Child marriage and the mental health of adolescent girls: a longitudinal cohort study from Uttar Pradesh and Bihar, India

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Summary

Background There has been much speculation about the role of inequitable gender norms and early marriage in mental health and suicide risks in girls and young women, but no prospective study has yet investigated this relationship. Understanding these links has become particularly important in the context of the COVID-19 pandemic which has led to increased risk of child marriage in the most vulnerable girls.

Methods We examined the association between early marriage and mental health in girls using data from Understanding the Lives of Adolescents and Young Adults (UDAYA), a longitudinal study in adolescents in Uttar Pradesh and Bihar, India. The study included girls who were unmarried at wave 1 (2015–2016) and participated at wave 2 data collection (2018–2019). Information on mental health (Patient Health Questionnaire-9 (PHQ-9)), suicidal thoughts, plans and attempts were collected at both waves. Logistic regression with survey weights was used to estimate the association between marrying between the two waves and mental health.

Findings Between waves 1 and 2, 1825 (23%) participants (n = 7864) married. Unmarried girls with depressive symptoms (PHQ score≥9) at wave 1 had greater odds of transitioning into marriage by wave 2 than those without (adjusted-OR 1.5; 95% CI 1.1 to 2.0). The odds of wave 2 depressive symptoms were higher in newly married vs unmarried girls (adjusted-OR 2.0; 95% CI 1.6–2.5). Among newly married girls, the odds of depressive symptoms were higher for those who experienced any abuse than those who did not (adjusted-OR 1.6; 95% CI 1.2-2.2). This effect was larger for girls who had not given birth (adjusted-OR 2.2; 95% CI 1.4–3.3).

Interpretation Our findings show poor mental health preceded and was a consequence of child marriage. Mental health should be considered in policies and programming aimed at reducing early marriage; equally the mental health of young brides should be a focus for community and maternal health services.

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Keywords: Child marriage; Girls; Mental health; India

Introduction

One-third of girls in South Asia are married before the age of 18, and 8% before 15 years.[1] India accounts for a third of child brides globally with 16% of adolescent girls aged 15–19 currently married.[2] There has been much speculation about the mental health consequences of early marriage (defined as marriage before 18 years of age) for girls, but no prospective study has investigated the relationship.[3] Child marriage profoundly changes a girl's life chances with loss of education and contact with families and peers. Higher rates of unintended pregnancy and domestic violence pose further risks.[4,5] Understanding these links has become even more important in the context of the COVID-19 pandemic where economic stress, parental deaths, and school closures could increase rates of child marriage in the most vulnerable girls.[6]

Most prospective studies examining the effects of marriage in adolescent girls have focussed on sexual and reproductive health. Additionally, there is a lack of

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Research in context

Evidence before this study

A nationally representative mortality survey in India found suicide rates in 15- to 29-year-old females twice as high as in high-income countries. Early marriage, reflecting underlying gender norms, might contribute to both mental health problems and high suicide rates. We searched PubMed and google scholar reports to understand the mental health effects of marriage in females during adolescence using the search terms "marriage", "early marriage", "females", "girls", "child", "mental health", "depression", "death", "cause of death", "mortality", "self-harm", "suicide", "India" on May 30, 2021, without language or publication date restrictions. There were associations reported between early marriage depression, suicide and self-harm but no previous longitudinal studies.

Added value of this study

This study provides a comprehensive assessment of the association between poor mental health and early marriage in females in India in representative adolescent samples from two states. It confirms poor mental health as a risk factor for early marriage. Additionally, the study confirms that early marriage heightens risks for depression and suicidality. It furthermore establishes abuse within marriage as an additional risk factor for mental health problems and suicide risks in girls.

Implications of all the available evidence

The study illustrates the importance of integrating mental health perspectives into programming targeting child marriage. Equally, a narrow focus on mental health and suicide prevention, without taking into consideration the broader context of early marriage and inequitable gender norms, seems unlikely to be successful in shifting the mental health profile of girls and young women.

definitive understanding of which social determinants can be targeted to improve mental health outcomes in various populations.[7] The knowledge gaps limit strategies needed to address the mental health needs of married adolescent girls.

