on the children's drawing code book.¹⁶ Each drawing was scored for complexity or richness of drawing (low, average, high) and for general impression (negative, average, positive). Developmental age was estimated for each drawing based on Good Enough Harris scoring.¹⁷ The difference between the actual chronological age and the estimated developmental age was computed for each child. In addition, a note was made when the child drew himself outside the house. Inter-rater agreement was determined for two raters (co-authors JU and MM) who scored all drawings. Identical scores were given in 78% of the drawings for general impression (kappa 0.29), 79% for complexity (kappa 0.57), 76% for mental age within one year (correlation 0.58), and 91% for location of child inside or outside home (kappa 0.83). The principal coder's reliability over four weeks was 0.42 for general impression, 0.53 for complexity, 0.69 for mental age, and 0.82 for location of child.

Lower complexity, a negative general impression, self-representation outside the house, and a wider difference between the chronological and developmental ages were indicators of a less advantaged mental health status.

Physical examination

Children were asked to take their shoes off. Their height and weight were measured on a mechanical scale. Visual acuity was tested using a Snellen chart posted on a wall at a 6 feet distance. The child was asked to sit on a chair and relax for a few minutes before his blood pressure was measured. A full physical examination was then conducted assessing gait, posture, nails, hands, arms, legs, and feet. Eyes, ears, nose, mouth, and throat were checked in addition to chest auscultation.

Blood samples

Blood was tested for haemoglobin (Hb), ferritin, and lead concentration (Pb-B). The blood lead samples were mailed to the University of Newcastle upon Tyne for analysis in an accredited laboratory at the Department of Environmental and Occupational Medicine. The other tests were performed in a hospital based clinical lab in Beirut. Mean Hb (g/l), ferritin ($\mu\text{g/l}$), and blood lead concentration ($\mu\text{g/dl}$) were reported. Pb-B was further divided into four categories (<10 , 10–14, 15–19, and ≥ 20 $\mu\text{g/dl}$), with 10 $\mu\text{g/dl}$ being the CDC permissible level for children.¹⁸

Data management and statistical analysis

The work characteristics of the working children were described. Their sociodemographic characteristics, social

Table 1 Work characteristics of working children

	n	% (95% CI)
Work experience		
Current workplace*	n=77	
Carpentry	19	24.7 (16.6 to 35.8)
Mechanics	22	28.6 (18.8 to 40.0)
Metal works	27	35.1 (24.5 to 46.8)
Other	9	11.7 (5.5 to 21.0)
Years in current workplace	n=76	
<1	13	17.1 (9.4 to 27.5)
1	29	38.2 (27.2 to 50.0)
2	15	19.7 (11.5 to 30.5)
≥3	19	25.0 (15.8 to 36.3)
Mean (SD)	1.72 (1.28)	
Years ever worked	n=76	
<2	33	43.4 (32.1 to 55.3)
2	18	23.7 (14.7 to 34.8)
≥3	25	32.9 (22.5 to 44.6)
Mean (SD)	2.34 (1.89)	
Salary		
Weekly salary (Lebanese pounds†)	n=76	
≤20000	32	42.1 (30.9 to 54.0)
21000–40000	30	39.5 (28.4 to 51.4)
>40000	14	18.4 (10.5 to 29.0)
Proportion kept by child (%)	n=61	
≤33	31	50.8 (37.7 to 63.9)
34–66	28	45.9 (33.1 to 59.2)
>66	2	3.3 (0.4 to 11.3)
Use of salary	n=73	
Family basic needs‡	47	64.4 (52.3 to 75.3)
Amusement	11	15.1 (7.8 to 25.4)
Combination of above	15	20.5 (12.0 to 31.6)
Work perceptions		
Perception of physical exertion at work	n=77	
Very tiring	14	18.2 (10.3 to 28.6)
Difficult	23	29.9 (20.0 to 41.4)
Easy/comfortable	40	51.9 (40.3 to 63.5)
Preferences regarding current job	n=77	
Stay in the job	39	50.6 (39.0 to 62.2)
Leave§	38	49.4 (37.8 to 61.0)
Satisfaction with current job	n=77	
High	50	64.1 (53.2 to 75.5)
Little	22	28.2 (18.8 to 40.0)
None	5	6.4 (2.1 to 14.5)
Relation with current employer		
Relation to current employer	n=76	
Family/relative	22	28.9 (19.1 to 40.5)
Friend/neighbour	18	23.7 (14.7 to 34.8)
Other	36	47.4 (35.8 to 59.2)
Employer's reaction to absence from work	n=76	
Penalty¶	26	34.2 (23.7 to 46.0)
Nothing	50	65.8 (54.0 to 76.3)
Physical or verbal abuse by employer	n=77	
Always	9	11.7 (5.5 to 21.0)
Sometimes	24	31.2 (21.1 to 42.7)
Rarely	10	13.0 (6.4 to 22.6)
Never	34	44.2 (32.8 to 55.9)

