Multidimensional poverty and adolescent mental health: Unpacking the relationship

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ABSTRACT

Extensive research suggests that poverty is associated with adolescent mental health problems. However, studies typically focus on monetary poverty and have not examined how other dimensions of poverty relate to adolescent mental health. This study examines the association between multidimensional poverty and mental health among adolescents using a Multidimensional Poverty Index. Based on data from the National Mental Health Survey in Colombia, we show that adolescents living in multidimensionally poor households have 50% higher risk of having mental health problems compared to adolescents in non-poor households. We unpack and assess the relation between each of the dimensions of poverty and mental health, and whether deprivations directly experienced by the adolescent are more strongly associated with mental health problems than deprivations experienced by other household members. Individual deprivations associated with *human capital* linked to schooling, work, health insurance and employment are more strongly associated with adolescent mental health problems than material deprivations. Lagging behind in school and working while studying has the strongest association with adolescent mental health problems. Results suggest that public policies that address dimensions of poverty associated with adolescents human capital accumulation may be critical to address mental health problems among adolescents.

1. Introduction

Mental health conditions affect almost one billion (13.2%) of the world's population, 81.8% of which live in low-and middle-income countries (Whiteford et al., 2013). Around half of all lifetime mental health conditions originate during childhood or adolescence (Kim-Cohen et al., 2003; Kessler et al., 2007), a period of unique vulnerability (Gore et al., 2011). Depression and anxiety, the most common mental health conditions during adolescence, account for 35% of the burden of disability among young people and contribute considerably to premature mortality through suicide (Erskine et al., 2015). Mental health conditions hamper adolescents' ability to accumulate human capital and are key drivers of poverty and disadvantage later in life (Clayborne et al., 2018). Mental health has become recognised as a key priority for global development: The United Nations Sustainable Development

Goals (SDGs), for example, pledges to step up efforts to improve mental health, particularly in Goal 3, which sets as a target for 2030 to "ensure healthy lives and promote wellbeing for all at all ages". As such, adolescent mental health is also a critical target for the achievement of sustainable development goals, and even more specifically those related to reducing inequality and improving inclusion and resilience in future generations (Vigo et al., 2016).

A vast literature has shown that poverty is associated with mental health problems during adolescence. Mental health conditions are more common among adolescents living in poverty than among adolescents from an affluent socioeconomic background (Ridley et al., 2020). This relationship is often explained by two complementary theories. On the one hand, the so-called social drift or selection theory, argues that poor mental health negatively impacts life chances, such as educational achievement or career trajectories, thus depriving individuals from

important social resources, thereby aggravating existing mental health problems (Bartel and Taubman 1986). On the other hand, according to the social causation theory, poverty may negatively affect mental health (Johnson et al., 1999). For example, living in inadequate housing and being exposed to environmental stressors (e.g., pollution, noisy environments) may impair cognitive and socio-emotional development, and cause mental illness (Ridley et al., 2020). The effect of poverty on mental health may be particularly pronounced during adolescence as the latter is a life-course period involving several important transitions that can have substantial effects on future life chances, including the transition from primary to secondary education, or from school to work.

An extensive literature has empirically examined the relationship between mental health and poverty. A systematic literature review of studies among adults found that about two thirds of the papers published report a significant negative association between poverty and common mental disorders, although the strength and consistency of the association varies significantly by the measure of poverty or socioeconomic status (Lund et al., 2010). Specifically, it appears that poverty-related dimensions such as education and social class are consistently and strongly associated with mental health conditions, while income and consumption are less consistently associated with mental health (Lund et al., 2010). A separate systematic review examining literature on the relationship between socioeconomic status and mental health found a consistent inverse relationship among children and adolescents (Reiss, 2013). However, the strength of the association varied for different indicators of socioeconomic status, with household income as well as low educational achievement of parents being most strongly associated with adolescents' mental health problems (Reiss, 2013).

Studies in these reviews typically measure poverty as a unidimensional concept, with most of them selecting single indicators based on either income or educational attachment. If they do measure more than one dimension of poverty, they do so without analysing whether or not the joint distribution of those dimensions of poverty is related to mental health. The need for multidimensional approaches to poverty measurement has become increasingly recognised in both academic and policy circles. For example, the Stiglitz, Sen and Fitoussie Commission on the Measurement of Economic Performance and Social Progress emphasises the importance of incorporating non-economic aspects of peoples' life in poverty measures (Stiglitz et al., 2009). In response, a Global Multidimensional Poverty Index (MPI) has been proposed by the United Nations Development Programme (Alkire et al., 2019; Poverty and Human Development Initiative, 2019). This index builds on Amartya's Sen's argument that poverty and social progress should be measured and tracked, not only by income, but also by functioning and capabilities, covering a wide range of quality of life dimensions and deprivations (Sen, 1985, 1999). The MPI measures deprivations in three broad dimensions that are considered fundamental for human development and wellbeing: health, education, and standard of living.

