



Risk Factors for Early Sexual Intercourse in Adolescence: A Systematic Review of Cohort Studies

Larissa F. Reis¹ · Pamela J. Surkan² · Kaitlyn Atkins² · Rodrigo Garcia-Cerde¹ · Zila M. Sanchez¹

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Abstract

This systematic review provides a comprehensive assessment of risk factors related to early sexual intercourse (ESI) among adolescents. We used PRISMA guidelines to identify eligible cohort studies published between January 1999 and December 2020. We searched on three databases: PubMed, Embase and LILACS. Studies were screened for quality and eligibility. Of 2787 identified studies, seven met our inclusion criteria. The studies examined a range of factors, which were organized into four dimensions – individual, family, social and environmental, and sociodemographic. Risk factors with strong associations for ESI were: adolescent and parental substance use, aggression and conduct disorders, family attachment, school achievement, family living situation, and maternal education. Three studies were birth cohorts. This review demonstrates the important roles of substance use, family attachment and academic factors in shaping adolescents’ sexual behavior. A strength of this review is its focus on longitudinal studies, enabling exploration of exposures collected before initiation of sexual intercourse.

Keywords Early sexual intercourse · Adolescence · Risk factors · Cohort studies · Systematic review

Introduction

Adolescents face multiple physical, emotional and social changes associated with the process of maturation, which can pose challenges [1]. Among these experiences, early sexual intercourse (ESI) in adolescence is associated with problems in health and social development, e.g. a greater likelihood of sexually transmitted infections (STIs), substance

use [2] and unintended pregnancies, leading to enormous costs to both individuals and to society [3]. Although there is lack of consensus about the age at which sexual intercourse is considered “early,” many consider before age 15 to be precocious [4].

The onset of sexual intercourse at younger ages remains a concern in public health because it is related to a wide range of negative health outcomes in adolescence, which can last into young adulthood [5]. Unsafe sex, defined as sex without a condom, is associated with ESI, which can lead to short- and long-term consequences [6]. These include unintended pregnancy [7] and STIs [8]. In the mental health domain, ESI has been linked to substance use [9], eating disorders [10], low self-esteem [11], antisocial personality [12], depression [13], suicidal ideation, and suicide attempts [14]. Regarding the social sphere, ESI tends to cluster with multiple sexual partners [15], unsafe abortion or abortion-related death [16], physical aggression [17], teen dating violence [18], and poor school performance [19]. Some researchers believe that adolescents’ intentions to engage in risky sexual behaviors are related to sensation seeking (a personality trait that makes an individual pursue new and exciting stimuli) [20], a phenomenon common during early adolescence [21].

✉ Zila M. Sanchez
zila.sanchez@gmail.com; zila.sanchez@unifesp.br

Larissa F. Reis
larissaferraz21@gmail.com

Pamela J. Surkan
psurkan@jhu.edu

Kaitlyn Atkins
kait.atkins@jhu.edu

Rodrigo Garcia-Cerde
rodrigo.jgc@gmail.com

¹ Department of Preventive Medicine, Universidade Federal de São Paulo, Rua Botucatu, 740, 4° andar, São Paulo, SP, Brasil

² Department of International Health, Johns Hopkins Bloomberg School of Public Health, Sao Paulo, Brazil

The prevalence of ESI varies widely worldwide. Recent data from the Youth Risk Behavior Surveillance (YRBS) in the United States found that 20.4% of students had already initiated sexual relationships by the 9th grade, or around ages 14–15 [15]. Data from the Global School-Based Health Survey (GSHS) from eight African countries found the prevalence of ESI to be 27.3% among 15-year-old adolescents. In relation to first sexual intercourse, the prevalence was higher among youth aged 11 or less (11.8%) when compared with youth who were 12 (5.5%), 13 (3.9%) and 14 (6.1%) years old [22]. A comparison of risky sexual behaviors between two cohorts in Spain found that the age of first sexual intercourse decreased with time. Adolescents from the 2006 and 2012 cohorts had their first sexual intercourse at 15.1 and 14.7 years, respectively [23].

