Article

Adolescents' Psychosomatic Symptoms and Family Affluence in the Czech Republic: Based on National Evidence

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Abstract: Family affluence associates with adolescents' psychosomatic symptoms. However, the strength of the association varies across countries. As there was no related national evidence in the Czech Republic, this study aimed to investigate the relationship between family affluence and adolescents' psychosomatic symptoms. The current research adopted the data from a national survey Health Behaviours of School-Aged Children (HBSC). 12166 observations were included in the binary-choice analysis. It was found that low family affluence background was a risk factor for adolescents' psychosomatic health. Compared to boys, girls were more likely to demonstrate psychosomatic symptoms. Furthermore, parent-adolescent communications might mediate the relationship between family affluence and psychosomatic complaints. The results suggest health inequity for adolescents from low-income families. Moreover, I also advocate related interventions aiming to improve parent-adolescent communication quality to decrease poor adolescents' psychosomatic health risks.

Keywords: Family Affluence; Psychosomatic Symptoms; Adolescent; Parent-Adolescent Communication; Health Inequality

1. Introduction

Psychosomatic symptoms, whose other name is subjective health complaints, refer to the subjective-reported health symptoms (e.g., headache, backache, nervousness, and sleep difficulties) experienced by individuals with or without a defined diagnosis. These symptoms are not only indicators for medical conditions but also highly correlated to well-being [1-4]. In detail, except for the symptoms implying some certain physical diseases, such as heart disease or cancer [3, 4], psychosomatic symptoms reflect mental health. For instance, it was found psychosomatic symptoms are related to psychiatric disorders, including depression, anxiety, and somatoform disorder [5-7]. For adolescents, scientists noted the consistent evidence over decades that most self-reported psychosomatic symptoms increase with age, and compared to boys, girls show more of the kind of subjective symptoms [8-11]. And it is worth noticing that there is an increasing trend of psychosomatic complaints among adolescents in high-income countries. Likewise, the increasing tendency interacts with gender and age. In detail, female adolescents demonstrate a greater deteriorating trend over time compared to younger ones and males [12,13].

It has been known for a long time that there are both individual and social factors underlying psychosomatic symptoms. Besides the mentioned personal facets like gender and age, the social factors have been proven to be linked to psychosomatic complaints. According to the ecological system theory [14], the environment where the adolescent is living has a direct and significant impact on the adolescent's affective-cognitive and behavioral development. One of the main direct environments is family. Ample studies

provided evidences that factors at the family level, including family socioeconomic status [15,16], family educational environment [17], and the quality of parent-child relationship [18], may cause adolescent's psychosomatic symptoms.

Particularly, among family factors, family wealth is a significant demographic contributor to children's health, including physical and mental aspects. Notably, psychosomatic symptoms can reflect both aspects. The social-epidemic theory of Ben-Shlomo and Kuh suggested that the poorer position of family socioeconomic status (SES) increases the risk of exposure to causal factors of health problems [19]. And it is worth noticing that, as youth is a critical development period, such negative exposures not only are associated with adolescents' current health outcomes but also have accumulated and long-term effects on their adulthood health. Regarding the physical health aspect, scientists observed a consistent correlation between family SES environment and health related outcomes crossing regions [20-22]. Likewise, practically, family wealth links to mental health. In Norway, it was found the low level of family income predicts children's psychological problems [23]. The similar phenomenon exists in North America and East Asia too [24, 25].

Even though there were already many studies focusing on the relationship between family affluence and adolescents' psychosomatic symptoms, the strength of the relation was varied [26, 27]. The reasons for the different conclusions might be inconsistent measurements of family affluence (adolescents' perceived family affluence or parent-report family wealth) and the varieties of contexts of the countries [26, 28]. Some scholars suggested that compared to using parental indicators to measure family wealth (such as education level and employment status), children's subjective feeling of family's affluence is a more sensitive variable when testing family affluence's effect on children [26, 29]. These previous researches indicated that adolescents' perceived family affluence is a more suitable index of family affluence when investigating the association of family affluence and adolescents' psychosomatic health for further studies. Our study planned to adopt this more sensitive index to depict family affluence's effects.