We argue that these recent conceptualisations of poverty that emphasise its multidimensional nature by combining multiple dimensions of poverty into a single index, should be considered in mental health research. This approach offers a novel way to analyse how less well explored dimensions of poverty–other than income and education-important to achieve a 'good life' (Aaberge and Brandolini, 2015) may be critical to understand the relationship between poverty and mental health. This study aims to address this gap by assessing the association between adolescents' mental health and multidimensional poverty. We focus on Colombia, as an upper middle-income country with relatively high prevalence of mental health conditions among adolescents (according to the World Health Organization, among adolescents aged 10–19 years old in Colombia, the prevalence of suffering any mental health condition during 2019 was 14%), a recently developed Multidimensional Poverty Index in Colombia (Angulo et al., 2016) and a rich nationally representative mental health dataset (The, 2015 Colombian Mental Health Survey). In our study, a multidimensional approach to

poverty enables us to examine the joint association of different dimensions of poverty with mental health, at both the household and adolescent level, identifying modifiable dimensions of poverty amenable to social intervention.

2. Specific deprivations and adolescent mental health

We draw on the ecological systems theory for human development, originally formulated by Urie Bronfenbrenner (1979) and widely applied to individuals' mental health to identify factors at different ecological levels associated with individuals' mental health (Eriksson et al., 2018). According to this theory, child and adolescents' development is affected not only by their individual characteristics, such as age, gender, and health, but also by multiple levels of their surrounding environment, such as their immediate environment (microsystem) including family, school, and peers. Beyond the microsystem, individuals are embedded into a mesosystem that refers to the interconnections between the different parts of the microsystem, e.g., the relation between the school and the peers, as well as a wider social system that is comprised of macrosocial and cultural factors (macro- and chronosystem). A key feature of the ecological systems theory is that the factors of the microsystem that are most closely and directly related to the child or adolescent are most influential in predicting child development or mental health. A possible hypothesis is that deprivations directly experienced by the adolescent, e.g., deprivations in educational access at the adolescent level, are more strongly associated with mental health than deprivations experienced at the household level, e.g., those experienced by household members or parents. However, it is also plausible that deprivations experienced by other household members are as strongly associated with adolescents' mental health as deprivations experienced directly by the adolescent. The latter would be in line with the ecological systems theory as it stresses the importance of interactions between the individual and the microsystem comprised of family and peers.

The MPI assesses poverty based on the prevalence of specific deprivations experienced by different members of the household. This allows for assessing the contribution of individual (adolescent) deprivation and household deprivation in relation to mental health outcomes. The dimensions included in the MPI (see Annex 1 for a list of the different dimensions and measures) capture deprivations in education, childhood and adolescent conditions, labour market participation, health, and access to public utilities and housing conditions. For these five general dimensions, the MPI assesses which household members, i.e., whether a child, an adolescent or adult, is deprived from a specific dimension, thus making it possible to distinguish not only between different deprivations but also between the household member directly affected by each deprivation.

3. Data and methods

3.1. Colombian Mental Health Survey (CMHS)

Data came from the 2015 Colombian Mental Health Survey (CMHS), a nationally representative survey covering 44,988 individuals across 13,201 households. The CMHS was implemented using a stratified multi-stage probabilistic sample design. The sample allows inference by ranges of age across geographical regions in Colombia. These age groups are children between 7 and 11 years, adolescents between 12 and 17 years and adults aged 18 years and above. The sample design selected municipalities as primary sampling units in the first stage. The second stage selected sets of geographically contiguous blocks within municipalities, as secondary sampling units. In the third stage, geographical segments within the sets of blocks were selected. Finally, within each selected segment, houses were visited. In total 1754 adolescents aged 12–17 years were interviewed using well-defined and tested international screening and diagnostic tools for mental health problems. A

complete description of the survey methodology is available elsewhere (Gómez-Restrepo et al., 2016).

3.2. Mental health problems

The Self-Reporting Questionnaire (SRQ-20) is a screening tool developed by the World Health Organization to help detect probable Common Mental Disorders (CMD) among individuals, particularly in resource poor settings (Maziak et al., 2002). This screening tool has been used not only in primary health care settings but also in many different studies to identify probable psychopathology. The SRQ-20 includes 20 'yes' or 'no' questions, on symptoms related to depression, anxiety, and psychosomatic complaints, to detect CMD with a high level of validity. The SRQ-20 has been validated as a screening tool in LMICs. The test has a sensitivity of 73–83% and a specificity of 72–85% against diagnostic tools (Harding et al., 1980).

To operationalize CMDs we used a cutoff of eight or more points on the SRQ-20 questionnaire as indicating the likely presence of mental health problems, similar to other studies on adolescents from low- and middle-income countries including Colombia (Harpham et al., 2004; Maziak et al., 2002; Paula et al., 2014).