Although a robust body of literature reports different factors associated with engaging in ESI, many of these studies are cross-sectional or observational with little rigor in their design and follow-up [24]. This fact makes it difficult to establish causal relationships and, consequently, limits their use in public health decision-making, particularly in the design of interventions aimed at delaying the onset of sexual activity in adolescents. Hence, the main gap is the lack of systematization of the results of cohort studies that aim to unveil risk factors for ESI. Findings of cohort studies can contribute to a greater understanding of ESI and its impacts over time and support the development of preventive strategies. In that sense, the aim of this systematic review is to identify risk factors associated with ESI among adolescents worldwide.

Methods

This study includes a systematic review of the scientific literature based on the PRISMA protocol [25, 26] (See Supplementary Material: PRISMA 2020 Checklist). The aim of this review was to identify risk factors for ESI in adolescence (ages 10 to 19 years) based on cohort studies (Table 1). In addition, this study was registered a priori in the international prospective register of systematic reviews (PROSPERO) (record number CRD42018089786).

Search Strategy

Three electronic databases (PubMed, Embase and LILACS) were searched. Our search for articles in PubMed used the following terms and keywords: “adolescent [mesh heading (mh)] OR adolescent [text word (tw)] OR adolescents [tw] OR youths [tw] OR teen [tw] OR adolescence [tw] AND Sexually Transmitted Diseases [mh] OR Sexually Transmitted Diseases [tw] OR STIs [tw] OR STI [tw] OR sexually transmitted infections [tw] OR STDs [tw] OR Unsafe Sex

Table 1 Scope of the systematic review

Population	Adolescents Age range ^a : 10–19 years old
Exposure	Risk factors ^b
Outcome	Early sexual intercourse
Study design	Cohort studies

^aAge range for outcome measure

^bOrganized into four dimensions: individual, family, social and environment, and sociodemographic factors

[mh] OR Unsafe Sex [tw] OR high-risk sex [tw] OR unprotected sex [tw] OR sexual behavior [mh] OR sex behavior [tw] AND cohort studies [mesh] OR cohort [tw].” For the other databases, we used a similar search string, adapted for each. The last database consultation was in December 2020.

Screening

Two researchers reviewed the titles and abstracts of all the studies that were identified in the search. Studies that did not meet the eligibility criteria (listed below) were excluded. The second step was to retrieve the full text of those that met the inclusion criteria. Disagreements were discussed with a third member of the research team to reach resolution.

Inclusion and Exclusion Criteria

To be eligible for inclusion, articles had to: (1) present findings from cohort studies; (2) include adolescents between 10 and 19 years old; (3) be in English, French, Portuguese or Spanish and; (4) be published between January 1999 and December 2020.

Studies were excluded if they did not meet the four inclusion criteria or were conducted with special populations e.g., street-involved youth, pregnant teenagers, sex workers, detained adolescents, youth undergoing intensive psychiatric treatment, adolescents recruited from medical clinics or men-who-have-sex-with-men. The reason for this was that we aimed to study risk factors for ESI in adolescence broadly, not in key populations. Key populations tend to report high rates of ESI, with different patterns compared to those of adolescents in general. Duplicate studies were automatically excluded by the Rayyan software.

Data Extraction and Quality Appraisal

From each article, we extracted the study authors, publication year, study country, sample size, study design, length of follow-up, statistical analytic techniques, independent variables, outcome measure, major findings, and study limitations. We used the Newcastle-Ottawa Quality Assessment Scale (NOS) for cohort studies to assess the quality of the

articles [27]. Higher scores indicated studies of higher quality. The NOS has three quality parameters: selection (four points), comparability (two points), and outcome (three points) .

Data Analysis

The first author reviewed all articles pulled for full-text review. These were examined using a data extraction form and a study quality scale. A second independent reviewer checked the data extraction and quality-assessment score for each article, and any discrepancies were resolved through discussion. Any articles that did not meet inclusion criteria after full-text review were excluded. For included studies, we used extracted data to summarize results stratified and organized by risk factors.

