



Parental Objective, Subjective, and Contextual Socioeconomic Status and Children's Mental Health in Iran: The Mediating Effect of the Subjective Measure

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Abstract

Background: Children from lower socioeconomic status (SES) households are at greater risk for mental illnesses. Socioeconomic status has different dimensions: Objective SES, subjective SES, and contextual SES. Evidence suggests that subjective SES partially mediates the impact of objective SES on mental health. However, these hypotheses have not been tested in Middle Eastern cultures, including Iran.

Objectives: We aimed to investigate: (1) if there is an association between parental objective, subjective, and contextual SES measures and their children's mental health in a network of general practitioners' clients, (2) if such an association exists for objective or contextual indicators, is it partially or fully mediated through subjective measure? and (3) if such an association exists, is it affected by children's age?

Methods: We assessed 1,103 parent-child pairs in the general practitioners' network of clients. The child's mental health was assessed by the Strengths and Difficulties Questionnaire (SDQ) and parental objective SES by education level, subjective SES by the MacArthur scale, and contextual SES by the household neighborhood. Linear regression models were used to investigate the impact of different SES measures on the SDQ score both bivariate and adjusted for each other. A mediation analysis was performed for objective SES' indirect effect on SDQ score through subjective SES.

Results: We found a significant association between objective and subjective SES and the SDQ score, which remained significant after adjusting for each other. Both objective and subjective measures had a small effect size (Cohen's f-squared = 0.03). There was no association between contextual SES and SDQ scores in our sample.

Conclusions: Socioeconomic status impacts children and adolescents' mental health. However, SES is a multi-dimensional concept. Further research considering different dimensions is needed to understand the interplay of these dimensions in different cultures and contexts. Addressing such exploratory questions may help pave the way for detecting and addressing these social determinants in primary care settings.

Keywords: Health inequalities, Social Class, Mental Disorders, Child Psychiatry, Adolescent Psychiatry

1. Background

Socioeconomic status (SES) inequalities are among universal disparities that exist in almost all societies to various degrees. Children and adolescents have less influence on, but are more vulnerable to, their social environment, including inequalities. Moreover, the harmful effects of a poor social environment can last until adulthood (1), contributing to intergenerational inequity (2). Current evidence suggests that children and adolescents with lower

SES are at greater risk for physical and mental illnesses, have less access to health care, experience more comorbidities, and, if they develop a health problem, experience it more severely (2-7).

However, significant inter-individual, inter-community, and age differences exist in children's responses to socioeconomic hardship (2, 3). Some observed differences in the association between SES and mental health differ by culture (3, 5), which warrants the replication of the studies in different settings. Some have pointed

out a potential moderating effect for children's age, suggesting that adolescents are less vulnerable to lower SES than younger children, with a stronger association among children younger than 12 years (2). Adolescents begin to develop their sense of social hierarchy and are mainly influenced by their homogenous peer groups, which may help them adapt to low SES effects. Understanding the complex interplay of SES and mental health across developmental stages might help develop age-specific interventions.

Socioeconomic status is a multi-dimensional concept, making it hard to capture with a single measure. The "absolute deprivation" theory emphasizes material and social constraints accompanying low SES. It is usually measured with objective socioeconomic status measures, including occupation, education, income, and wealth (2, 3, 8). On the other hand, the "relative deprivation" theory is rooted in the social comparison concept and the negative emotional states that come with it. The subjective socioeconomic status indicators were developed to capture this dimension and provide a cognitive average of different objective measures during an individual's lifespan (7, 9). The other dimension, contextual socioeconomic status, focuses on community-level indicators of SES, claiming that after adjusting for individual-level subjective indicators, the community SES level still impacts health outcomes, although usually with a smaller effect size than individual-level indicators (10). Contextual SES is traditionally measured by the proportion of house ownership, unemployment rate, income per capita, etc., at the neighborhood, city, district, or country level (8).