Meanwhile, the social inequalities in the Czech Republic are limited. According to the Europe-wide Report, Czech is in the economic growth stage, and at the same time, the Gini coefficient (0.25) was the third-lowest among OECD countries in 2018, which means income inequality was not obviousS, [30]. In addition, regarding the aspect of health, the health insurance system provides universal coverage, which guarantees the citizen's essential medical resources support, including psychiatric clinic services. Thus, theoretically, in Czech, the inequality of family affluence does not have very significant negative effects on adolescents' psychosomatic health. However, as poor family economic status is still a risk factor for youth's health outcomes, it is necessary to investigate the strength of family affluence-adolescents' health relationship.

Nonetheless, very few studies probed the associations of family affluence and adolescents' psychosomatic symptoms in the Czech Republic. Moreover, the pathway of the influences of family affluence and other family related variables on adolescents' psychosomatic health remains unclear, it is necessary to conduct comprehensive studies about the associations of family-level factors and adolescents' health (including self-reported psychosomatic symptoms) based on national data [31].

Therefore, the current study aimed to explore the relationship between family affluence and adolescents' psychosomatic complaints by using the data from Health Behaviour in School-aged Children (HBSC) project, to provide a national perspective. Also, this study included the covariate of "communications with parents" to examine if family affluence can possibly impact children's psychosomatic complaints through parent-adolescent communications.

2. Materials and Methods

2.1. Data Resources

The study adopted the newest HBSC data in the Czech Republic, which was collected from 2017 to 2018. The targeted sample was adolescents in school at 11/13/15-year-old country specific grade. HBSC is a cross-national survey initiated by World Health Organization, utilizing standard two-stage sampling and data collection methods, which focuses on adolescents' self-reported health, wellbeing, and their social context [32]. HBSC-2018 of the Czech Republic included 16065 participants in the beginning, and it received 13377 effective responses [33].

2.2. Measurements

Family Affluence: Family Affluence Scale (FAS) was used to measure adolescents' perception of family affluence. The instrument included six items regarding perceived property and lifestyles: the number of bedrooms, cars, computers, dishwashers, bathrooms, and holidays abroad. As recommended by the HBSC team, the scores can identify adolescents' family affluence into the following three categories: lowest 20% (low affluence); middle 60% (medium affluence); and highest 20% (high affluence) [34]. This instrument has been proven with good validity in the Czech Republic [35].

Psychosomatic symptoms: HBSC-Symptom Checklist (HBSC-SCL) measured individuals' self-reported psychosomatic symptoms. The checklist aimed to ask the frequency of following each symptom: headache, stomach ache, backache, feeling low, irritability or bad temper, feeling nervous, difficulties in getting to sleep, and feeling dizzy. As suggested by diagnosis criteria accepted by many previous research studies, respondents with recurrent multiple health symptoms (two or more symptoms at least weekly) are considered as displaying noticeable subjective psychosomatic symptoms [16,27]. HBSC-SCL priorly manifested good reliability and validity in Europe and North America [36,37]. This study coded adolescents as "with psychosomatic symptoms" or "without psychosomatic symptoms" based on the criteria.

Demographic information: The demographic variables that needed to be controlled were gender, country-specific grade (in another word, age), and the city size of living area. In them, city sizes were assigned into four categories: "50K+ inhabitants", "10K-49.9K inhabitants", "2K-9.9K inhabitants", and "<2K inhabitants". Country-specific grade levels were "11-year-old grade", "13-year-old grade", and "15-year-old grade".

Covariates of "talks to parents": two 5-point-Likert questions were utilized to estimate the quality of parent-child communications: "How easy is it for you to talk to your father about things really bothering you" and "How easy is it for you to talk to your mother about things really bothering you". In detail, participants responded from 1 to 5 where 1 referred to "very easy", 2 represented "easy", 3 was "difficult", 4 meant "very difficult" and 5 was "don't have or see".