Results

We identified 2,787 citations through our literature search (Fig. 1). After excluding duplicate citations, 2,461 records were eligible for review. Subsequently, we excluded 2,428 (98.6%) citations after screening titles and abstracts. We obtained full text articles for the remaining 33 citations, and from these records, seven were included for quality assessment. A total of seven articles met the review criteria and were included in the final analysis.

Of the seven studies reviewed, four (57.1%) achieved high [7–9] and three (42.9%) moderate (56) NOS ratings. Three studies were birth cohorts [28–30] and four were part of longitudinal investigations: the National Longitudinal Study of Adolescent Health (Add Health) [28], the South Africa Tanzania Project [29], Young in Norway [31] and the Wisconsin

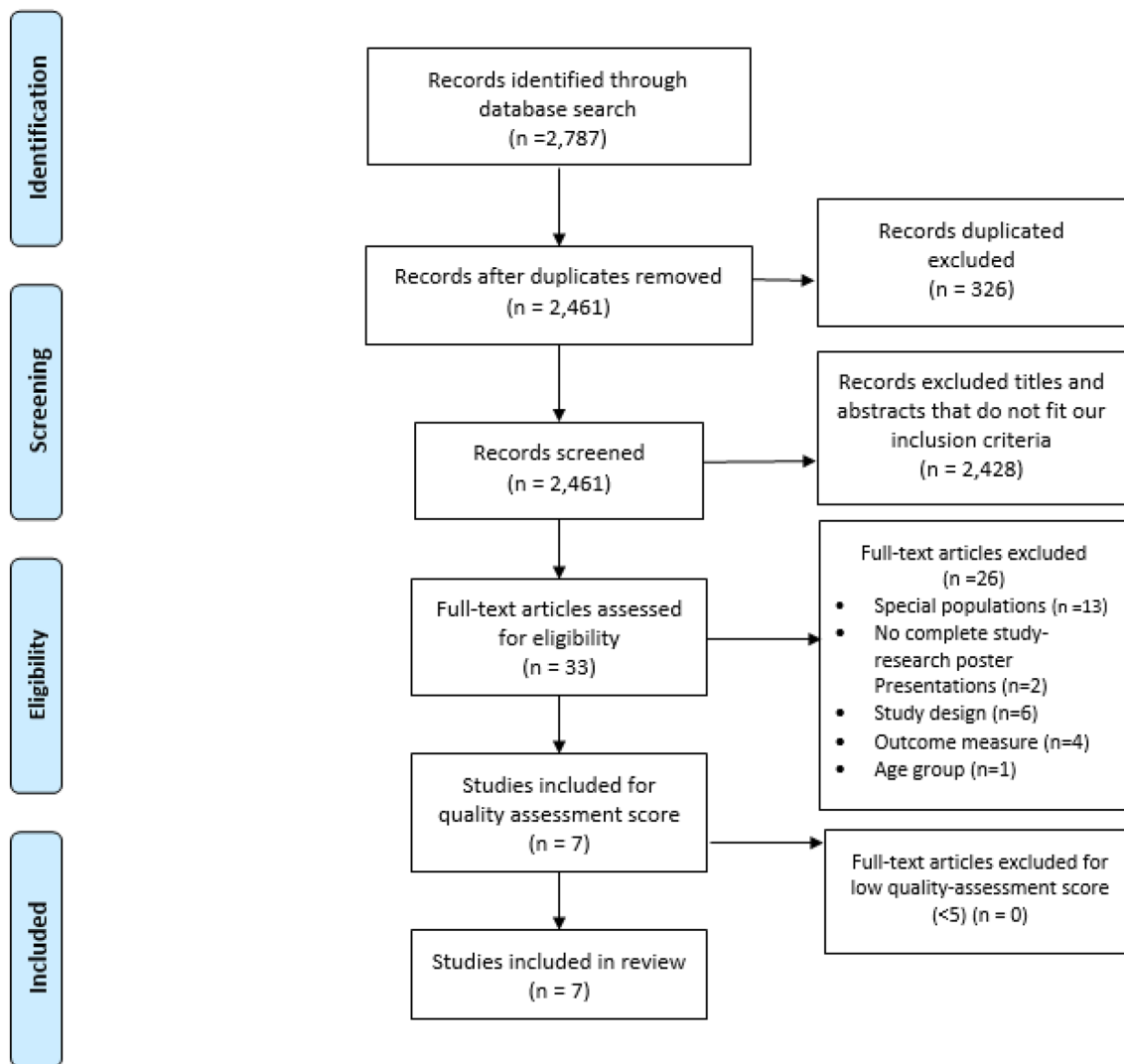


Fig. 1 PRISMA flow diagram for identification of included articles

Study of Families and Work [32]. Follow-up assessments in the birth cohorts ranged from 15 to 21 years and participants were followed up from six to nine times [33]. Among longitudinal studies, follow-up varied from one to seven years and participants were most commonly assessed only once after baseline. All studies reported loss to follow-up. Retention of $\geq 80\%$ of the participants was reported by three studies (42.9%) [34,]. Participants lost to follow-up were caused by: parents' refusal for their children to participate or to answer sexuality questions, students not being present in class during the data collection and an increased number of follow-up visits not in the original design. Characteristics associated with mothers of non-responders included being < 25 years old at the time of delivery, non-white, having low education, and having smoked during pregnancy.

In total, seven studies with 11,667 participants from five countries were included. New Zealand, Norway, and South Africa contributed one study each. Australia and the United States contributed two studies each. The articles included were published between 1999 and 2020, however the data presented were collected from 1972 [29] to 2009 [28] and samples ranged from 273 to 4,808 participants. All but one study, which focused only on females, included both sexes. Among non-birth cohorts, the age at baseline ranged from 11 to 14, with a mean of 12.3 years. Sexual