*Carpentry included furniture painting, mechanics included soldering radiators, metal works included autobody repair, and other included workplaces of less industrial nature (electric work, hairdressing, butchery).

†1 US dollar = 1500 Lebanese pounds; minimum wage about 70 000 Lebanese pounds per week.

‡Rent, food, education.

§Prefers another job (n = 11), back to school (n = 11), travel (n = 11), combinations (n = 5).

¶Deduction from salary (n = 11), physical or verbal abuse (n = 11), or both.

and nutritional habits, self-reported health complaints, use of health services, physical examination findings, blood results, and mental health scores were then compared to those of the comparison group. Statistical significance, set at a p value of 0.05, was tested using χ^2 analysis for categorical variables and *t* test for continuous variables. To reduce multiple comparisons, an index of health complaints was created for each body system or organ (for example, skin, eye, respiratory, musculoskeletal). A positive response to one question or more related to complaints in the system or organ was considered a positive complaint for that system or organ.

Multivariate logistic and linear regression analyses were performed to estimate the strength of association between work status (independent variable) and different health outcomes (dependent variables). Age adjusted prevalence odds ratio (OR) with 95% confidence intervals (CI) and β coefficients were computed for the logistic and linear regression models, respectively. Associations were further adjusted for years at school, education of father and mother (illiterate, elementary, more than elementary), and occupation of father (white collar, skilled blue collar, unskilled blue collar).

Eighteen full-time school children reported working a few hours a week and four were recently re-enrolled in school

Table 2 Sociodemographic characteristics of working children (n=78) and their comparison group (n=60)

	Working children		Comparison		p value
	n	%	n	%	
Age (years)	n=78		n=60		
10–12	16	20.5	28	46.7	
13–14	28	35.9	17	28.3	
15–18	34	43.6	15	25.0	0.004
Mean (SD)	14.09 (1.76)		13.08 (2.07)		0.002
No. of times displaced during war*	n=78		n=57		
0	41	52.6	44	77.2	
1	20	25.6	6	10.5	
>1	17	21.8	7	12.3	0.01
Mean (SD)	0.82 (1.13)		0.44 (0.98)		0.04
Years at school	n=76		n=54		
Mean (SD)	6.49 (2.69)		7.28 (3.84)		0.17
Father's education	n=77		n=58		
Illiterate	24	31.2	7	12.1	
Elementary/reads and writes	40	51.9	23	39.7	
>Elementary	13	16.9	28	48.3	0.001
Mother's education	n=78		n=59		
Illiterate	29	39.7	10	16.9	
Elementary/reads and writes	32	33.8	25	42.3	
>Elementary	12	16.4	24	40.7	0.002
Father's occupation	n=76		n=60		
White collar	12	15.8	19	31.7	
Skilled blue collar	20	26.3	18	30.0	
Unskilled blue collar	36	47.4	13	21.7	
Military	2	2.6	7	11.7	
Unemployed	6	7.9	3	5.0	0.006
Mother involved in paid work	n=73		n=57		
Yes	10	13.7	8	14.0	
No	63	86.3	49	86.0	0.96
No. of siblings in same household	n=78		n=60		
<3	22	28.2	24	40.0	
3–5	28	35.9	22	36.7	
>5	28	35.9	14	23.3	0.20
Proportion of working siblings (%)	n=76		n=58		
0	12	15.8	27	46.6	
<50	28	36.8	13	22.4	
≥50	36	47.4	18	31.0	0.001

*Lebanese civil war (1975–90).

after some interruption. Hence, the above analysis was repeated limiting the comparison group to full-time students who never worked or stopped school. The findings were not different, so we elected to present the more diverse comparison group to ensure a bigger sample size. SPSS for Windows was used for data entry and analysis.