Early marriage may also play a role in high suicide rates among young girls in South Asia.[8] According to the World Health Organisation (WHO) data, the ratio of male: female age-standardised suicide death rates in Southeast Asia (which includes Bangladesh, India, Nepal and Sri Lanka) is 1.57: 1 as compared to the ratio of close to 3:1 in high-income countries showing a much narrower gender gap (i.e. higher age-standardised suicide rates in females as compared to males in Southeast Asia as compared to high-income countries).[9] The female age-standardized suicide death rate in Southeast Asia is much higher (11.5 per 100,000) as compared to the global female average (7.5 per 100,000).[9] A study of female adolescents in Ethiopia observed elevated rates of suicidal thoughts or attempts related to early marriage.[10] However, given the cross-sectional design, the study could not elucidate whether poor mental health preceded or was a consequence of early marriage.

In this paper, we investigate the associations between adolescent marriage, depressive symptoms and suicide risks using data from the prospective Understanding the Lives of Adolescents and Young Adults (UDAYA) study.[11,12] This is a representative longitudinal study in adolescents in the states of Bihar and Uttar Pradesh in India. Its rich data on confounders, including socio-economic disadvantage and mental health before marriage, offers an outstanding opportunity to characterise the association of mental health problems with early marriage.

The objectives of this study were:

1. To examine if girls with mental health problems were more likely to enter marriage compared with their peers without mental health problems
2. To assess the association between transitioning to marriage and future mental health, while accounting for mental health prior to marriage, in adolescent girls in an Indian context
3. To assess the association of childbirth, and abuse (physical, emotional, or sexual) within marriage, and depressive symptoms.

Methods

The study was conducted in the states of Bihar and Uttar Pradesh in India. Uttar Pradesh is the most populous state in India with 199.8 million people (17% of national population) and Bihar is the third most populous state with a population of 104.1 million.[13] The majority reside in rural areas (89% in Bihar and 78% in Uttar Pradesh).[13] The per capita income is well below the national average making them the poorest among all the states and union territories in India.[14] Furthermore, both states are part of the Northern India, one of the two geographic areas where child marriage rates are persistently high.[5] According to the National Family Health Survey-5 (a survey focused on maternal and child health outcomes among a nationally representative sample of girls in India) conducted in 2019–2020, 40.3%

of women aged 18–29 years were married before age 18 in Bihar and 18.8% in Uttar Pradesh.[15]

Study participants and data collection

UDAYA is a longitudinal representative study of 10 to 19-year-old adolescents in Bihar and Uttar Pradesh.[11,12] The baseline survey (wave 1) was conducted in 2015–2016, and the follow-up survey (wave 2) was conducted in 2018–2019. In this paper, we used data of unmarried adolescent females at wave 1 and for whom data from both waves were available, but as described below both unmarried and married females as well as males were recruited into the UDAYA study.

The study used a systematic, multi-stage stratified design to draw independent sampling areas for rural and urban areas. A total of 150 primary sampling units (PSUs) (villages in rural areas and census wards in urban areas) were selected in each state using the 2011 census list. The selected PSUs were mapped, and a household list was prepared. Each PSU was then divided into two nearly equal segments, from which one segment was randomly chosen for conducting interviews with females and the other segment used for interviews with males (married females were interviewed in both segments to meet the sample size requirement of the original UDAYA study). Systematic sampling was used to select households in each segment for interviews, which were conducted in three categories: younger females (10–14 years), unmarried older females (15–19 years), and married older females (15–19 years) in the female segment, and younger males (10–14 years), older males (15–19 years), and married older males (15–19 years) in the male segment. A maximum of three interviews with no more than one respondent per category were conducted in each selected household. If there were more than one respondent in a single category, Kish table was used to randomly select a respondent. The respondent thus selected was not allowed to be replaced. The response rate in wave 1 was 92% and 20,594 adolescents (14,625 females, 9732 unmarried females) were interviewed using an age-appropriate structured questionnaire in Hindi.

At the time of wave 2 data collection (2018–19), 6% of female participants had immigrated and could not be tracked and another 6% refused to participate. The remaining 12,251 female participants were reinterviewed, but 3% gave inconsistent responses related to age and education, and were, thus, excluded. The effective follow-up rate for females was 81% (n = 11,864).

Our study sample comprised unmarried adolescent females at wave 1 and for whom data from both waves was available (n = 7864, including n = 257 females who were married without "*gauna*" at wave 1). "Gauna" is a term used locally for a ceremony that indicates the start of marital life and the consummation of the marriage. If the girl is married but "gauna" has not occurred, the girl continues to stay with her parents. The dataset available for download includes computed survey weights for the entire sample and each state (used in the current report).

