



Relationship between perceived stress, health-related quality of life and physiological dysregulations among Hong Kong parents from low-income families

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Introduction

- Low-income families face increased exposure to stressors including material hardships, poorer social support and violence, which contributes to family disharmony and children's behavioural problems, and subsequently impacts on the physical and mental health-related quality of life (HRQOL) of both parents and their children.
- Long-term activation of the stress-response system can also lead to cumulative physiological dysregulations, predisposing an individual to cardiovascular diseases, depression and death.
- This study explores how subjectively perceived stress correlates with objectively measured HRQOL and physiological dysregulations among low-income parents in Hong Kong.

Methods

Design: Prospective study with 3 assessments (at baseline, 12- and 24- months) between 2016 and 2019

Subjects: 217 primary parents from two less affluent communities in Hong Kong

Outcome measures:

1. **Perceived stress level** – measured by the Depression-Anxiety-Stress Scale (DASS); a stress subscale score of ≥ 15 identifies the presence of significant parental stress
2. **HRQOL** – measured using the Short-Form-12-item (version 2) Health Survey and aggregated into a physical component summary (PCS) and mental component summary (MCS); higher score indicates better HRQOL
3. **Physiological dysregulations** – captured with the Cardio-Metabolic Dysregulation Index (CMDI) calculated as a simple count of the total number of cardiovascular and metabolic biomarkers above normal levels (**Table 1**); a higher score reflects more physiological dysregulations

Table 1. Biomarkers and Cut-offs for calculation CMDI (ranges from 0-6)

Physiological system	Representative biomarkers	Cut-offs
Anthropometric	Waist-to-hip ratio	≥ 0.8 in women, ≥ 0.9 in men
Lipid metabolism	Total cholesterol to HDL-C ratio	> 4.0 in women; > 4.5 in men
	Triglycerides	≥ 1.7 mmol/L
Glucose metabolism	Fasting glucose	≥ 5.6 mmol/L
Cardiovascular	Resting systolic blood pressure	≥ 130 mmHg
	Resting diastolic blood pressure	≥ 80 mmHg

Confounding factors: age, gender, education level, employment status, household income, marital status, history of intimate partner abuse, family harmony, parenting style, neighbourhood cohesion, medical history of the parent and lifestyle factors

Analysis: A linear mixed effect model adjusted for parent's characteristics and time to determine the associations between perceived stress, HRQOL and CMDI

Discussions

- Perceived stress was significantly associated with worse physical and mental HRQOL, but not physiological dysregulations. Nevertheless, physical HRQOL was inversely associated with CMDI.
- Our findings suggested a **possible pathway of how stress could adversely affect physical health of an individual.**

Results

38 parents (17.5%) perceived significant level of stress, who scored 13.4% and 31.4% lower in their physical and mental HRQOL respectively, but had similar CMDI compared to parents who did not experience stress (**Table 2**).

Table 2. Characteristics of the 217 parents at baseline, 12- and 24-month

	Baseline (n=217)	12-month (n=175)	24-month (n=184)
Socio-Demographic			
Age, y	42.4 \pm 6.2		NA
Gender			
Female		91.7% (199)	
Household income			
< 50% HK median [†]		33.2% (69)	
50% - <75% HK median [†]		24.0% (50)	
$\geq 75%$ HK median [†]		42.8% (89)	
Education level			
No education/primary school	32.5% (33)		
Secondary school	75.2% (155)		
Tertiary or above	8.7% (18)		
Currently employed	39.8% (78)		
Single-parent family	22.3% (45)		NA
Intimate partner abuse	13.2% (28)		
Smoker, current	16.9% (36)		
Alcohol use	17.4% (37)		
Comorbidities			
Any physical disease	34.9% (75)	30.5% (46)	36.8% (53)
Any mental disease	8.4% (18)	6.6% (10)	12.5% (18)
PHQ-9 (full score=27)			
Score	3.0 \pm 3.7	NA	2.9 \pm 4.0
Depression (PHQ-9 score \geq 10)	5.9% (12)	NA	7.6% (13)
Core Outcome Measures			
DASS (full score=42)			
Stress score	7.3 \pm 8.2	7.6 \pm 9.0	7.2 \pm 8.2
Depression score	4.4 \pm 6.5	4.1 \pm 6.9	4.1 \pm 6.2
Anxiety score	5.1 \pm 6.5	4.9 \pm 6.7	4.8 \pm 5.9
SF-12v2 (subscale full score=100)			
Physical component summary	47.9 \pm 8.9	48.1 \pm 9.5	46.6 \pm 9.2
Mental component summary	52.4 \pm 11.1	52.9 \pm 11.0	52.7 \pm 11.3
Physiological markers of health			
Systolic blood pressure, mmHg	111.8 \pm 15.0	113.0 \pm 15.4	110.6 \pm 15.3
Diastolic blood pressure, mmHg	69.0 \pm 9.7	69.9 \pm 10.8	70.5 \pm 11.9
Fasting blood glucose, mmol/L	4.99 \pm 0.94	5.14 \pm 0.99	4.98 \pm 0.64
Total cholesterol-to-HDL-C ratio	3.39 \pm 0.95	3.38 \pm 0.92	3.50 \pm 1.07
Triglycerides, mg/L	1.09 \pm 0.82	1.07 \pm 0.60	1.11 \pm 0.80
Waist-to-hip ratio	0.84 \pm 0.08	0.85 \pm 0.07	0.85 \pm 0.07
Cardio-metabolic dysregulation index (0-6)	1.29 \pm 1.26	1.43 \pm 1.27	1.52 \pm 1.21
BMI, kg/m ²	24.5 \pm 3.6	24.6 \pm 3.5	24.5 \pm 3.4
Family & Neighbourhood Environment			
FHS-5 score (full score=25)	19.4 \pm 3.5	NA	19.3 \pm 3.6
PSDQ score (full score=75)	51.7 \pm 10.1	NA	52.5 \pm 11.7
NCES score (full score=50)	32.6 \pm 7.7	NA	32.1 \pm 6.6
CTSPC			
Physical assault subscale score (full score=54)	4.0 \pm 5.9	NA	2.7 \pm 5.2
Neglect subscale score (full score=30)	2.3 \pm 3.5	NA	2.7 \pm 3.4

BMI, body mass index; CTSPC, Conflict Tactics Scale for Parent and Child; DASS, Depression Anxiety Stress Scales; FHS-5, Family Harmony Scale – 5; HDL-C, High-density lipoprotein-cholesterol; NA, Not applicable; NCES, Neighbourhood Collective Efficacy Scale; PHQ-9, Patient Health Questionnaire – 9; PSDQ, Parenting Styles and Dimensions Questionnaire; SD, Standard Deviation; SF-12v2, 12-item Short-form Health Survey Version 2.0
[†] Hong Kong household median income = HK\$ 25,000 in 2016

After adjustment for confounders, significant negative associations were found between perceived stress level and both physical (-0.30, $p < 0.01$) and mental HRQOL (-0.64, $p < 0.01$), as well as between physical HRQOL and CMDI (-0.15, $p < 0.01$) (**Figure 1**). Conversely, stress was not associated with CMDI, and time factor was not associated with any outcomes.

Figure 1. Linear mixed effect model of the relationship between parental stress, health-related quality of life and cardio-metabolic dysregulation index