RESULTS

Status at work

Table 1 describes the work characteristics of the working children. Although more than 56% had been working for two or more years, 80% were still receiving less than half the minimum wage of about US\$50 (equivalent to 70 000 Lebanese pounds) per week. The salary was mostly used to meet the family's basic needs like house rent, food, or education. Interestingly, two thirds of the children reported high satisfaction with their jobs, yet 50% preferred to leave to another job or back to school. One third reported being punished or penalised for absence, and 42% reported frequent verbal or physical abuse by the employer.

Sociodemographic characteristics and habits

Working children were older in age and more frequently displaced during the civil war (1975–90) than the comparison group (table 2). Their parents were of lower education, their fathers more likely to be in unskilled blue collar jobs, and a high proportion of their siblings were already enrolled in the labour force.

When nutritional and social habits were compared, working children were found to have a lower daily intake of fruit and vegetables and a higher intake of coffee and sodas

(table 3). A higher proportion of working children was currently smoking or had already started dating girls.

Physical health

Working children tended to report more health complaints in general, but only a few were statistically significant after adjusting for age and social background (table 4). Working children reported skin (95% CI 1.34 to 8.97), eye (95% CI 1.08 to 6.35), and ear (95% CI 1.17 to 8.56) complaints within the last two weeks two to three times more frequently than non-working children. No differences were detected in the reporting of chronic illnesses or use of health services. However, working children were almost four times (95% CI 1.50 to 8.85) more exposed to injuries in the last 12 months. Close to half (47%) of the injured working children were injured at work, and 13 of them had two or more injuries. A total of 30 work injuries were reported. The top causes were sharp objects (n = 10), falls (n = 7), and flames or hot objects (n = 6), mostly leading to cuts (n = 13) and burns (n = 8). Half of the children injured at work reported days off work.

Table 5 compares the clinical and laboratory findings of the two groups of children. Skin and nail changes were detected at least seven times more among working children compared to the comparison group. In addition, working children had a higher mean blood lead concentration (13.5 µg/dl v 10.2 µg/dl), with a smaller proportion (21% v 53%) below the permissible level of 10 µg/dl.

Mental health

No differences between the two groups of children were noted regarding anxiety, hopelessness, and self-esteem, or

Table 3 Social and nutritional habits of working children (n=78) and their comparison group (n=60)

	Working children			Comparison group			p value
	Total	n	%	Total	n	%	
Social life and habits							
Ever tried smoking	77	19	24.7	60	7	11.7	0.05
Current smoker (≥ 1 cigarette a day)	77	7	9.1	60	0	0.0	0.04
Any of friends smoke	77	31	40.3	60	16	26.7	0.10
Any of siblings smoke	76	21	27.6	60	10	16.7	0.13
Father smokes	75	48	64.0	60	44	73.3	0.25
Mother smokes	77	40	51.9	60	34	56.7	0.58
Drinks alcohol	77	4	5.2	60	6	10.0	0.28
Ever alone on a date	77	25	32.5	58	9	15.5	0.03
No help at home in the morning	76	39	51.3	60	18	30.0	0.01
Helps with housework	77	30	39.0	60	22	36.7	0.78
Prepares own clothes	77	27	35.1	50	15	30.0	0.55
Leaves home after 8 am	66	33	50.0	40	15	37.5	0.21
Evening activities limited to TV	77	42	54.5	50	40	80.0	0.003
Nutritional habits							
Lunch mostly outside home	75	25	33.3	49	6	12.2	0.01
Dinner mostly outside home	76	7	9.2	49	1	2.0	0.11
Usually eats vegetables daily	76	44	57.9	59	48	81.4	0.004
Usually eats fruits daily	76	48	62.3	60	49	81.7	0.01
Cups of milk per day, mean (SD)	74	0.54 (0.71)		59	0.78 (0.79)		0.07
Cups of tea per day, mean (SD)	75	1.39 (1.08)		60	1.58 (1.01)		0.28
Cups of coffee per day, mean (SD)	75	0.25 (0.62)		59	0.08 (0.28)		0.05
Bottles of soda per day, mean (SD)	73	1.59 (1.07)		58	1.07 (0.53)		0.001