Based on this conceptual framework, it is plausible to assume that the effects of objective and contextual SES on health outcomes might be mediated, at least to some degree, through subjective SES (11). The studies that assessed this path consistently found that the objective measures' impact is partially mediated through subjective SES (11-14). Although this association has been studied in the Iranian adult population (12, 15, 16), we could not find any study among children and adolescents. Moreover, although there were some attempts to clarify the relationship between objective measures and children's and adolescents' mental health in Iran (17-19), we could not find any study on children and adolescents' mental health with subjective or contextual measures.

We sought to explore the association between parental objective, subjective, and contextual SES and children's mental health using data obtained in a study (20) on the integration of child mental health care into a mental health collaborative care program implemented in urban primary health care facilities in Tehran, the capital city of Iran (21). Specifically, our study questions are: (1) is there an as-

sociation between parental objective, subjective, and contextual SES measures and their children's mental health in a network of G.P.'s clients? (2) if such an association exists for objective or contextual indicators, is it partially or fully mediated through subjective measure? and (3) if such an association exists, how is it affected by children's age?

2. Objectives

Addressing such exploratory questions to identify social determinants of child and adolescent mental health and pave the way for integrating tools to identify and address these social factors or youth perceptions of them in primary care (22).

3. Methods

3.1. Setting and Participants

In 2018 - 2020, a trial explored the effects of integrating child and adolescent mental health care into the Tehran University Collaborative Care Program (TUCCP) provided by a group of Community Mental Health Centers (CMHC) in relatively disadvantaged areas in Tehran. The details of the original study have been described elsewhere (20). Briefly, General Practitioners (GPs) working in the TUCCP who volunteered to participate in the baseline phase of the study were randomized and received either enhanced training about child and adolescent mental health identification and management or a refresher course on identification and referral of children with mental health conditions. All children (male and female) aged five to 15 years were considered eligible if they visited one of the volunteered G.P.'s offices during the recruitment period for either a mental or a general non-emergent medical condition. We excluded the children who reported pain or appeared medically ill, those under active treatment in one of the collaborated CMHCs, or could not speak Farsi. Children and their accompanying parents were screened after obtaining informed consent. Parents were defined here as the person bringing the child to G.P.'s office (mostly mothers). Children who screened positive for mental health problems were recruited for follow-up in the trial study, whose results can be found elsewhere (23). However, for this study, we report on the baseline data of all screened children and parents, regardless of the screening results, before they were offered any intervention.

3.2. Data Collection and Measures

Trained Master's level psychologists interviewed eligible parents. Demographic information included the children's age and gender, household district, and parents'

years of education. For the current investigation, the parents' years of education were considered as the measure of objective socioeconomic status and transformed into a categorical variable with four levels: No or elementary education, middle school education, high school education, and higher (college) education. We used the household location as the measure of contextual socioeconomic status. Based on previous evidence (24-26), we divided the 22 districts of Tehran into a categorical variable with four levels. The most disadvantaged districts of 17 to 20 and satellite towns were categorized as neighborhood one, the districts 9 to 14 and 21 as neighborhood two, the districts 4, 7, 8, and 22 as neighborhood three, and the least disadvantaged districts of 1, 2, 3, 5, and 6 as neighborhood four.

Parental subjective socioeconomic status was assessed using the MacArthur scale (27). It is a 10-rung ladder presented to the participants, who are then asked where they perceive themselves in their community, with more privileged people being on higher rungs of the ladder. The scale has proven reliable and applicable in many countries, including Iran (15, 16, 28).

The children's age was also categorized into three groups according to commonly accepted developmental cutoffs, age of entering different educational levels in Iran, and literature suggesting that the effect of SES on child mental health may change after age 12 (29). The categories are early childhood (five through seven years old), middle childhood (seven through 12 years old), and late childhood (more than 12 years old).

The children's mental health status was assessed by the parent-rated version of the Strengths and Difficulties Questionnaire (SDQ) (30), which is a widely used 25-item questionnaire with a validated Farsi language version (31, 32). The subscales of SDQ include emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems, and prosocial behavior. The scores of the first four subscales can be summed up to a single SDQ total difficulties score. In this study, we report the total difficulties score.

3.3. Analysis

Statistical analysis in this study was conducted using the R software (version 4.1.1) (33). We provide the descriptive distribution of different variables across three children's age groups with separate significance test results for each variable. The P-values are based on F tests from one-way ANOVA for numerical variables and contingency tables with chi-squared tests for categorical variables. The analyses were conducted using the "compareGroups" package (34).