2.3. Statistical Analysis

First, the study examined the missing value pattern by the Test of Little's Missing Completely at Random. The results showed that for items in the key independent variable (family affluence), the missing pattern was not completely random (p<0.01). And it was the same missing pattern for the dependent variable (psychosomatic symptoms) (p<0.01). Thus, multiple imputations or other imputation methods could not be used to impute missing values. Therefore, the current study did not include cases with missing values. Second, it was supposed to do descriptive statistics to demonstrate the sample feature. Also, the Chi-Square test was conducted to see the associations between independent variables and the diagnosis of adolescents' psychosomatic symptoms. Finally, this research adopted the Binary-Choice Probit Model to measure the effect of family affluence on adolescents' psychosomatic symptoms. The model was specified as the following:

$$\ln(P(D=1)/1-P(D=1))=\ln(\text{Odds Ratio})= \beta 0+\beta 1X1+\beta 2X2+...+\beta nXn.$$

In this model, P(D=1) referred to the probability of dependent variable psychosomatic symptoms being confirmed. The odds ratio, in the current case, was the rate of probability of having psychosomatic symptoms to the probability of not having psychosomatic symptoms. The variable X indicated each independent variable. In this case, demographic data were controlled variables. Family affluence was the key independent variable. "Talks to mother" and "talks to father" were covariates.

3. Results

3.1. Sample Characteristics

The sample's demographic information was reported in Table 1. The results suggested among all family affluence backgrounds, there were more adolescents reporting noticeable psychosomatic symptoms. However, the difference in the portions of normal adolescents and those with psychosomatic symptoms became more slight along with the family affluence (Table 1). The Chi-square tests indicated all demographic variables and family affluence impacted children's psychosomatic symptoms.

Table 1. The summary of descriptive statistics for sample characteristics

Variable	Whole sample (N=12166) n(%)	Sample with PSS (N=7271) n(%)	Sample without PSS (N=4895) n(%)	Chi-square test χ^2
Gender				228.528***
Male	6117(50.3)	3247(44.7)	2870(58.6)	
Female	6049(49.7)	4024(55.3)	2025(41.4)	
Grade				140.738***
Special grade for 11-year old	3736(30.7)	1943(26.7)	1793(36.6)	
Special grade for 13-year old	4285(35.2)	2654(36.5)	1631(33.3)	
Special grade for 15-year old	4145(34.1)	2674(36.8)	1471(30.1)	
City size				19.402***
50+ inhabitants	2799(23.0)	1720(23.7)	1079(22.0)	
10K-49.9K	3364(27.7)	2062(28.4)	1302(26.6)	
2K-9.9K	2678(22.0)	1603(22.0)	1075(22.0)	
<2K	3325(27.3)	1886(25.9)	1439(29.4)	
Class of Family Affluence				13.322***
Low affluence	3126(25.7)	1954(26.9)	1172(23.9)	
Medium affluence	7096(58.3)	4166(59.9)	2930(57.3)	
High affluence	1944(16.0)	1151(16.2)	793(15.8)	

Note: PSS referred to psychosomatic symptoms. In Chi-square test column, p***<0.01.

3.2. Binary-Choice Model

Odds ratios were reported in Table 2, where the model represented in column (1) was entered into controlling variables, including gender, grade, and the city size of the living area. And the model represented in column (2) included the family affluence additionally after adjusting the controlling factors.

Table 2. Binary-Choice Model describing effects of individual-level factors and family-level factors on children's psychosomatic symptoms.