3.3. Colombian Multidimensional Poverty Index (CMPI)

We measured poverty using the CMPI developed by Angulo et al. (Angulo et al., 2016), which has been used in Colombia since 2011 to set official government targets and track progress in relation to poverty. The CMPI is based on the Alkire and Foster (2011) poverty methodology (henceforth referred to as the AF method). It identifies dimensions and indicators based on a review of the country's specific needs and priorities. It consists of 15 key indicators that represent the following 5 general dimensions of wellbeing: 1) household education conditions (2 indicators), 2) childhood and adolescent conditions (4 indicators), 3) labour market participation (2 indicators), 4) health (2 indicators), and 5) access to public utilities and housing conditions (5 indicators). The CMPI operationalises these 15 indicators as dichotomous deprivation variables. A household is considered deprived for a given indicator if any of its members is deprived of this specific dimension. The index aggregates deprivation indicators into a C-weighted sum of deprivations, which uses a nested weighting system, where each of the five general dimensions have the same weight and within each dimension each indicator is equally weighted. The exact dimensions, variables, and weights that the CMPI uses are presented in Annex Table 1. The so-called C-weighted sum of deprivations takes values between zero and one, where zero means no deprivation, and one means deprivation in all 15 indicators.

Like the global MPI, the CMPI uses a cut-off of 33% of the C-weighted sum of deprivations to identify a household as poor. This threshold was established by Angulo et al. (2016) based on data from subjective assessments that asked households to report whether they considered themselves as poor, combined with 'objective' data on their level of monetary poverty. Descriptive statistics of the CMPI and its dimensions are presented in Table 1.

3.4. Empirical strategy

To examine the association between multidimensional poverty and adolescent mental health problems, we specified the following logistic regression model:

$$P(y=1|\mathbf{x}) = G(\beta_0 + \beta_1 Poor_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5)$$

where $P(y=1|\mathbf{x}) = y$ represents the odds of mental health problems, and G is a function that takes values between zero to one, expressed as a log-odds transformation. $Poor_1$ is a dummy variable capturing whether an adolescent lives in a multidimensionally poor household. Rather than a

Table 1
Descriptive statistics.

	Mean+	Std. Dev.	Min	Max
Outcome of Interest (SRQ-20)				
Positive for mental health problems (Score ≥ 8 pts)	0.054	0.225	0.000	1.000
Poverty				
The Colombian Multidimensional Poverty Index (CMPI)				
Multidimensionally Poor (Yes = 1)	0.288	0.453	0.000	1.000
C-Weighted sum of deprivations (%)	24.073	14.856	0.000	67.000
Household CMPI deprivation indicators				
Proportion of adolescents living in a household deprived in:				
Educational achievement	0.541	0.498	0.000	1.000
Literacy	0.146	0.353	0.000	1.000
Attendance to education	0.134	0.341	0.000	1.000
School lag	0.620	0.485	0.000	1.000
Comprehensive childcare	0.033	0.178	0.000	1.000
Child labour	0.100	0.301	0.000	1.000
Long term unemployment	0.068	0.251	0.000	1.000
Formal employment	0.716	0.451	0.000	1.000
Health insurance	0.151	0.358	0.000	1.000
Health services access	0.136	0.343	0.000	1.000
Material of floor	0.080	0.271	0.000	1.000
Material of walls	0.032	0.175	0.000	1.000
Sewage	0.143	0.350	0.000	1.000
Water source	0.105	0.306	0.000	1.000
Overcrowding	0.160	0.367	0.000	1.000
Unpacking the CMPI				
Individual deprivations (Adolescents):				
Attending school (not working) and not lagged	0.407	0.491	0.000	1.000
Attending school (not working) but lagged	0.425	0.495	0.000	1.000
Working (not attending school)	0.038	0.190	0.000	1.000
Attending school and working	0.031	0.173	0.000	1.000
Not attending school and not working	0.099	0.299	0.000	1.000
No health insurance or access to services	0.098	0.297	0.000	1.000
Any adult member deprived in:				
Education (literacy/achievement)	0.551	0.498	0.000	1.000
Long term unemployment	0.080	0.271	0.000	1.000
No formal employment	0.716	0.451	0.000	1.000
Any children member deprived in:				
Comprehensive childcare	0.033	0.178	0.000	1.000
School lag	0.118	0.323	0.000	1.000
Housing deprived in:				
Adequate material of floors/walls or access to sewage/water	0.217	0.413	0.000	1.000
Overcrowding	0.160	0.367	0.000	1.000
Demographic characteristics				
Age	14.517	1.730	12.000	17.000
Gender (Female = 1)	0.506	0.500	0.000	1.000
Self-reported ethnicity (1 = indigenous, afro descendant or rom, 0 = otherwise)	0.156	0.363	0.000	1.000
Rural areas (Yes = 1)	0.260	0.439	0.000	1.000

Source: Own calculations based on the CMHS. Sample size: 1754. + Mean expanded using sample weights that correct for non-response and structure of the total population.