Interviews of boys and girls were undertaken in separate segments of each PSU to maintain privacy. Names were not recorded in the computer form in which data were collected. Interviewers conducted interviews in locations that offered privacy for the interview, skipped to relatively non-sensitive sections in case the interview was observed by parents or other family members, called upon a fellow interviewer to engage the bystander, and terminated interviews if privacy could not be ensured.

Every team had one field editor responsible for back-checks and quality control of interviews and one supervisor responsible for the overall management of fieldwork, team-related logistics and for assisting in field editing and back-checking. A field coordinator oversaw fieldwork, ensured correct survey procedures were followed and data quality was maintained. Each team filled quality control sheets to provide information on response rates in each PSU. Population Council of India staff monitored and supervised data collection operations during field visits. Additionally, the staff generated field quality tables from the data received from the teams on a regular basis. More details about the interviews, interviewers' selection and training can be found in the earlier published reports.[11,12]

Measures

At wave 1 and 2 interviews, information was collected about respondent's education, their literacy and numeracy levels, work, growing up experiences (related to physical health, exposure to various programmes, migration etc.), agency (e.g. aspirations), exposure to mass and social media, awareness of sexual and reproductive health matters, awareness of government programmes, sexual activity, marriage (a single question with seven options related to marital status with two follow-up questions about marriage date and number of times married), health including nutritional status and mental health, family life and sex education, civic participation, and experience and perpetration of violence. For girls who got married by wave 2, data on marriage including the relationship with husband, abuse, and pregnancy was also collected during the wave 2 interview. Interview questionnaires used for wave 1 and 2 can be accessed from www.projectudaya.in. For participants who had migrated between wave 1 and 2 and could be tracked (n = 95), wave 2 data collection was conducted using telephone interviews. Sensitive data regarding sexual experiences and violence was not gathered over telephonic interviews for privacy and safety purposes.

Population Council of India staff conducted the training of interviewers, while external experts from Sangath (NGO working in mental health) trained interviewers in administering the mental health section of the questionnaire. Overall, 100 young men and women underwent interviewer training, and 35 young men underwent training for household mapping and listing exercises. On the basis of the performance, 80 young men and women were recruited as field investigators and 30 young men were recruited for the household mapping and listing exercise. Interviewers underwent extensive training in ethical issues. Interviewers for the interviews were divided into 10 teams. Each team consisted of three male and five female investigators. Female investigators conducted interviews for girls and male investigators conducted interviews for boys.

The Patient Health Questionnaire-9 (PHQ-9) was used to collect data on depressive symptoms at both waves (Hindi version).[16] The PHQ-9 is a standard depression screening instrument used globally, and has been validated in Indian settings.[17] It covers questions about a range of depressive symptoms including feeling hopeless, trouble with sleep, lack of energy or pleasure in activities and concentration over the past 15 days or 2-week period. The responses are recorded as "not at all", "less than one week", "one week or more" and "nearly every day", coded from 0 to 3, and are used to create a summary depressive symptoms score ranging from 0 to 27. For the purpose of this paper, we used scores of $\geq$9 as the cut-off value for moderate to severe depressive symptoms (hereafter depressive symptoms) as in a validation study for PHQ-9 in Indian adolescents, score of 9 showed a better sensitivity as compared to a score of 10 for ICD-10 diagnosis of depression.[17]

At both waves, suicidal ideation was measured using a single question put to adolescents older than 13 years of age, "during the past one year, did you ever seriously consider attempting suicide?". Response categories included "yes", "no" and "I don't want to answer".[18] The latter category was treated as missing in the present study. Those participants who responded "yes" to contemplating suicide were then asked, "during the past one year, how many times did you actually attempt suicide". One attempt or more was considered as any suicide attempt being present.

In wave 2 interview, girls who entered marriage between waves 1 and 2 were asked about different forms of abuse from their husband. There were seven questions related to physical abuse (example: has your husband slapped you, dragged or beaten you up); one question related to sexual abuse (has your husband ever forced sex); and one related to emotional abuse (does your husband humiliate you in front of others). A single binary abuse variable was created, coded as 1 if having answered 'yes' to any abuse item, or 0 if answered 'no' to all abuse items. Childbirth was recorded based on response to a single question about pregnancy and its outcome (have you ever been pregnant, if yes, how old you were when you became pregnant and what was the outcome of pregnancy), coded as 1 if reporting to have had childbirth and 0 if not.