within the subcategories of the anxiety scale. The lie score was high in both (6.67 v 6.68). With regard to the drawings, working children drew themselves outside the house four times more frequently than the comparison group (adjusted OR 4.50, 95% CI 1.43 to 14.29). No differences between the two groups were noted in the complexity or general impression of the drawings. However, both groups of children were behind in their developmental age as reflected by the draw a person scale, with a greater deficit between the chronological and developmental ages for the working children (deficit of 8.0 v 6.5 years, $p = 0.001$).

When asked about their future perspectives and aspirations, close to 40% of both groups of children expected to travel when they grew older. Working children foresaw themselves working in a blue collar job 4.5 times more than

their comparison peers, and were more confident in attaining such a job later (adjusted OR 5.92).

DISCUSSION

The current study epitomises the challenges faced when the impact of work on the health of working children is examined. The results suggest that the health of children working in small industrial shops, in comparison to non-working children, is disadvantaged in key physical, mental, and social aspects. Although not striking, these findings are alarming when put in perspective. The exposure of working children to work is limited to a few years, which might be too short to show health effects. Moreover, both working and comparison non-working children come from similarly poor and disadvantaged communities, which dilutes differences

Table 4 Reported health problems and complaints of working children and their comparison group

	Working children		Comparison group		Age adjusted* OR (95% CI)	Fully adjusted* OR (95% CI)
	Total	n (%)	Total	n (%)		
Recent complaints (last 2 weeks)						
Any skin complaints	77	34 (44.2)	60	14 (23.3)	2.82 (1.29 to 6.17)	3.50 (1.15 to 10.65)
Any eye complaints	77	35 (45.5)	60	17 (28.3)	2.50 (1.16 to 5.37)	1.91 (0.72 to 5.04)
Any ear complaints	77	27 (35.1)	60	9 (15.0)	3.38 (1.39 to 8.21)	3.07 (1.07 to 8.85)
Any dizziness	77	31 (40.3)	60	23 (38.3)	0.94 (0.46 to 1.93)	1.13 (0.44 to 2.93)
Any headache	77	40 (51.9)	60	21 (35.0)	2.08 (1.01 to 4.27)	1.67 (0.68 to 4.17)
Any respiratory complaints	77	38 (49.4)	60	34 (56.7)	1.05 (0.50 to 6.29)	1.23 (0.47 to 3.23)
Any heart palpitations	77	9 (11.7)	60	4 (6.7)	1.78 (0.50 to 6.29)	2.60 (0.43 to 15.63)
Any gastrointestinal complaints	76	28 (36.8)	60	17 (28.3)	2.14 (0.96 to 4.81)	1.72 (0.62 to 4.72)
Any musculoskeletal complaints	77	40 (51.9)	60	16 (26.7)	3.05 (1.43 to 6.47)	2.81 (1.08 to 7.32)
Chronic illness						
Any history of a chronic illness	77	13 (16.9)	60	6 (10.0)	1.48 (0.51 to 4.27)	0.65 (0.15 to 2.82)
Health during last 12 months						
Any injury	77	47 (61.0)	60	20 (33.3)	2.78 (1.34 to 5.71)	3.98 (1.49 to 10.64)
Any visits to doctor	77	49 (63.6)	60	36 (60.0)	1.02 (0.49 to 2.86)	0.92 (0.35 to 2.43)
Any visits to emergency services	77	14 (18.2)	60	7 (11.9)	1.58 (0.58 to 4.33)	2.20 (0.55 to 8.77)
Any hospital admissions	77	18 (23.4)	59	9 (15.3)	1.61 (0.65 to 2.17)	1.57 (0.46 to 5.29)

OR, odds ratio; CI, confidence interval.