intercourse before the age of 11 was excluded in one study [33] because of concerns about incest or other forms of sexual abuse. Most studies characterized sexual intercourse as penile-vaginal intercourse, though one study included anal sex in the definition [32]. One study reported oral sex as a secondary outcome [34]. Study outcomes also varied in terms of age of sexual intercourse. In five studies, the cutoff for ESI was defined as age 15. A single study did not establish a cutoff age for ESI, but found 16 years as the median age of first sexual intercourse, suggesting 15 could be considered the age of ESI for this sample. Taken together, six of the seven studies (85.7%) considered the age of 15 as ESI, and two treated ESI to be age 16 [31]. A summary of study results is shown in Table 2.

Regarding the data analyses, studies conducted multivariate analyses, such as logistic regression [29, 31], structural equation modelling [32], cumulative risk analysis [34], Kaplan-Meier survival probabilities [28, 30], and Cox regression [33] to estimate associations between potential risk and protective factors and the outcomes, controlling for potential confounders (Table 2).

In this review, the studies included assessed 50 different risk factors for ESI outcomes (Table 2). Of these, 36 (72.0%) were identified as statistically significant risk factors for ESI. Considering that these studies included a wide range of risk factors, we organized them into four dimensions: individual, family, social/environment, and sociodemographic. Risk factors for ESI in each dimension are reported in Table 3.

Individual Risk Factors

More than half of the studies (55.6%) identified individual risk factors for ESI. These factors were related to development, behaviors, beliefs and psycho-emotional factors, and mental health. The most common exposures were mental health problems (19.4%); attitudes and beliefs (13.9%, each) were the second most common exposures, and the developmental characteristics were the least frequent (8.3%) (Table 3).

Developmental Characteristics

Although three studies have examined age at menarche, only one found a significant trend for ESI – when menstruation occurred at age 11 (OR 1.5 95% CI 0.19–12) [29]. Associations between early perceived relative pubertal maturation among boys and ESI were also observed (RR 1.46 95% CI 0.94–2.29) [33].