Statistical analysis

Baseline characteristics collected at wave 1, and mental health at wave 1 and 2 were described for girls who remained unmarried between the two waves, and those who married, using number and percentage for categorical variables and mean (standard deviation (SD)), or median (interquartile range (IQR)) for continuous variables. Baseline characteristics were also described for 9732 girls, unmarried at wave 1, in the complete UDAYA study sample and 7864 girls with information available at both waves.

Objective 1: Transition to marriage by history of mental health problems

We estimated the association between mental health problems at wave 1 (depressive symptoms, seriously contemplated suicide at least once, and attempted suicide at least once) as the predictor and odds of transitioning to marriage by wave 2, using logistic regression models with computed survey weights applied. Models were adjusted for age at wave 1. From these models, we also estimated the proportions (and corresponding 95% confidence intervals (CIs)) of unmarried and newly married girls who at wave 1 had history of mental health problems.

Objective 2: Association between transitioning to marriage and mental health outcomes

Logistic regression models with survey weights applied were used to estimate the odds ratios (OR) and 95% CIs for the association between entering marriage and mental health outcomes (wave 2 depressive symptoms, contemplating suicide at least once, or attempting suicide at least once). Models were adjusted for baseline confounders identified *a priori*, which were state, caste, age at wave 1, household income quintile at wave 1, and level of education at wave 1. Model for wave 2 depressive symptoms as the outcome was additionally adjusted for wave 1 PHQ total score, while models for contemplating suicide at least once and attempting suicide at least once were respectively adjusted for contemplating suicide at least once and attempting suicide at least once at wave 1.

Objective 3: Association between childbirth and abuse within marriage and depressive symptoms

For newly married girls, proportions of those with childbirth or experience of any abuse and age at marriage (median, interquartile range, mean and standard deviation) were reported overall and by depressive symptoms at wave 2. Then, for these participants, the odds ratios (and 95% CIs) for the association between

childbirth, any abuse, and age at marriage and depressive symptoms at wave 2 were estimated using logistic regression models, adjusted for baseline confounders (state, caste, wave 1 PHQ total score, household income quintile at wave 1, and level of education at wave 1, and age at marriage for abuse and childbirth) and survey weights applied. We also report results from an additional analysis that included both abuse and childbirth variables and an interaction term between the two.

None of the variables, except variables related to suicide, had missing values. Analyses including variables related to suicide were performed using complete cases (i.e., after excluding participants with missing data). All analyses were performed using STATA SE version 17.

The analyses assume that within each state, the impact of early marriage on mental health is the same. To explore whether the associations between marriage and mental health outcomes were different in Bihar and Uttar Pradesh, we repeated all analyses separately for each state.

We followed the STROBE statement for reporting this paper.[19]

Results

Out of 7864 unmarried girls at wave 1 who completed wave 2 data collection, 1825 (23%) girls married between the two waves (Table 1). Compared to unmarried girls, newly married girls were more likely to be from Bihar state (61% vs 42%), from backward classes (including scheduled caste, scheduled tribe, other backward classes, 88% vs 76%), from households with the lowest income (16% vs 8%), and with no schooling at wave 1 (11% vs 5%). The median age at first wave was 17 years (IQR 16–18) (mean age 16.8 (SD 1.5)) for newly married girls and 16 years (IQR 15–17) (mean age 15.5 (SD 2.3)) for unmarried girls (Table 1). Baseline characteristics of the overall sample of girls who were unmarried at wave 1 (n = 9732) were comparable to those included in this study with the information available for both waves (Supplementary Table S1).

At both waves, a higher proportion of newly married girls had mental health problems than their unmarried peers. In both groups (newly married and those who remained unmarried), depressive health symptoms were higher at wave 2 compared with wave 1. However, the difference in proportion of those with high depressive symptoms was wider between the two groups at wave 2 (19% vs 10% newly married vs those who remained unmarried), compared with wave 1 (9% vs 5%) (Table 1).