*OR (logistic regression) adjusted for age, or adjusted for age, years at school, education of father, education of mother, and occupation of father.

between the two groups. The inclusion of a second comparison group of schoolchildren from a better off neighbourhood could have helped distinguish specific work effects from non-specific socioeconomic status effects on health.

Physical health

Working children reported more acute health complaints in general, and skin, ear, and musculoskeletal complaints in particular. These complaints could be associated with their jobs, which required handling of chemicals and assuming awkward postures. Musculoskeletal complaints were also reported among children working in agriculture,^{19, 20} retail shops,²¹ or small industry.^{22, 23} The difference in complaints between the working and comparison groups, however, was not striking; a finding that concurs with a field investigation of 78 working children (49 boys) and 103 schoolchildren (60 boys), 10–14 years of age in Cairo.⁴ No statistically significant differences were reported between the two groups regarding fever, diarrhoea, cough, and difficulty breathing in the past two weeks, nor in the presence of a rash or skin condition, low back pain, muscle or joint pain, or eye infection or injury in the past year.⁴

The physical examination of working children, also reported by Graitcer and Lerer,⁴ documented an increased discoloration of skin and deformities of nails; both easily linked to unprotected handling of tools and chemicals, especially solvents. Musculoskeletal symptoms, eye irritation, and tinnitus are subjective complaints that are usually difficult to confirm clinically and hence differences between the groups may not be noted.

Nutritionally, the non-working group reported a higher consumption of vegetables, fruit, and milk compared to a higher consumption of caffeine in the working group. However, the distribution of haemoglobin and iron content was similar in both groups. Likewise, the height, weight, and body mass index, after adjusting for age, were comparable between the two groups, possibly because they have similar social and nutritional backgrounds. Graitcer and Lerer⁴ and Mitra²² found similar results; however, studies from Jordan reported stunting and wasting among the working children in comparison to non-working children²⁴ and siblings,²⁵ and

increased anaemia among working children in comparison to their siblings.²⁵

Increased Pb-B among working children, especially among those working in mechanics shops, confirms the findings of an earlier study that compared the Pb-B of adult blue collar to white collar workers in Beirut.²⁶ Increased Pb-B might be associated with exposure to lead from exhaust emissions since more than 90% of the vehicle fleet in Lebanon was operating on leaded gasoline at the time of the study. Moreover, workers in small industrial shops are in the habit of washing their greasy hands with gasoline and of eating at the workplace.

The higher occurrence of injuries among working children is consistent with the literature, regardless of the economic sector of child labour.^{27–30} This is attributed to lack of experience and incompatibility of the physical strength and measurements of the child with the used tools and performed tasks. A population based survey in Massachusetts reported that 24% of all adolescent injuries occurred at work.³¹ It is worth mentioning that working children in our study sustained many injuries on the roadways. We did not inquire whether this occurred while on duty, but it suggests that those children spent a lot of time on the street.

Social health

Work provides children with a sense of independence and an opportunity to spend long hours outside home. This might expose them to undesirable role models and to adverse habits such as smoking, drinking, and drug abuse,³² and endanger their ability to distinguish right from wrong.³³ The current study confirms these observations, with a higher proportion of working children smoking, consuming caffeine, and dating. The latter behaviour was not investigated in depth, but its presence would place children at a higher risk for exposure to sexually transmitted diseases.

Mental health

Research on the effect of work on the mental health status of children has been controversial. Steinberg and Dornbusch³⁴ reported that adolescents working for long hours are at higher risk for psychological distress, drug abuse, anxiety,

Table 5 Findings on physical examination and laboratory tests of working children and their comparison group