univariate or a bivariate descriptive analysis, we opted to perform a multivariate analysis, as it allows to investigate the relationship between mental health and the joint distribution of the multiple dimensions of poverty, after controlling by relevant demographic characteristics. The four basic demographics that we control for are: age in single years (x_2); gender operationalized as a dummy variable, where one represents females and zero represents males (x_3); self-reported ethnicity, which takes values of one if the adolescent reports belonging to an indigenous, afro descendant or Roma community and zero otherwise (x_4); and a dummy variable that takes the value of one when the adolescent lives in a rural area and zero if the adolescent lives in an urban area (x_5). We preferred to perform a logistic model over a linear model because the dichotomic nature of our mental health result indicator.

For testing whether a relationship exists between the joint distribu-

tion of the multiple dimensions of poverty considered by the CMPI and mental health problems we model *y* as a function of the C-weighted sum of deprivations, controlling by our four basic demographics, as follows:

$$P(y = 1|\boldsymbol{x}) = G(\beta_0 + \beta_1 C + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5).$$

Furthermore, we assessed the association between multidimensional deprivation and the presence of mental health problems across the entire range of the C-weighted sum of deprivations, by using a graphical local polynomial regression.

We then assess how each of the 15 deprivations considered in the CMPI are related to adolescent mental health problems using the following model:

$$P(y = 1|\boldsymbol{x}) = G(\beta_0 + \beta_1 \boldsymbol{W}_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5)$$

where $\boldsymbol{W}_1$ is a matrix capturing the 15 CMPI deprivation indicators.

Finally, to unpack and assess whether deprivations directly experienced by the adolescent are more strongly associated with mental health problems than deprivations experienced by other household members, we replaced the C-weighted sum of deprivations in the above equation with a series of indicator variables in the regression to capture: i) individual deprivations associated with the adolescent (including educational non-attendance, lagging behind in school (by at least one year relative to the adolescents' age), working, and lack of health insurance or health care access); ii) household deprivations of other members of the household, which take the value of one if any other member is deprived in the corresponding indicator; and iii) housing deprivations. Details on how these indicators were operationalized are summarised in Annex 1. In this latter case, the model has the following form:

$$P(y = 1|\boldsymbol{x}) = G(\beta_0 + \beta_1 \boldsymbol{W}_2 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5)$$

where the $\boldsymbol{W}_2$ matrix captures the specific deprivations experienced by the adolescent or other members of the household. In this particular analysis, to avoid collinearity, we exclude the deprivation indicators experienced by other household members that were strongly correlated with the same adolescent's individual deprivation. This is the case for health insurance and access to health services deprivations, both of which were strongly correlated with the same adolescent's individual deprivation. The correlation matrix of the independent variables used in our multivariate analysis is presented in Annex 2. Correlations between deprivation indicators were relatively low, and in all cases below 0.3.

All models were estimated using sample weights provided by the 2015 CMHS to control for non-response and to allow the sample to reflect the distribution of the population by area and age ranges, according to the sampling frame. Standard errors were calculated considering the sampling design of the CMHS. The results of the multivariate models are presented in the form of odds ratios (OR).

4. Results

4.1. Descriptive statistics

Out of the total sample of adolescents, 5.4% have an SRQ-20 score equal or higher than eight points, which is indicative of probable mental health problem. Multidimensional poverty at the household-level is experienced by 28.8% of adolescents, while the mean of C-weighted sum of deprivations is 24.1% (See Table 1). The most common household deprivations encountered by adolescents were: lack of formal employment among at least one adult household member, school lag among school aged members, or low educational achievement –assessed only among adults (i.e., less than 8 years of education completed). In relation to adolescents' individual conditions, most participants were 'attending school (not working) but lagging behind' (42.5%) or 'attending school (not working) and not lagging behind' (40.7%). The least common category comprised adolescents 'attending school and working at the same time, which represents 3.1% of the sample. Adolescents neither

attending school nor working corresponds to 9.9%. No health insurance or access to health services is reported by 9.8% of adolescents.

4.2. The association between overall household poverty and mental health

To assess the functional form of the association between multidimensional poverty and mental health, Fig. 1 shows the local polynomial curve. As the C-weighted sum of deprivations increases, the risk of having a mental health problem rises. However, the relationship does not appear to be linear: it is positive and steepest at highest levels of deprivation (i.e., over 55% of C-weighted sum, which is made of 35 observations); positive but weaker at the lowest quintile of deprivations (i.e., 0–20% of C-weighted sum, 817 observations); and weak or inexistent in the middle of the distribution (i.e., 21%–55% of deprivations, 902 observations). Although, through these different slopes across the deprivation distribution, we observe different degrees in the relationship between mental health and multidimensional deprivations, when we test whether mental health differ amongst these groups, we cannot reject that the difference in mental health between the highest levels of deprivation and the middle of the distribution is equal to zero. Overall, the results do show a stepped distribution, where higher levels of deprivation are on average associated with higher risk of mental health problems, across two different groups.