Mental health problems at wave 1 were predictive of the odds of transitioning into marriage by wave 2 (Table 2). Unmarried girls with depressive symptoms (PHQ score≥9) at wave 1 had one and a half times the odds of transitioning into marriage by wave 2, as compared to those without depressive symptoms (adjusted-OR 1.5; 95% CI 1.1 to 2.0). For girls with depressive symptoms, 31.8% (95% CI 25.9 to 37.7) transitioned into marriage by wave 2, compared with 24.3% (95% CI 22.4 to 26.2) of girls without depressive symptoms. Similarly, girls who contemplated or attempted suicide at wave 1 were more likely to transition into marriage by wave 2 compared with their peers who did not.

After adjustment for baseline confounders including PHQ scores at wave 1, a higher proportion of newly married girls (16.3%; 95% CI 14.0 to 18.7) had depressive symptoms at wave 2, compared with unmarried girls (9.1%; 95% CI 8.0 to 10.3), corresponding to double the odds of depressive symptoms at wave 2 in newly married vs unmarried girls (adjusted OR 2.0; 95% CI 1.6 to 2.5). Also, newly married girls had higher odds of contemplating suicide (1.5; 95% CI 1.1 to 2.1) or attempting suicide at wave 2 (1.4; 95% CI 0.7 to 3.0) compared with unmarried girls (Table 3).

For newly married girls, median age of marriage was 18 years (IQR 16–19) and was similar for those with and without depressive symptoms at wave 2. Half of the newly married girls experienced some form of abuse in the marital unit (20% emotional abuse, 24% physical abuse, and 36.2% sexual abuse). A higher proportion of married girls who experienced abuse had moderate to severe depressive symptoms at wave 2 (58.5% compared with 35.5% in those without) (Table 4). Among newly married girls, those who had experienced any abuse had higher odds of having depressive symptoms at wave 2 compared with those who did not (OR 1.6; 95% CI 1.2 to 2.2). No associations were found between age at marriage or childbirth and depressive symptoms (Table 5). However, there was an evidence for an interaction between experience of abuse and childbirth (interaction coefficient 0.5; 95% CI 0.4 to 0.8), with the odds of depressive symptoms associated with abuse halved among those with childbirth vs those without (the OR for the effect of abuse on depressive symptoms 1.1; 95% CI 0.7 to 1.8 among those with childbirth and 2.2; 95% CI 1.4 to 3.4 among those without childbirth) (Tables 5).

State specific findings are provided in the supplementary material (Supplementary Tables S2–S5). For depressive symptoms and contemplated suicide the state-specific results were comparable to each other and to the overall results. The point estimate for attempted suicide was stronger for Bihar but the 95% CIs were extremely wide and overlapped.

Discussion

Almost a quarter of the girls married during the study's three-year follow-up. Girls who married had lower education levels and were from poorer households, consistent with findings from India's National Family Health Survey 3 and 4, where greater wealth and

Total number of adolescents girls	n = 7864	
	Unmarried	Newly married
	n = 6039	n = 1825
Household characteristics at wave 1		
State, n (%)		
Uttar Pradesh	3496 (57.9)	707 (38.7)
Bihar	2543 (42.1)	1118 (61.3)
Caste of the head of the household in 4 categories, n (%)		
SC/ST	1169 (19.4)	437 (23.9)
OBC	3426 (56.7)	1174 (64.3)
General	1444 (23.9)	214 (11.7)
Combined household wealth quintile, n (%)		
1 (lowest income quintile)	501 (8.3)	294 (16.1)
2	760 (12.6)	380 (20.8)
3	1115 (18.5)	433 (23.7)
4	1715 (28.4)	450 (24.6)
5	1948 (32.3)	268 (14.7)
Participant characteristics at wave 1		
Age, years		
Median (IQR)	16.0 (15.0–17.0)	17.0 (16.0–18.0)
Mean (SD)	15.5 (2.3)	16.8 (1.5)
Years of schooling, n (%)		
None	291 (4.8)	200 (11.0)
1–4yrs	566 (9.4)	94 (5.2)
5–7yrs	1236 (20.5)	329 (18)
8–9yrs	1746 (28.9)	573 (31.5)
10–11yrs	1315 (21.8)	369 (20.2)
12 and above	885 (14.7)	260 (14.2)
Mental health measures at wave 1		
PHQ≥9 (depressive symptoms), n (%)	311 (5.1)	157 (8.6)
PHQ, total score median (IQR)	0.0 (0.0–2.0)	0.0 (0.0–4.0)
Seriously contemplated suicide at least once, n (%)	190 (3.7)	104 (5.8)
Not asked/don't want to answer[a]	847 (14.0)	19 (1.0)
Attempted suicide at least once, n (%)	28 (0.5)	27 (1.5)
Not asked/don't want to answer[a]	849 (14.1)	19 (1.0)
Mental health measures at wave 2[b]		
PHQ≥9 (depressive symptoms), n (%)	609 (10.1)	349 (19.1)
PHQ, score median (IQR)	2.0 (0.0–5.0)	3.0 (1.0–7.0)
Seriously contemplated suicide at least once, n (%)	356 (6.0)	177 (10.0)
Not asked/don't want to answer[a]	58 (1.0)	59 (3.2)
Attempted suicide at least once, n (%)	76 (1.3)	46 (2.5)
Not asked/don't want to answer[a]	60 (1.0)	59 (3.2)[b]