Behavioral Factors

Substance use was highly associated with ESI for both genders. Daily smoking was associated with 1.4 and 3.0 higher odds engaging in ESI when compared to non-smokers (boys: OR 1.4 95% CI 0.69–2.9; girls: OR 3.0 95% CI 1.5–6.1) [29]. Alcohol intoxication was also associated with ESI (boys: RR 2.22 95% CI 0.91–2.51, girls: RR 3.41 95% CI 1.28–9.08) [33], (boys: OR 1.5 95% CI 0.65–3.6, girls: OR 1.3 95% CI 0.53–3.4). Also, intention to have sexual intercourse was associated with transition to first sexual intercourse (regression coefficient = 0.10) and the strongest predictor of intention was social outcome expectancies (regression coefficient = 0.43). Conversely, having self-efficacy to negotiate delayed sex was negatively associated with ESI (regression coefficient = - 0.08). Standardized regression coefficients were divided by the standard deviation of the predictors. In this case, a one unit change in a dichotomous predictor was interpreted as the magnitude of change associated with moving from one category to another [32].

Beliefs and Psycho-Emotional

Furthermore, all three studies that investigated religion found it was associated with ESI. Being less religious was a risk factor among adolescents with strong parental disapproval of sex (OR 1.63 95% CI 1.25–2.12) [31]. Likewise, being involved in religious activity played a role for boys in delaying the age of sexual intercourse (OR 0.39 95% CI 0.17–0.91) [29]. Higher self-esteem scores among girls (OR 2.4 95% CI 1.0–5.9) also predicted ESI. Among boys, high (RR 2.96 95% CI 1.22–7.21) and moderate (RR 1.93 95% CI 0.82–4.53) self-perceived

Table 2 Sample characteristics of the included studies (n=7)

Author (Year)	Independent variables	Dependent variables and cutoff age	Country	Sample size and demographics	Statistical methods	Follow up (years)	Retention rate (%)	Quality assessment score ^b
Ashby et al. (2006) [31]	-Age -Sex -Race/ethnicity -Maternal education -Hours of TV watched per day -Parental monitoring -Parental presence -Perceived parental tolerance of sexual intercourse -Depression -Self-esteem -Religion -Education aspirations -Taking a virginity pledge -Intelligence -Pubertal status	Initiation of sexual intercourse Age: 16	United States	N: 4,808 77.1% non-Hispanic white 11.7% Hispanic 53.5% female Age ^a : 12–13	-Univariate and multivariate logistic regression	2	65.4	8
Marino et al. (2013) [28]	-Maternal ethnicity -Maternal education -Family income -Expected birth weight ratio -Father's absence -Age at menarche	Early first sexual intercourse Age: 15	Australia	N: 607 Ethnicity: Not reported 100% female Age ^a : Birth	-Univariate comparisons -Kruskal-Wallis tests - χ^2 tests -Kaplan-Meier Survival probabilities -Cox regression models	17	91.3	7
Mathews et al. (2009) [32]	-Age -Gender -Socioeconomic status -Physical violence in intimate relationship -Parents education -Self-efficacy to negotiate delayed sex -Intention to have sexual intercourse	Transition to first intercourse Age: 15	South Africa	N: 1,440 Ethnicity: Not Reported 58.1% female Age ^a : 12–14	-Structural equation modelling	1	76.0	8

Table 2 (continued)

Author (Year)	Independent variables	Dependent variables and cutoff age	Country	Sample size and demographics	Statistical methods	Follow up (years)	Retention rate (%)	Quality assessment score ^b
Paul et al. (2000) [29]	-Parents education -Parents occupation -Family structure -Family attachment -School performance, attitude and attachment -Plan to leave school -Being in trouble at school -Outside home interests -Religion activities -Maternal depression -TV watching habits -Self-esteem -Conduct disorder -ADHD ^c -ODD ^d -Depression -Anxiety -Alcohol intoxication -Maternal age at 1st pregnancy -Age at menarche	Initiation of sexual intercourse Age: 15	New Zealand	N: 1020 97% European 3% Maori 48.9 female Age ^a : Birth	Multivariate logistic regression	21	91.7	8

Table 2 (continued)

Author (Year)	Independent variables	Dependent variables and cutoff age	Country	Sample size and demographics	Statistical methods	Follow up (years)	Retention rate (%)	Quality assessment score ^b
Pedersen et al. (2003) [33]	-Degree of urbanization -Parents occupation -Parents education -Parental relationship -Family structure -Parental monitoring -Gender -Self-perceived romantic appeal -Social acceptance -Depression -Pubertal maturation -Grade level -Academic self-concept -Aspiration higher education -Plan to leave school -Smoking -Alcohol intoxication -Drug use -Peers' substance use -Conduct problems -Religion	First sexual intercourse Age: 16	Norway	N: 1.399 Ethnicity: Not Reported 53.8% female Age ^a : 12–14	-Logistic models -Multivariate Cox regression	7	69.1	6