Table 2 (Model 1) shows the results of the multivariate regression model of a mental health problem on a binary indicator capturing whether an adolescent lives in a multidimensionally poor household. There is a statistically significant association between multidimensional poverty and probable mental health problems. Compared to their counterparts living in non-poor households, adolescents living in multidimensionally poor households exhibited on average 49% higher odds (OR = 1.49, 95% [CI] 1.106–2.031) of having a mental health problem.

Table 2 (Model 2) estimates the odds of a mental health problem among adolescents according to household poverty using the C-weighted sum of deprivations. Controlling for gender, age, ethnic background and area of residence (urban/rural), we observed a positive and statistically significant association between the C-weighted sum of deprivations and mental health problems. On average, a 1% increase in the weighted sum of deprivations is associated with a 0.13% (OR = 1.013, 95% [CI] 1.004–1.022) increased in the odds of having a mental health problem.

4.3. The multiple dimensions of poverty and adolescent mental health problems

Table 3 presents the odds ratios of mental health problems across the different CMPI deprivations. Adolescents living in households where at least one member is deprived from comprehensive childcare, child labour, school lag, or formal employment have higher odds of mental health problems. Among material household deprivations, lack of access to the public water system comes out as a strong predictor of mental health problem.

To assess the association between adolescent individual deprivations, household deprivations and mental health problems, Table 4 shows the odds ratios of experiencing mental health problems according to the specific CMPI deprivations across these characteristics. Adolescent deprivations in school/work and health insurance access were strong predictors of mental health problems. Adolescents attending school and working at the same time have 5.7 times higher odds of experiencing a mental health problem than those attending school, not working and not lagging behind. Furthermore, adolescents attending school, not working, but lagging behind have 1.4 higher odds of having a mental health problem compared to those attending school (not working) without lagging behind. Absence of health insurance or no access to health care services is associated with 2.1 higher odds of having a mental health problems.

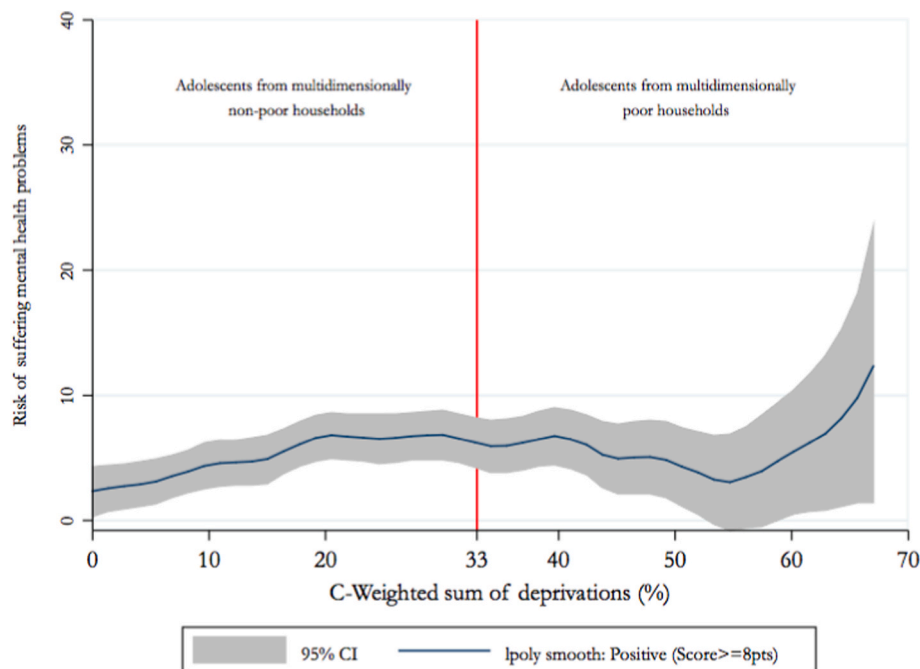Turning to deprivations by other members of the household, results

Fig. 1. Association between the c-weighted sum of deprivations and adolescents' mental health problems.
Source: Own calculations based on the 2015 CMHS. Sample size: 1754. Notes: Results use the sample weights that correct for non-response and structure of the total population. Fitted values obtained using a local epanechnikov kernel polynomial smooth function.

Table 2
Odds ratio of mental health problems among adolescents in relation to multidimensional poverty.