We chose a stepwise approach using linear regression models to explore the associations of different variables

with child and adolescent mental health. In the first step, we examined the association of subjective, objective, and contextual measures with children's SDQ in separate models. In the next step, for SES measures that had a significant association with the SDQ at the first step, we fitted a multivariable model adjusting the effects of the SES measures for each other. The effect size of the SES measures that had a significant association with the SDQ score on the multivariate model was calculated by Cohen's f-squared indicator using the "effectsize" package (35). In the third step, we checked if the subjective indicator had any mediating role between other significant SES variables and the SDQ score. Mediation was assessed via the "mediation" package (36), which calculates the decrease in the regression coefficient of the desired variable after adding the mediator to the model and obtaining percentile confidence intervals by the bootstrap method with 5,000 iterations.

Finally, to examine whether there is a moderating effect by child's age group, we calculated the differential impact of SES measures on SDQ scores in different age groups by adding interaction-term of SES variables with children's age group to the models. The head-to-head comparisons, not including the intercept, were obtained by calculating estimated marginal means using the "emmeans" package (37). We entered the objective SES variable as an integer numeric variable for both mediation and moderation analysis. As Quon and McGrath (7), in their systematic review, found that the studies that adjusted the models for children's age and gender reported a significantly lower correlation between SES indicators and health, all the models were adjusted for children's age group and gender.

All the models were checked by plotting the residuals. The absence of collinearity was assessed by calculating the variance inflation factor using the "car" package (38). We encountered some missing values in the baseline data of some individuals, especially those that did not enter the follow-up trial study. However, due to the very limited number of missing data, we did not use mitigating approaches to replace these values and limited each analysis to the portion of the sample with all the interested values available.

4. Results

In total, 1,103 child-parent dyads were screened at the baseline of the original study. The sample included similar proportions of boys and girls, but almost 90% of the parents were mothers. Dyads with their child in the middle childhood ages constituted 51% of all cases, with the remaining cases distributed relatively equally over the early and late childhood age groups.

Except for parents' age, education, and neighborhood, other variables were fairly evenly distributed between the three child age groups with no significant differences (Table 1). Younger children had significantly younger parents ($P < 0.001$), as expected, but their parents also had a higher rate of college education ($P < 0.001$). There was a small but significant difference between the distribution of the three age groups across neighborhoods ($P < 0.05$).

In the first step of the analysis, we used linear models to investigate bivariate associations of the parental objective, subjective, and contextual SES measures with children's SDQ scores (Table 2). The subjective SES measure showed a significant inverse association with the SDQ scores (regression coefficient: -0.59; Confidence interval [CI]: -0.77, -0.40; $P < 0.001$). Similarly, there was a negative and significant association for the children's SDQ scores of parents with high school (regression coefficient: -1.26; CI: -2.48, -0.37; $P < 0.05$), and higher education (regression coefficient: -3.18; CI: -4.52, -1.83; $P < 0.001$), compared to children of parents with no or elementary education. However, no significant association was observed for the contextual SES (neighborhood) measure.

In the next step, we fitted multivariable models, adjusting the subjective and objective measures for each other. Subjective SES still had a significant negative association with SDQ scores (regression coefficient: -0.52; CI: -0.71, -0.33; $P < 0.001$). The objective SES measure still had a significant association but only when children of parents with higher education were compared to children of parents with no or elementary education (regression coefficient: -2.48; CI: -3.83, -1.14; $P < 0.001$). Of note, the considerable decrease in the regression coefficient of objective SES suggested a probable partial mediating effect for subjective SES. Cohen's f -squared of both indicators was 0.03, interpreted as a small effect size (39). The mediation analysis showed that a significant proportion (0.22; CI: 0.11, 0.41; $P < 0.001$) of the objective SES measure's effect on the SDQ scores was mediated through the subjective measure. Table 3 summarizes the findings of the moderation analysis. Although we found a lower impact of subjective and objective measures on the SDQ in the late childhood group, these impact differences were insignificant compared to other age groups.