	Working children		Comparison group		Age adjusted* OR (95% CI) or β (SE)	Fully adjusted* OR (95% CI) or β (SE)
	Total	n (%)	Total	n (%)		
Physical examination						
Any skin problems	78	57 (73.1)	60	19 (31.7)	7.50 (3.32 to 16.96)	5.90 (2.15 to 16.22)
Any nail problems	78	47 (60.3)	60	9 (15.0)	8.79 (3.68 to 21.00)	6.83 (2.45 to 19.04)
Any eye problems	78	39 (50.0)	60	17 (28.3)	2.20 (1.05 to 4.59)	1.73 (0.68 to 4.40)
Any nose/nasal problems	78	9 (11.5)	60	1 (1.7)	6.62 (0.80 to 54.70)	1.02 (0.07 to 15.17)
Any musculoskeletal problems	78	5 (6.4)	60	2 (3.3)	1.44 (0.26 to 8.04)	0.44 (0.04 to 4.68)
Systolic blood pressure (mm Hg)†	66	113.3 (13.6)	53	108.3 (11.2)	β : 2.67 (2.23), p=0.23	β : 2.18 (2.65), p=0.41
Diastolic blood pressure (mm Hg)†	66	68.9 (8.2)	53	66.1 (9.3)	β : 1.24 (1.55), p=0.43	β : 3.43 (2.00), p=0.09
Height (cm)†	78	157.5 (12.3)	54	155.3 (14.2)	β : -2.16 (1.55), p=0.17	β : -0.06 (1.98), p=0.98
Weight (kg)†	78	50.1 (14.3)	60	46.9 (14.0)	β : -1.06 (2.09), p=0.61	β : 2.19 (2.70), p=0.42
Body mass index (kg/m ²)†	78	19.8 (3.8)	54	19.3 (3.3)	β : 0.62 (0.63), p=0.80	β : 1.00 (0.85), p=0.24
Laboratory findings						
Haemoglobin (g/l)†	77	130 (10.8)	59	130 (12)	β : 0.27 (0.17), p=0.12	β : 0.07 (0.22), p=0.74
Ferritin (μ g/l)†	77	31.3 (19.6)	59	27.5 (15.0)	β : 3.11 (3.17), p=0.33	β : 5.19 (4.01), p=0.20
Blood lead concentration (μ g/dl)†	77	13.5 (6.1)	59	10.2 (5.0)	β : 3.00 (1.00), p=0.003	β : 3.46 (1.29), p=0.008
Blood lead concentration (μ g/dl)	71		53			
<10		15 (21.1)		28 (52.8)	1.00 (Reference)	1.00 (Reference)
10–14		34 (47.9)		18 (34.0)	3.39 (1.40 to 8.21)	2.34 (0.74 to 7.36)
15–19		13 (18.3)		3 (5.7)	7.16 (1.72 to 29.74)	6.19 (0.75 to 51.15)
≥20		9 (12.7)		4 (7.5)	3.68 (0.95 to 14.31)	10.08 (1.31 to 77.39)

OR, odds ratio; CI, confidence interval; SE, standard error.

*OR (logistic regression) and β coefficient (linear regression) adjusted for age, or adjusted for age, years at school, education of father, education of mother, and occupation of father.

†Mean (standard deviation).