Abbreviations: n, number of adolescents; SD, standard deviation; SC, scheduled caste; ST, scheduled tribe; OBC, other backward classes; IQR, interquartile range; PHQ, Patient Health Questionnaire. [a]Suicide question was not asked from those age under 13 years (n = 837, 10% of the sample at wave 1). [b]Suicide question not asked to those interviewed on telephone (n = 56).

Table 1: **Descriptive characteristics and mental health of 7864 girls in the UDAYA study, stratified by change in marital status at follow-up.**

education in the population was associated with a reduction in rates of early marriage between 2006 and 2016.[20] We found a reciprocal relationship between poor mental health and early marriage. Girls who married in the course of follow-up had poorer mental health at baseline compared to their unmarried peers. However, after taking into account baseline mental health, these girls had an even higher risk of mental health problems at follow-up, whether assessed by depressive symptoms or indicators of suicide risk. An experience of abuse perpetrated by the husband was associated with poorer mental health in newly married girls at follow-up, with the association stronger in those who had not given birth. Childbirth, within itself, did not appear to affect the likelihood of reporting depressive symptoms.

Predictor	at wave 1	OR (95%) for transition into marriage	Proportion % (95%CI) who transitioned into marriage by wave 2
Depressive symptoms	PHQ <9	1 (ref)	24.3 (22.4–26.2)
	PHQ ≥9	1.5 (1.1–2.0)	31.8 (25.9–37.7)
Contemplated suicide	No	1 (ref)	27.0 (24.9–29.1)
	Yes	1.8 (1.3–2.5)	39.4 (31.4–47.3)
Attempted suicide	No	1 (ref)	27.4 (25.3–29.5)
	Yes	3.3 (1.6–6.9)	54.5 (37.1–71.8)

Abbreviation: CI, confidence interval.

Table 2: **Association between mental health problems at wave 1 as predictors and odds of transitioning into marriage by wave 2 adjusted for age and proportion of girls without and with mental health problems at wave 1 who transitioned into marriage by wave 2 (Objective 1 Transition to marriage by history of mental health problems; n included in analysis = 7864).**

In this paper we made use of a unique longitudinal study. The dataset was large and included a representative sample of girls in Uttar Pradesh and Bihar, two of the most populous states in India. While loss to follow up was fairly large in this study (20%), a comparison between overall sample and those included in this analysis suggests that any differences in terms of the baseline characteristics between the two groups were minor (Supplementary Table S1). We had rich data on confounders, including mental health, education, and household income prior to marriage, but residual confounding cannot be ruled out. This is particularly true for analysis of the mental health consequences of abuse and childbirth among newly married girls, where we did not have measures for potential confounders such as the education and socioeconomic position of husbands. Additionally, we did not have information about any help received by adolescents with mental health distress and/or those who had attempted or contemplated suicide.

The higher proportion of newly married girls with mental health problems at the study outset might be related to pre-existing difficulties including disengagement from education and family stressors.[3,21] In the Young Lives study tracing life trajectories of 12,000 children since 2002 across four countries (Ethiopia, India, Peru and Vietnam), staying in school for longer and higher maternal aspirations for their daughters' education were protective against early marriage. Conversely, limited household resources resulted in enhanced gendered social risks such as early marriage for girls.[22] Marriage is an important developmental transition in the life of a girl influenced by a complex interaction of physical and psychological factors, and social environment. Social factors such as poverty, academic