5. Discussion

We examined the association between parental objective, subjective, and contextual SES and their children's mental health among 1,103 parent-child pairs in a G.P.'s network of clients in Tehran. The bivariate analysis indicated a significant inverse association between parental subjective and objective SES and children's mental health. The as-

sociation for both subjective and objective SES remained significant after adjusting for each other. We found a significant partial mediating role of subjective SES for objective SES effects on mental health. The moderating effect of children's age group on the association between objective and subjective SES and mental health was insignificant. We could not find any association between contextual SES and children's mental health.

Numerous studies have replicated the association between objective SES indicators and children's mental health in different contexts and countries (29, 40-49). Previous studies on the Iranian population include a nationally representative school-based study (CASPIAN) (17) that found an increased risk of mental and behavioral problems among school-age children and adolescents from lower SES. In that study, objective SES was evaluated by parents' education, occupation, and family assets. Similarly, in a systematic review in 2013, Sajjadi et al. (18) found that low SES status was among the most important predictors of adolescents' depression. A recent survey conducted in Qazvin city found an inverse association between family assets and problematic child mental health and peer relations (50). To our knowledge, no past studies of the association of SES with child mental health problems in Iran have used subjective measures or investigated the child's age as a moderator.

We found a significant association between parental objective and subjective SES measures and children's mental health. However, the objective SES effect appears more prominent for college-educated parents. Different pathways have been proposed to explain the relationship between family SES and children's mental health. The "absolute deprivation" pathway suggests that less privileged children may encounter material hardship that interferes with their normal cognitive, socioemotional, and physical development (5). On the other hand, the "relative deprivation" pathway emphasizes the anger and sorrow accompanying the comparison of oneself with others and the perception of injustice (6, 45).

The impact of objective and subjective SES remained significant after adjusting for each other; we found a significant partial mediating role for subjective SES between objective measure and children's mental health. This finding supports the idea that although the objective SES effect is partially mediated through subjective SES, it also has some direct independent effects (7, 51). Although there are plausible criticisms of using mediation analysis on cross-sectional data (52) some scholars argue for their usefulness when there is a robust theoretical background (53). We believe that the same applies to this study's field, as there is sound theoretical background (54), and this mediation has been tested in several cross-sectional studies with the same

Table 1. Participants' Demographic, Socioeconomic, and Mental Health Characteristics Across Three Children's Age Groups and Comparisons Among Groups ^a

	Early Childhood (N = 262)	Middle Childhood (N = 562)	Late Childhood (N = 268)	Total (N = 1103)	Significance of Age Groups Comparison ^b
Child gender					0.23
Female	129 (49.8)	261 (47.4)	141 (53.8)	531 (49.5)	
Male	130 (50.2)	290 (52.6)	121 (46.2)	541 (50.5)	
Parent gender					0.07
Female	238 (91.2)	490 (87.3)	244 (92.1)	972 (89.4)	
Male	23 (8.81)	71 (12.7)	21 (7.92)	115 (10.6)	
Parent age	35.2 ± 6.56	36.8 ± 6.25	40.1 ± 6.57	37.2 ± 6.64	< 0.001**
Parent education					< 0.001**
No or elementary education	29 (11.2)	69 (12.4)	47 (18.1)	145 (13.5)	
Middle school education	28 (10.9)	75 (13.5)	47 (18.1)	150 (14.0)	
High school education	115 (44.6)	266 (47.8)	124 (47.7)	505 (47.0)	
Higher education	86 (33.3)	146 (26.3)	42 (16.2)	274 (25.5)	
Household neighborhood					0.034*
1	160 (62.5)	315 (56.9)	133 (50.6)	608 (56.7)	
2	50 (19.5)	148 (26.7)	68 (25.9)	266 (24.8)	
3	34 (13.3)	59 (10.6)	45 (17.1)	138 (12.9)	
4	12 (4.69)	32 (5.78)	17 (6.46)	61 (5.68)	
SSS (MacArthur scale) (1-10)	5.62 ± 2.09	5.61 ± 2.06	5.47 ± 2.08	5.58 ± 2.07	0.61
SDQ total problem score	13.0 ± 6.00	12.9 ± 6.63	13.1 ± 6.60	13.0 ± 6.47	0.90

Abbreviations: SDQ, Strengths and Difficulties Questionnaire; GHQ, General Health Questionnaire; SES, socioeconomic status; SSS, subjective socioeconomic status. ^a Values are expressed as No. (%) or mean ± SD. The numbers might not add up because of missing values. * Statistically significant at alpha < 0.05. ** Statistically significant at P < 0.001.