Table 6 Mental and social health of working children and their comparison group

	Working children n (%)	Comparison group n (%)	Age education adjusted* OR (95% CI) or β (SE)	Fully adjusted* OR (95% CI) or β (SE)
Scales				
Anxiety score (in quartiles)				
≤ 8	20 (26.7)	18 (38.3)	1.00 (Reference)	1.00 (Reference)
8–12	16 (21.3)	9 (19.1)	1.79 (0.52 to 6.14)	1.75 (0.41 to 7.49)
13–17	20 (26.7)	13 (27.7)	1.32 (0.42 to 4.18)	1.00 (0.23 to 4.40)
≥ 18	19 (25.3)	7 (14.9)	2.67 (1.02 to 10.63)	0.76 (0.08 to 7.03)
Mean (SD)	12.9 (5.8)	11.5 (5.5)	β : 0.50 (1.15), $p=0.66$	β : -0.64 (1.19), $p=0.60$
Hopelessness score (in quartiles)				
≤ 3.5	17 (25.0)	12 (24.5)	1.00 (Reference)	1.00 (Reference)
3.6–6.0	22 (32.4)	17 (34.7)	0.71 (0.23 to 2.13)	0.38 (0.09 to 1.65)
6.1–8.0	14 (20.6)	14 (28.6)	0.88 (0.23 to 3.41)	0.56 (0.09 to 3.50)
> 8.0	15 (22.1)	6 (12.2)	0.53 (0.10 to 2.77)	0.33 (0.05 to 2.48)
Mean (SD)	6.1 (3.0)	5.6 (2.8)	β : 0.06 (0.63), $p=0.91$	β : -0.06 (0.73), $p=0.93$
Self-esteem score (in quartiles)				
≤ 14	16 (23.5)	7 (14.0)	1.30 (0.32 to 5.38)	1.18 (0.26 to 5.40)
15–17	15 (22.1)	13 (26.0)	0.60 (0.16 to 2.27)	0.46 (0.10 to 2.15)
18–20	22 (32.4)	14 (28.0)	1.05 (0.28 to 3.92)	1.01 (0.21 to 4.93)
> 20	15 (22.1)	16 (32.0)	1.00 (Reference)	1.00 (Reference)
Mean (SD)	17.5 (4.1)	18.5 (3.9)	β : 0.04 (0.85), $p=0.97$	β : 0.48 (0.88), $p=0.59$
Child's drawing				
Richness (complexity) of drawing				
Low	51 (68.0)	24 (51.1)	1.00 (Reference)	1.00 (Reference)
Average/high	12 (16.0)	13 (27.7)	0.60 (0.25 to 1.42)	0.98 (0.17 to 2.76)
Child drew himself inside house				
Yes	41 (53.9)	42 (77.8)	1.00 (Reference)	1.00 (Reference)
No	35 (46.1)	12 (22.2)	4.20 (1.61 to 10.99)	4.50 (1.43 to 14.29)
General impression				
Negative	55 (71.4)	39 (67.2)	1.00 (Reference)	1.00 (Reference)
Average/positive	22 (28.6)	19 (32.8)	0.81 (0.35 to 1.85)	0.58 (0.21 to 1.62)
Loss in mental development (years)†				
Mean (SD)	8.0 (2.1)	6.5 (2.1)	B: 1.68 (0.37)‡, $p=0.001$	B: 1.72 (0.43)§, $p=0.001$
Future dreams				
Job when adult				
White collar	8 (10.5)	24 (40.7)	1.00 (Reference)	1.00 (Reference)
Blue collar	68 (89.5)	35 (59.3)	6.02 (2.11 to 17.20)	4.53 (1.33 to 15.48)
Confidence in attaining job				
Not sure	16 (21.3)	26 (45.6)	1.00 (Reference)	1.00 (Reference)
Sure	59 (78.7)	31 (54.4)	3.85 (1.60 to 9.26)	5.92 (2.06 to 16.95)
Expects to travel for work				
No	46 (60.5)	35 (61.4)	1.00 (Reference)	1.00 (Reference)
Yes	30 (39.5)	22 (38.6)	0.65 (0.28 to 1.53)	0.94 (0.35 to 2.51)

OR, odds ratio; CI, confidence interval; SD, standard deviation; SE, standard error.

*OR (logistic regression) and β coefficient (linear regression) adjusted for age and years at school, or adjusted for age, years at school, education of father, education of mother, and occupation of father; except for loss in mental development.

†Loss = chronological age – mental age.

‡Adjusted only for years at school.

§Adjusted for years at school, education of father, education of mother, and occupation of father.

depression, fatigue, and insomnia. Delinquency, antisocial behaviour, reduced self-esteem, poor group relationships, poor work orientation, and autonomy from parents were also mentioned as developmental long term costs of early employment.³⁵ In contrast, many argue for the potential benefit of early work. Work can enhance the development of a sense of responsibility and discipline, help in the acquisition of new skills, and provide opportunity to explore new career goals and achieve economic advances.^{3–36} It may also teach the child the value of money and provide him/her with valuable role models.³⁷

The working children in our study function in a more challenged social context. For these children, work is neither an option nor a luxury. Instead, they are forced by a poor educational system and hard living needs into exploitative work environments where they could be abused.^{33–38} Our working children were paid much less than the minimal legal wage and 42% reported frequent physical or verbal abuse. More than one third reported dissatisfaction with their jobs and almost 50% preferred to leave. Consequently, we expected that working children would report higher anxiety, more hopelessness, and lower self-esteem than non-working children.