	(1)	(2)
	Positive (Score ≥ 8 pts)	Positive (Score ≥ 8 pts)
Multidimensional poverty		
Multidimensionally Poor (Yes = 1)	1.499**	
	(0.229)	
C-weighted sum of deprivations		1.013**
		(0.005)
Demographic characteristics		
Age	1.205**	1.205**
	(0.029)	(0.029)
Sex (Female = 1)	1.480**	1.480**
	(0.137)	(0.136)
Self-reported ethnicity (1 = indigenous, afro descendant or rom, 0 = otherwise)	0.861 (0.149)	0.850 (0.143)
Rural areas (Yes = 1)	1.066 (0.176)	1.039 (0.165)
Constant	0.003**	0.002**
	(0.001)	(0.001)
Observations	1754	1754
Model	Logit OR	Logit OR

Source: Own calculations based on the 2015 CMHS. Notes: results use the sample weights that correct for non-response and structure of the total population. OR: Odds Ratios.
$**p < 0.01$, $*p < 0.05$.

show that adolescents that live in households where at least one other member is working in the informal sector have 1.4 higher odds of having a mental health problem. In addition, living in a household in which a child under five years lacks comprehensive childcare is associated with 3.4 higher odds of having a mental health problem. In addition, living in a household in which a child under 12 years old is lagging behind in school is associated with 1.6 higher odd of having a mental problem. Interestingly, we find no evidence that deprivations associated with the material living conditions at the household-level (i.e., adequate material of floors/walls or access to sewage/water, overcrowding) are associated

Table 3
Odds ratio of suffering mental health problems among adolescents in relation to household multidimensional deprivations.

	Positive for mental health problems
	(Score ≥ 8 pts)
Household CMPI deprivations	
Educational achievement	0.739* (0.097)
Literacy	0.783 (0.263)
Attendance to education	0.752 (0.192)
School lag	1.749** (0.282)
Comprehensive childcare	3.687** (0.643)
Child labour	2.186** (0.326)
Long term unemployment	1.127 (0.268)
Formal employment	1.622** (0.248)
Health insurance	0.781 (0.152)
Health services access	1.080 (0.237)
Material of floor	0.343* (0.162)
Material of walls	1.878 (0.627)
Sewage	0.519* (0.130)
Water source	2.246** (0.471)
Overcrowding	1.218 (0.274)
Demographic characteristics	
Age	1.163** (0.030)
Sex (Women = 1)	1.630** (0.174)
Self-reported ethnicity (1 = indigenous, afro descendant or rom, 0 = otherwise)	0.842 (0.144)
Rural areas (Yes = 1)	1.301 (0.253)
Constant	0.002** (0.001)
Observations	1754
Model	Logit OR

Source: Own calculations based on the 2015 CMHS. Notes: Standard errors in parentheses. Results use the sample weights that correct for non-response and structure of the total population. OR: Odds Ratios.
$**p < 0.01$, $*p < 0.05$.

with adolescent mental health, after taking into account the individual and other household members deprivations and controlling for relevant demographic characteristics.

Table 4

Odds ratio of a mental health problem among adolescents in relation to individual vs other members deprivations (i.e., adolescents, adults or children in the household).

	Positive for mental health problems (Score $\geq$ 8 pts)
Individual deprivations experienced by the adolescent	
Attending school (not working) but lagged (reference category: attending school, not working and not lagging behind)	1.407* (0.184)
Working (not attending school)	0.783 (0.362)
Attending school and working	5.673** (0.984)
Not attending school and not working	0.471 (0.207)
No health insurance/access to services	2.123** (0.396)
Any adult member deprived in:	
Education (literacy/achievement)	0.855 (0.110)
Long term unemployment	1.057 (0.221)
No formal employment	1.442** (0.189)
Any children member deprived in:	
Comprehensive childcare	3.365** (0.639)
School lag	1.593* (0.310)
Housing deprived from:	
Adequate material of floors/walls or access to sewage/water	0.869 (0.179)
Overcrowding	0.973 (0.219)
Demographic characteristics	
Age	1.186** (0.029)
Sex (Female = 1)	1.768** (0.193)
Self-reported ethnicity (1 = indigenous, afro descendant or rom, 0 = otherwise)	0.811 (0.161)
Rural areas (Yes = 1)	1.371 (0.242)
Constant	0.002** (0.001)
Observations	1754
Model	Logit OR

Source: Own calculations based on the 2015 CMHS. Notes: Standard errors in parentheses. Results use the sample weights that correct for non-response and structure of the total population. OR: Odds Ratios.

**p < 0.01, *p < 0.05.

5. Discussion

This paper analyses the association between multidimensional poverty and mental health among adolescents in Colombia. Our findings suggest that adolescents living in multidimensionally poor households are at greater risk of having a mental health problem. However, this relationship was not linear and appears to be stronger at the bottom of the deprivation index. We find that both deprivations directly experienced by the adolescent as well as deprivations experienced by other household members were strongly associated with the adolescents' own mental health. Importantly, it is deprivations associated with school, work, health insurance and employment which most strongly predict adolescent mental health; while we find no evidence that material household deprivations (e.g., material of floors/walls or access to sewage/water, overcrowding) are associated with adolescent mental health.