^b The reported P-values are obtained through the ANOVA test for numeric variables and the chi-square test for categorical variables.

results (11-14).

We could not find an association between contextual SES and children's mental health. A previous study of a nationally representative sample in Iran reported a lower prevalence of psychiatric disorders in children who reside in rural areas (55), which differ significantly in macroeconomic indices (56). Two other studies on adults living in Tehran found a significant impact of the household district on the individual's mental health. However, in both studies, the impact of contextual indicators was less than that of the individual-level indicators (57, 58). The lack of association in our sample could be due to the unbalanced distribution of subjects. As is evident in Table 1, more than half of our sample lived in less privileged areas of Tehran. Moreover, since the effect of contextual indicators are minor compared to individual-level indicators, finding differences might need higher statistical power.

We considered parental education a proxy for objective SES, i.e., access to material and social resources. However, the "family process model" suggests an alternative path linking parental education and children's mental health. The model suggests that higher maternal education directly affects parenting styles by increasing maternal knowledge about childrearing. Highly educated parents spend more time with their children, invest more in their development, and use less harsh parenting strategies (47). Children with higher maternal education levels also benefit from more developed social cognitive skills, e.g., theory of mind (59). Reverse-causation of low SES by child mental health problems should also be considered. Having a child with mental illness can limit the parents' potential to pursue education and career (47). Nevertheless, Wadsworth and Achenbach estimated this effect to be low in early and middle childhood (60). A question remains

Table 2. Multiple Linear Regression Coefficients of Socioeconomic Status Variables Predicting Children's Strengths and Difficulties Questionnaire Scores in Bivariate and Multivariate Models and Their Effect Sizes^a

Variables	Bivariate Model		Multivariate Model		Cohen's f-squared
	Estimate	Ci	Estimate	Ci	
Subjective measure					
SSS (MacArthur Scale)	-0.59**	-0.77, -0.40	-0.52**	-0.71, -0.33	0.03
Objective measure					
Parental education: Middle school vs. no or elementary education	-1.12	-2.62, 0.39	-0.73	-2.22, 0.76	0.03
Parental education: High school vs. no or elementary education	-1.26*	-2.48, -0.37	-0.77	-1.99, 0.45	
Parental education: Higher education vs. no or elementary education	-3.18**	-4.52, -1.83	-2.48**	-3.83, -1.14	
Contextual measure					
Neighborhood 2 vs. neighborhood 1	0.27	-0.70, 1.24	-	-	-
Neighborhood 3 vs. neighborhood 1	0.80	-0.42, 2.02	-	-	
Neighborhood 4 vs. neighborhood 1	-0.77	-2.54, 1.00	-	-	

Abbreviations: Ci, confidence interval; SSS, subjective socioeconomic status.

^a All models are adjusted for children's age groups and gender. * Statistically significant at P < 0.05. ** Statistically significant at P < 0.001.

Table 3. The Results of Moderation Analysis by Children's Age Group: The Estimate and Confidence Interval of Differential Impact (Interaction Term Regression Coefficient) of Parental Socioeconomic Status Indicators on Children's Mental Health Across Different Age Groups^a

	Differential SSS Impact on SDQ Score		Differential OSS Impact on SDQ Score	
	Estimate	Ci	Estimate	Ci
Middle childhood vs. Early childhood	-0.01	-0.47, 0.45	-0.07	-1.01, 0.95
Late childhood vs. Early childhood	0.26	-0.28, 0.80	0.62	-0.56, 1.81
Late childhood vs. Middle childhood	0.27	-0.19, 0.73	0.69	-0.32, 1.71

Abbreviations: SSS, subjective socioeconomic status; OSS, objective socioeconomic status; SDQ, Strengths and Difficulties Questionnaire.