	Odds ratio (95% CI)	Estimated proportion[a] % (95% CI)
PHQ ≥9 (depressive symptoms)		
Not married	1 (ref)	9.1 (8.0–10.3)
Newly married	2.0 (1.6–2.5)	16.3 (14.0–18.7)
Contemplated suicide		
Not married	1 (ref)	5.3 (4.5–6.1)
Newly married	1.5 (1.1–2.1)	7.9 (6.0–9.7)
Attempted suicide		
Not married	1 (ref)	1.3 (0.8–1.8)
Newly married	1.4 (0.7–3.0)	1.9 (0.9–2.8)

Abbreviations: CI, confidence interval. All models were adjusted for age (in years at wave 1), state, caste (wave 1), education level (wave 1), and household income quintile (wave 1). Model with depressive symptoms as the outcome were additionally adjusted for PHQ score (wave 1), while models with contemplated suicide or attempted as the outcomes were respectively adjusted for contemplated suicide (wave 1) and attempted suicide (wave 1). [a]Estimated proportion (%) of individuals, while holding confounders at their average values in the cohort.

Table 3: **Proportion and association of marital transition with mental health outcomes at follow-up in 7864 girls stratified by change in marital status (Objective 2 Association between transitioning to marriage and mental health outcomes).**

	Total	PHQ <9	PHQ ≥9
	N = 1825	N = 1476	N = 349
Age at marriage (years)			
Median (IQR)	18.0 (16.0–19.0)	18.0 (16.0–19.0)	18.0 (17.0–19.0)
Mean (SD)	17.7 (1.9)	17.7 (1.9)	17.6 (1.8)
Experienced any abuse[a], n (%)			
No	827 (45.3)	703 (47.6)	124 (35.5)
Yes	907 (49.7)	703 (47.6)	204 (58.5)
Missing	91 (5.0)	70 (4.7)	21 (6.0)
Childbirth, n (%)			
No	911 (49.9)	736 (49.9)	175 (50.1)
Yes	914 (50.1)	740 (50.1)	174 (49.9)

IQR, interquartile range; SD, standard deviation. [a]abuse-physical, emotional or sexual abuse.

Table 4: **Proportion of depressive symptoms in 1825 girls who married during follow-up stratified by the experience of abuse and childbirth respectively (Objective 3 Association between childbirth and abuse within marriage and depressive symptoms).**

	Odds Ratio (95% CI)
Estimate from regression models that did not include interaction term	
Age at marriage, per year increment	1.0 (0.9–1.1)
Experienced any abuse in marriage vs not	1.6 (1.2–2.2)
Had childbirth vs did not	0.7 (0.5–1.0)
Estimate from regression models that included both any abuse and childbirth variables and an interaction term between the two	
Experienced any abuse in marriage vs not:	
among girls without childbirth	2.2 (1.4–3.3)
among girls with childbirth	1.1 (0.7–1.8)
Had childbirth vs did not:	
among girls without experience of any abuse	1.1 (0.6–1.9)
among girls with experience of any abuse	0.5 (0.4–0.8)

Abbreviations: CI, confidence interval. Models adjusted for state, caste, education level (wave 1), household income (wave 2), PHQ score at wave 1, models for experienced any abuse and childbirth additionally adjusted for age at marriage.

Table 5: **Associations between age at marriage, experience of any abuse, and childbirth and depressive symptoms among 1825 newly married girls (Objective 3 Association between childbirth and abuse within marriage and depressive symptoms).**

difficulties and maladjustment along with mental health problems could lead to the family and the girl deciding in favour of an early marriage.[22] In some cases, the prospect of improving social status via marriage might be an attempt to alleviate low self-esteem and confidence commonly associated with depressive symptoms. In such a circumstance, directly addressing mental health in policies and programming to prevent child marriage would make sense.

Our findings are consistent with harmful mental health consequences arising from early marriage including depressive symptoms, and suicidal thoughts and attempts. An additional association of abuse in marriage with worse mental health is consistent with findings from gender-based violence research in South Asia and Africa.[23] For adult women in India, physical and sexual violence perpetrated in married life has been linked to depressive disorders and attempted suicide.[24] Such risks are likely to be greater for girls, given their limited physical, psychological and financial resources.[22] It is possible that the birth of a child may reduce the risks for mental health problems, either because a mother is valued more within a family or when the pressure to produce a child has been a cause of abuse. It is also possible that having a nurturing relationship with a baby may have a beneficial emotional impact in the context of marital abuse.