Variables	Psychosomatic symptoms		
	(1) Odds Ratio	(2) Odds Ratio	(3) Odds Ratio
Gender (base group: male)			
Female	1.822***	1.815***	1.645***
Grade (base group: 11-year old)			
Special grade for 13-year old	1.558***	1.561***	1.367***
Special grade for 15-year old	1.756***	1.756***	1.421***
City size (base group: 50+ inhabitants)			
10K-49.9K	0.951	0.952	0.957
2K-9.9K	0.943	0.947	0.946
<2K	0.804***	0.812***	0.813***
Class of Family Affluence			
(base group: medium affluence)			
Low affluence		1.115***	1.055
High affluence		1.039	1.100
Covariates			
Talk to father			1.287***
Talk to mother			1.253***
R²	0.047	0.048	0.093
Observations	12166	12166	11386

Note: $p^{***}<0.01$, $p^{**}<0.05$

In the beginning, this binary-choice model indicated that compared to boys, girls were more likely to demonstrate psychosomatic symptoms. And the results suggested that more psychosomatic symptoms were manifested as age increased. In comparison with the adolescents living in the largest-size cities (with a population over 50K), those living in the smallest-size cities (with a population below 2K) were 19.6% (p<0.01) less likely to show psychosomatic symptoms. Most importantly, we found that after controlling the demographic factors, compared to adolescents from families with medium affluence, adolescents from low-affluence families were 11.5% (p<0.01) more likely to face psychosomatic symptoms risk. At the confidence level of 90%, compared to low-family-affluence adolescents, those living in high-affluence families were 10.0% possibly less to experience psychosomatic symptoms. The difference in psychosomatic symptoms probit between medium family affluence and high affluence was not significant (*p*=0.48). Thus, there was no inequality in psychosomatic health between the medium-affluence and high-affluence families. In conclusion, low family affluence was a risk factor of adolescents' psychosomatic health.

Next, we computed a new model by additionally including the covariates of adolescents' talks to their parents (see column (3) in Table 2). There were 780 participants with the missing values of "talks to parents". However, the missing rate was acceptable, and it was feasible to use the complete data and not to do imputation [38]. It was obvious that after adding the covariates of "talks to parents," even though the statistical significance still existed, the effects of gender and grade on psychosomatic symptoms decreased. The effect of city size was barely influenced. It was worth noting that in the new model, the effects of family affluence on the probability of psychosomatic symptoms became no longer significant. These findings implied that adolescents' communication with parents was the possible mediator in the relationships between family affluence and psychosomatic problems. To confirm the hypothesis, I continued to conduct the mediation

analysis. The results suggested that "talks to parents" completely mediated the relationship between family affluence and adolescents' psychosomatic symptom (see Table 3).

Table 3. The mediation analysis suggesting the complete mediator role of "talks to parents".

Path Type	Effect	Estimate	SE	β	z	p
Indirect	class_family affluence1 ⇒ talk to father ⇒ diagnosis_PS	-0.02	0.00	-0.02	-10.04	< .001
	class_family affluence1 ⇒ talk to mother ⇒ diagnosis_PS	0.00	0.00	0.00	-4.32	< .001
	class_family affluence2 ⇒ talk to father ⇒ diagnosis_PS	-0.03	0.00	-0.02	-10.56	< .001
	class_family affluence2 ⇒ talk to mother ⇒ diagnosis_PS	-0.01	0.00	-0.01	-5.47	< .001
Direct	class_family affluence1 ⇒ diagnosis_PS	-0.01	0.01	-0.01	-1.30	0.20
	class_family affluence2 ⇒ diagnosis_PS	0.01	0.01	0.01	0.67	0.50
Total	class_family affluence1 ⇒ diagnosis_PS	-0.04	0.01	-0.04	-3.61	< .001
	class_family affluence2 ⇒ diagnosis_PS	-0.03	0.01	-0.02	-2.33	0.02

Note: (1)Betas are completely standardized effect sizes; (2) class_family affluence1 = middle SES - low SES, class_family affluence2 = upper SES - low SES; (3) diagnosis_PS referred to the diagnosis of psychosomatic symptoms.