^a Both models are adjusted for children's age groups and gender.

unanswered: How does parental subjective SES affect children's mental health? Is it through the parent's mental state and parenting behaviors? Or do children develop their own perception of SES that impacts their well-being?

We could not find a significant moderating effect based on children's age. The decreasing pattern of associations between SES and mental health in the late childhood group is a fairly replicated finding in the field. In a 2013 systematic review of studies from 23 countries, Reiss noted some studies reporting this attenuating pattern and suggested age 12 as a turning point for this association (2). Interestingly, all these studies used objective indicators of SES; or if they included a subjective indicator, the informant was the parent, like the current study (51, 61-63). However, the studies that measured the adolescent's own perception of their status in their school community found significant associations even in ages over 12 years (6, 7, 64). The authors have attributed this attenuation of parental SES indicators to the development of adolescents' own sense of social hierarchy, which could be more focused on comparisons between peer groups. Because the peer groups are

usually more homogenous regarding SES, this homogeneity could buffer parental SES indicators' impact by affecting adolescents' subjective perception of SES (7). This again emphasizes the importance of subjective SES when considering mental health. The lack of significance in our study could be due to the unbalanced distribution of the sample across age groups. Additionally, our sample size was possibly insufficient to detect a moderating effect, as investigating the interaction of variables needs higher statistical power. Nevertheless, another explanation could be cultural differences. As middle-eastern societies are more family-centered than others and children start becoming independent later in life, the impact of the parental social situation on children may go beyond what is observed in western cultures (65).

5.1. Strengths and Limitations

In addition to the relatively large sample size, the current study has several other strengths, including assessing subjective SES, often not measured, and examining the moderating role of a child's age. However, the original

study was not designed for this paper's objectives, which limits the findings. Most importantly, the enrolled families mostly came from disadvantaged areas of the capital city of Iran, which raises concerns regarding generalizability. Also, we did not have an ad-hoc sample size calculation for the outcomes of this study, and our final sample size had limitations in detecting some patterns, especially in the analysis that included interaction effects. Our sample size also had an unbalanced distribution across age groups. Moreover, the clinical sampling setting and evidence suggest that children from lower SES strata experience more illnesses than others. However, we do not believe that the sample radically differs from the general population as the SDQ total difficulty scores and subjective SES measures of our sample were close to two other studies of children recruited from the general Iranian population (66) and a national survey among adults, respectively (67). Additionally, because our study is cross-sectional, our mediation analysis was prone to bias.

We considered parental education as a proxy for other indicators of objective SES. This limits our assessment of the family's SES, as the evidence suggests that although different indicators of objective SES (e.g., income, wealth, education, and occupation) are correlated but also have independent effects (8, 68). We also used the parental subjective SES measure, which may differ from the child's own perception. We did not present analyses based on different SDQ subscales. However, further analyses on the subscales of the SDQ produced similar results (data not shown). Lastly, we examined current SES. As the literature suggests a role for both chronically low and recent declines of SES (2, 6), we may have missed part of the SES-mental health relationship by not considering past SES or recent changes.

5.2. Conclusions

There is an association between parental-reported SES and the mental health of children and adolescents. However, SES is a multi-dimensional concept and cannot be captured by a few indicators. Understanding the interplay between different indicators of SES and the mental health of children and adolescents needs further prospective studies in different cultures and contexts. We recommend considering multiple dimensions of SES in these studies to understand this relationship better. Such information could reveal modifiable indicators fostering resilience, with clues to preventive interventions to reduce the harmful effects of social adversities in this vulnerable age group. Such interventions could be ultimately incorporated into primary, school-based, and community mental health care as part of primary and secondary prevention programs.

Footnotes

Authors' Contribution: L.W., R.M., V.S., Z.S., and H.Z. conceptualized and supervised the main study. V.S. and A.M.A. conceptualized this secondary study. H.Z. supervised data collection. A.M.A. and A.H.N. analyzed the data and prepared the manuscript draft supervised by L.W., R.M., V.S., and H.Z. All authors critically reviewed and approved the final manuscript.

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