Early marriages have been a priority area for public health policy makers who have tried to understand the contribution of demographic risk factors such as education and household income.[22] However, most policy measures have targeted socio-ecological factors for reducing child marriage and overlooked poor mental health as either a risk for, or a consequence of marriage.[25] Interventions enhancing a young woman's own human capital and opportunities (e.g. interventions to support girls' education by cash or in-kind transfers) have proved more effective in delaying marriages than those targeting families, perhaps consistent with the need to consider poor mental health as a contributing factor.[26]

The study findings add to the case for integrating the social, emotional and mental health needs of girls into programs and policies focused on child marriage. Interestingly, 45% of girls married before 18 years of age (current legal age for marriage in girls in India) whereas 21% of adolescent girls married at 18 years of age in our sample highlighting the urgent need to use multipronged approaches to address the underlying causes of child marriage. Legislative measures such as increasing legal age of marriage for girls might not be very helpful when the drivers of early marriage include limited social resources, lack of education opportunities for girls, poor adjustment in academic context, and mental health problems with marriage as a perceived escape for the parents and the girl. Universal interventions to promote a greater connection to school such as a recently trialled SEHER intervention in the state of Bihar, may help in reducing both school dropout and mental health problems in girls.[27] Targeted interventions such as counselling services for girls vulnerable to early marriage might be prioritised through Adolescent Friendly Health Clinics under National Adolescent Health Programme (Rashtriya Kishor Swasthya Karyakram) launched in 2014.[28] Similarly, girls who have married early should be considered as a group at high risk for mental health problems by community and primary health care workers. Under the Integrated Child Development Scheme, Aanganwadi workers can not only be trained to identify common mental health problems but deliver mental health interventions to the adolescent girls.[29]

Our study illustrates the importance of integrating mental health perspectives into programming targeting child marriage. Equally, a narrow focus on mental health and suicide prevention, without taking into consideration the broader context of early marriage and inequitable gender norms, seems unlikely to be successful in shifting the mental health profile of girls and young women.

Box 1. Legal context of child marriage in India

In India, Prohibition of Child Marriage Act, 2006 prohibits the marriage of girls below the age of 18 years and boys below the age of 21 years. An earlier Child Marriage Restraint Act passed in 1929 had set a minimum legal age for marriage for girls at 14 years and for boys at 18 years which was amended to 18 years for girls, and 21 years for boys in 1978.[30] In 2008, Law Commission made a recommendation to make the legal age of marriage for boys and girls uniform at 18 years as they did not find any rational basis for the age disparity in marriage.[30] However, the recommendation was not followed through. In 2021, Prohibition of Child Marriage (Amendment) Bill was introduced in Indian Parliament to increase the minimum age of marriage for females from 18 to 21 years (at par with males) in response to the recommendations of a task force set up by Central Government that assessed the correlation of age of marriage and motherhood with health, well-being, and nutritional status of mother and child, during pregnancy, birth and thereafter taking into consideration key parameters such as Infant Mortality Rate, Maternal Mortality Rate, Total Fertility Rate, Sex Ratio at Birth, Child Sex Ratio.[31] The Bill was referred to the Standing Committee on Education, Women, Children, Youth, and Sports in December 2021 for further discussion. This started a debate about the pros and cons of using legislative measures to reduce child marriage and the possibility of law curtailing the freedom of choice for adult women, being misused against consenting adults wanting to marry, and a possible increase in sex-selective practices (such as female infanticide as daughters are often considered a liability in Indian context, increasing the legal age of marriage by another three-years would mean increased perceived burden for the families).

Contributors

SA was involved in conceptualisation, accessing data, formal analysis, validation, writing – original draft, and writing review and editing. KF was involved in conceptualisation, data curation, formal analysis, validation, visualisation, writing review and editing. GD was involved in conceptualisation, data curation, guiding data analysis, validation, visualisation, writing review & editing. GP was involved in conceptualisation, guiding data analysis, writing review & editing.

Data sharing statement

Interview questionnaires used for UDAYA wave 1 and 2 can be accessed from www.projectudaya.in. UDAYA wave 1 and 2 de-identified data can be accessed from data repository at Harvard Dataverse.

All data used in this paper is available for download from Harvard Dataverse https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/RRXQNT https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/ZJPKW5.

Declaration of interests

None.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.lansea.2022.100102.

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