The main limitation of our analysis is that it relies on cross-sectional data and a purely correlational analysis. Therefore, our results have no causal interpretation. Our study relies on a single measure of mental health in the form of probable mental health problems and cannot be generalized to other mental health outcomes. Yet, despite these limitations, our results shed some light on the potential dimensions of poverty that may be important for adolescent mental health, which may be worthy of further investigation and analysis. Given that our analyses focus entirely on the Colombian context, to understand how results could be generalized to other upper-middle income countries, subsequent research address this issue by analysing the relationship between multidimensional poverty, income poverty and youth depressive symptoms in a cross-country setting using Mexican, South African and Colombian data (Zimmerman et al., 2022).

Our findings are in line with studies reporting significant

associations between unidimensional measures of poverty, e.g., income, parental education or low socio-economic status and mental health (Reiss, 2013; Lund et al., 2010; Ridley et al., 2020). Although the causal nature of this relationship is not yet well understand, evidence suggests that poverty may increase stress, exposure to trauma and violence, feelings of shame and social isolation as well as exposure to hazardous living conditions, all of which may contribute to worse mental health (Ridley et al., 2020).

Our results also suggest that the relationships between poverty and mental health is predominantly driven by the lowest half of the poverty distribution. Thus, a simple distinction between adolescents living in multidimensionally poor versus non-poor households might oversimplify the differences in the risk of mental health problems. Although we did not formally test for the functional form, we found this relationship to be non-linear. Local polynomials suggest that the relationship may be positive and stronger at the top of the C-weighted sum of deprivations; weak or absent in the centre of the distribution; and positive but weaker at the bottom of the distribution. To our knowledge only one study, based on a sample from Britain, has assessed the functional form of the relationship between poverty and mental health of children or adolescents, and also reports a non-linear relationship (Piotrowska et al., 2015).

Our analyses for specific dimensions of poverty-related deprivations suggest that deprivations experienced directly by the adolescent are more consistently and strongly associated with their mental health than deprivations experienced by other household members. We find that adolescents that work and attend school at the same time have substantially greater risk of having mental health problems compared to those that attend school but do not work. Although we do not have detailed information about the working conditions or time dedicated to this activity by the adolescent, it is plausible that the double burden of working and attending school may lead to increased levels of stress, exhaustion, and increased risk of mental health problems. These results are consistent with those obtained in a study of adolescents in Bangladesh, showing that mental health problems are highest among adolescents enrolled at school who are also working (Izutsu et al., 2006). A possible interpretation is that aspirations and expectations play an important role in the mental health of adolescents, and that combining education and work hampers the ability of adolescents to achieve their aspirations at school. Consistent with this view, studies in Colombia (Bedoya et al., 2019; Bernal et al., 2018) suggest that education is the most important aspiration identified by adolescents. Lybert and Wydick (2018) suggest that hope and aspirations are important factors underlying the relationship between poverty and psychological wellbeing. Based on the framework of goals, agency and pathways (Locke and Lantham, 1990; Snyder, 1994), they argue that individuals aspire to one of several possible life outcomes; and an aspiration creates a 'reference point' in such a way that outcomes might rise up to the aspiration point and utility diminishes after the aspiration has been realised. Failing to achieve aspirations, therefore, signifies a significant psychological loss (Heath, Larrick and Wu 1999). As such and in line with the research that finds a positive strong relationship between socioemotional development and education and adult outcomes (Jackson et al., 2020; and Deming, 2017), our result suggests that working while studying could jeopardized this virtuous cycle among adolescents.

On the other hand, we also find that having no access to healthcare or health insurance is strongly associated with adolescents' risk of suffering mental health problems, suggesting that aspirations may not be the only explanation. Enabling conditions to achieve a good health may also play an important role. Education and health capture two key dimensions of human capital that may be critical to the mental wellbeing of adolescents. While findings for health insurance may relate specifically to the treatment gap for mental health in Colombia (Kohn et al., 2018), this indicator may capture broader impacts of deprivations in health care which may influence adolescents' ability to accumulate human capital, which may in turn increase the risk of mental health problems.

Three household member deprivations were associated with adolescent mental health problems: whether any children under six years of age were lacking comprehensive childcare; whether an adult member was working in the informal sector; and whether an adult member experienced long term unemployment. These results suggest that stressful circumstances experienced by other members of the household, and not only those associated with the adolescent alone, can have implications for the mental health of the adolescent. Our results are consistent with those of Whitbeck et al., (1997) who found that parental working conditions and family economic hardship affect parenting behaviour and self-efficacy in adolescence. Similarly, Heymann and Earle (2001) find that parental working conditions affect the home environment, while Bubonya et al. (Bubonya et al., 2017) found that the mental health of adolescents is negatively affected by parental job loss. The role of the home environment in adolescent mental health is well documented in the literature (e.g., Basu and Banerjee 2020). Deprivations affecting the household may impact parental involvement in the adolescent's life and the overall quality of the home environment. Evidence suggests that higher parental involvement is associated with lower probability of a mental health problem (Wang et al., 2019; Hasumi et al., 2012). Literature also suggests that lower expectations from parents are associated with higher risk of internalising symptoms (Nguyen et al., 2018; Costa et al., 2006). Studies also report that adolescents exposed to family violence are at greater risk of a mental health problem during early adolescence, as do those exposed to alcohol problems and parental migration and dissolution.