4. Discussions

The primary goal of this research was to investigate the association between family affluence and adolescents' psychosomatic symptoms. The binary-choice model suggested that after controlling demographic confounds, low family affluence was associated with adolescents' psychosomatic symptoms. This model also suggested that among the controlling variables, gender and country-specific grade were correlated to adolescents' psychosomatic symptoms. The city size of the living area had a much slighter impact. Furthermore, it found the covariates of "talks to parents" might be the underlying mediator between family affluence and adolescents' psychosomatic symptoms.

According to the findings, low family affluence is a risk factor for adolescents' psychosomatic health in the Czech Republic. It has been known for the long term that socioeconomic inequality is associated with adolescents' health, no matter the physical or mental aspect. As described in the introduction part, Ben-Shlomo and Kuh's theory suggested youth from poorer families are more likely to exposure to health risks [19]. For instance, children and adolescents with higher-educated parents face less stressful life situations and eventually show better mental health conditions [39]. Another theory that may explain the finding is, due to the limitations of educational level and income, poor-SES people's tendency of health risk behaviors is higher than high-SES individuals [40]. It was found that lower parental education and family SES predicts adolescents' substance use, which is highly correlated to psychosomatic symptoms [41]. In addition, a classical psychiatric theory argued that in some cases, psychiatry disorder is a result of high frequented stress caused by socioeconomic deprivation [42]. A longitudinal research confirmed that low childhood socioeconomic can predict adulthood mental health problems [43]. Besides, according to a systematic review work based on 52 evidence-based studies from 1990 to 2011, it was noted the low level of socioeconomic is associated with children's and adolescents' mental-health-related disorders [44]. Interestingly, in the Czech Republic, we did not find the adolescents' psychosomatic health inequality between middle-affluence and high-affluence families. This result suggests Czech is a relatively socially equal society in health. This finding is consistent with European-wide Report, which indicated Czech public health insurance system benefits citizens' health outcomes by providing universal essential medical services [30]. However, we cannot underestimate the poor family economic status's negative effects on adolescents' health.

The finding of the effects of gender and grade is consistent with previous researches. An old epidemiological survey study conducted in Israel pointed out that the prevalence of psychosomatic symptoms is higher among girls instead of boys [9]. In fact, many related researches since 2000 echoed this old evidence [45-47]. Similarly, both old and recent reports noted psychosomatic symptoms increases with age [8, 48].

The results align with ample previous studies regarding the role of adolescents' talks to parents. In this study, it is clear that fewer and poorer-quality communication with parents links to a higher risk of psychosomatic symptoms. The previous study has already suggested parental support as one of the significant social support resources has direct and indirect impacts on adolescents' well-being and health [49, 50]. Moreover, our study suggests the latent mediator role of communications with parents in the relation between family affluence and psychosomatic symptoms. A previous theoretical mediation model suggested interpersonal relationship mediates the association of SES and self-reported health [50]. Based on ecological theory, the parent-adolescent relationship is a type of critical interpersonal relationship for adolescents, which can directly impact adolescents' development. Actually, an intervention program empirically proved that the improvement of parent-adolescent communication quality decreases the psychological symptoms for both parents and adolescents [51].

I acknowledge some limitations of this study. First, this study diagnosed adolescents' psychosomatic symptoms based on the previous criteria, but there was no empirical evidence to measure the validity of the psychosomatic-symptom checklist in the Czech Republic. Therefore, I suggest further studies focus on the construct and criterion validity of the measurement HBCS-Symptoms checklist for Czech adolescents. Second, observations in the study were from 11 years old to 15 years old, which meant the research only focused on the early adolescents, and the late adolescents were missing. The study recommends researchers expand the sample to late adolescents in the future.

Conclusions

The current study suggests that poor SES condition is a risk factor for adolescents' psychosomatic health. In addition, the findings underscore the importance of interventions aiming to improve parent-adolescent communication to reduce the risk of psychosomatic problems.

Interests Statement

The authors have declared that no competing interests exist.

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