This assumption was not supported by the study findings, where no differences were observed on any of the three scales. However, interesting observations were noted when children were asked to draw themselves at home. A greater number of working children drew themselves outside the house, possibly revealing a feeling of not belonging, and they had wider developmental deficit. Nevertheless, both groups of children drew poor pictures with minimal numbers of elements and exhibited a considerable loss in mental development. This shows that all children, working or non-working, were quite disadvantaged and that schoolchildren were not particularly benefiting from being at school. Schools in poor neighbourhoods are poorly staffed and budgeted, with a high dropout rate. In other words, many of these schoolchildren may perceive themselves as temporary students and expect to join the labour force at any time. Interestingly, 59.3% of the non-working children foresaw themselves in a blue collar job in the future. This concurs with earlier research in India³⁹ and Latin America.³⁸ Schools meant boredom for many children,³⁹ and the traditional orientation of the educational system assigned them to an inferior social position.³⁸ Consequently, children were ready to leave school and go to work³⁹ where

they develop an independent image of themselves as “proto-adults”.³⁸ In view of an irrelevant and oppressive education, working children feel needed, useful, and contributing to their families.⁴⁰

Another explanation for the lack of difference on any of the mental health scales might be the limitations in the instruments or response sets among subjects. Perrin and Last,⁴¹ for example, state that boys tend to under-report internalised symptoms of anxiety. This was reflected in the high score on the lie items within the anxiety scale for both groups, indicating a high level of defensiveness.¹³

Study conclusions and limitations

While working children performed worse than the comparison group on several physical, social, and mental health parameters, the differences were less than expected. If true, this finding could probably be related to the short period of exposure of working children to hazards at work and the delay in the onset of many health problems for years after exposure. Several methodological issues related to the cross-sectional study design, sample size, and selection of study subjects may have also diluted the differences and biased associations towards the null.

Children who are currently working in physically demanding jobs might have been selected to work there because of their good health status or could have left the job because of injury or illness (a healthy working children effect). Moreover, the study's small sample size, reflected in the reported wide confidence intervals, could have limited its power to detect differences.

Selection biases are also of concern. Almost 12% of the working children worked in relatively less hazardous workplaces (electric work, hairdressing, butchery), while the comparison group included children who currently or previously worked a few hours a week. The study findings, however, did not change when working children were compared to the sub-sample of “pure” schoolchildren. Moreover, the comparison group was recruited on a volunteer basis with no information on the pool of schoolchildren out of which they were drawn, precluding any assessment of its representativeness. It is possible that the comparison group may have been exposed to hazards outside the workplace, such as involvement in household chores or engagement in street activities, but this was not likely in our study sample. On the contrary, this group reported less “risky” social behaviour with less outings, more time spent at home, and no difference in contribution to housework (tables 2 and 3).

In contrast, every effort was made to reduce interviewer bias and the potential to overestimate the association between work and health outcomes. Interviewers, both physicians, and the analyst of the drawings were blinded to the work status of the child. Nevertheless, it is worth noting that using logistic regression to estimate prevalence odds ratios in cross sectional studies has been reported to overestimate the true associations.⁴²

Implications

The study findings suggest aspects of child labour that warrant intervention. The working children carry the burden of supporting their families and in return are underpaid and experience frequent physical and verbal abuse. The real challenge remains a societal commitment to protect children, control child labour, and provide children with proper education and technical training. Short of abolishing child labour in hazardous occupations, interventions could include the improvement in work environment and the relationship between the working child and the employer, the reduction of work related injuries, the provision of after-work social and educational activities, and the provision of accessible

health care centres that can routinely evaluate and manage any health complaints reported by the children. The possibility of working children adopting risky social and health behaviours should be addressed through focused awareness campaigns. Further, tomorrow's school dropouts are the next groups of working children, and those should be identified early and channelled into controlled and safe technical training programmes or sites. With regard to the causal association between work and health of children, prospective studies should be conducted to allow long term observation of the health of children as soon as they join the labour force. It is possible that the ill effects of working as a child could be best measured when the child is an adult. Studies that examine early predictors of health effects, such as neurobehavioural performance,⁴³ could also fill a gap.

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(1) b; (2) c; (3) a; (4) a; (5) d