6. Conclusion

Our results provide evidence that multidimensional poverty is associated with adolescent mental health and provide a nuanced picture of the role of different dimensions of poverty. We find that deprivations associated with *human capital,* such as those linked to schooling, work, health insurance and employment, are strongly associated with adolescent mental health. Adolescents lagging behind in school or those who are working while studying are significantly more likely to have mental health problems, as are adolescents living in a household without access to childcare, households with adult members being employed in the informal sector, and households facing long term unemployment. Public policies aimed at improving adolescents' and households' conditions in these dimensions of human capital may be targets for intervention that may improve adolescent mental health.

Credit author statement

Yadira Díaz: Conceptualization, Methodology, Software, Formal analysis, Writing – Original Draft. Phillip Hessel: Conceptualization, Methodology, Writing – Review & Editing, Funding acquisition. Mauricio Avendano: Conceptualization, Methodology, Writing – Review & Editing, Funding acquisition. Sara Evans-Lacko: Conceptualization, Writing – Review & Editing, Funding acquisition.

Data availability

The authors do not have permission to share data.

Annex 1. Dimensions, indicators, and weighting system of the CMPI

Dimension	Variable	
	Variable	Deprivation indicators A household is considered deprived if:
Household education conditions (0.2)	Educational achievement (0.1)	The average number of formal education year for members 15 and older is lower than 9 years.
	Literacy (0.1)	At least one member 15 and older does not know how to read and write
Childhood and adolescents' conditions (0.2)	School attendance (0.05)	At least one child between the ages of 6 and 16 in the household does not attend school
	No school lag (0.05)	At least one children or adolescents (7–17 years old) within the household is suffering from school lag (according to the national norm)
	Access to childcare services (0.05)	At least one child between the ages of 0 and 5 in the household does not have simultaneously access to health, nutrition and education
	Children not working (0.05)	At least one child between 12 and 17 years old in the household is working
Employment (0.2)	No one in long-term unemployment (0.1)	At least one member from the Economically Active Population (EAP) is facing long-term unemployment (more than 12 months)
	Formal employment (0.1)	At least one member from the EAP that is employed I not affiliated with a pension fund (formality proxy)
Health (0.2)	Health insurance (0.1)	At least one member over the age of 5 is not insured by the Social Security Health System
	Access to health services (0.1)	At least one member did not have access to a health institution in case of need
Access to public utilities and housing conditions (0.2)	Access to water source (0.04)	Urban households are considered deprived if they lack public water system access.
	Adequate elimination of sewer waste (0.04)	Rural household are considered deprived when the water used for the preparation of food is obtained from wells, rainwater, spring source, water tank, water carrier or other sources.
	Adequate floors (0.04)	Urban households are considered deprived if they lack access to a public sewer system.
	Adequate external walls (0.04)	Rural households are considered deprived if they use a toilet without a sewer connection, a latrine or simply do not have a sewage system.
	No critical overcrowding (0.04)	Households with dirt floors are considered deprived.

Source: Adapted from Angulo et al. (2016). Notes: Numbers within parenthesis indicate the assigned weight for each dimension and each indicator within each dimension.

Annex 2. Correlation matrix of the independent variables included in the CMPI used in the multivariate analyses

	Studying (not working) but lagged	Working (not studying)	Studying and working	Not studying & not working	No health insurance/access to services	Education (literacy/achievement)	Long term unemployment	No formal employment	Comprehensive child care	School lag	Adequate material of floors/walls or access to sewage/water
Working (not studying)	-0.166										
Studying and working	-0.172	-0.040									
Not studying & not working	-0.288	-0.068	-0.070								
No health insurance/access to services	-0.023	0.054	0.018	0.056							
Education (literacy/achievement)	0.100	0.099	0.013	0.101	0.022						
Long term unemployment	-0.020	0.067	0.022	0.027	0.034	0.075					
No formal employment	0.011	0.050	0.063	0.073	0.066	0.274	0.196				
Comprehensive child care	0.018	0.026	-0.024	0.044	0.037	-0.030	-0.021	0.025			
School lag	0.157	0.023	-0.018	-0.017	-0.018	0.127	-0.020	0.093	0.008		
Adequate material of floors/walls or access to sewage/water	0.040	0.031	0.010	0.017	-0.005	0.201	0.106	0.165	0.016	0.132	
Overcrowding	0.130	-0.025	-0.021	0.074	-0.037	0.148	0.003	0.133	0.064	0.229	0.183

Source: Own calculations based on the 2015 CMHS. Sample size: 1754.

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