Table 2 (continued)

Author (Year)	Independent variables	Dependent variables and cutoff age	Country	Sample size and demographics	Statistical methods	Follow up (years)	Retention rate (%)	Quality assessment score ^b
Price et al. (2009) [34]	-Family structure -Gender -Parents education -Pubertal development -Academic achievement -Self-esteem* -Depression symptoms -Sports participation -ADHD ^c -ODD ^d -Media exposure -Identification with media -Parent-child relationship quality*	Early sexual debut Age: 15	United States	N: 273 90% European American 53.0% female Age ^a : 13	-Bivariate correlations -T-tests -Logistic regression -Cumulative risk analysis	2	87.0	6
Skinner et al. (2015) [30]	-Age -Gender -Family income -Maternal age at 1st pregnancy -Maternal ethnicity -Parental education -Maternal employment in late pregnancy -Mother's relationship status at pregnancy -Parental substance use at pregnancy -Age of menarche -Conduct problems -Depression	First sexual intercourse Age: 15	Australia	N: 1,200 Ethnicity: Not Reported 50.6% female Age ^a : Birth	-Kaplan-Meier survival probabilities -t tests -X ² test -univariate and multivariable logistic regression	17	42.3	6

^aReport age at baseline

^bThe Newcastle-Ottawa scale (NOS).

^cADHD: Attention-deficit hyperactivity disorder

^dODD: Oppositional defiant disorder

*Variables not analyzed because measures were not longitudinal in relation to the outcome

romantic appeal (the respondent's belief that others would be romantically attracted to them) were found as risk factors for ESI [33].

Mental Health

Moreover, conduct problems were associated with ESI in all three studies that investigated this exposure: for both genders, early development of aggressive problems significantly

Table 3 Risk factors associated with early sexual intercourse among adolescents (n = 36)

Risk Factors	Number of studies (references)	Total (%)
Individual		20 (55.6)
Developmental		3 (8.3)
Age at menarche	1 [29]	
Pubertal maturation	2 [33, 34]	
Behavioral		5 (13.9)
Substance use		
Smoking	1 [29]	
Alcohol intoxication	2 [29, 33]	
Sexual behavior		
Self-efficacy to negotiate delayed sex	1 [32]	
Intention to have sexual intercourse	1 [32]	
Beliefs and psycho-emotional		5 (13.9)
No religiosity	3 [29, 31, 33]	
High self-esteem	1 [29]	
High self-perceived romantic appeal	1 [33]	
Mental health		7 (19.4)
Conduct problems ^a	3 [29, 30, 33]	
Depressive symptoms	2 [30, 31]	
ADHD ^b	1 [34]	
ODD ^c	1 [34]	
Family		8 (22.2)
Parental substance use		4 (11.1)
Smoking	2 [30, 33]	
Alcohol problems	1 [33]	
Drug use	1 [30]	
Family attachment		4 (11.1)
Poor parental monitoring	1 [31]	
Low parental care	1 [33]	
Parental high overprotection	1 [33]	
Perceive parental strong disapproval of sex	1 [31]	
Social and Environmental		11 (30.6)
Suffer physical violence in intimate relationship	1 [32]	1 (2.8)
Not have outside home interests	1 [29]	1 (2.8)
Peers substance use	1 [33]	1 (2.8)
Academic		6 (16.7)
Low school achievement	3 [29, 33, 34]	
Low education aspirations	1 [33]	
Plan to leave school	1 [29]	
Being in trouble at school	1 [29]	
Watches television	2 [31, 34]	2 (5.6)
Sociodemographic		14 (38.9)
Ethnicity	1 [31]	1 (2.8)
Gender	1 [32]	1 (2.8)
Age	2 [31, 32]	2 (5.6)
Not living with both biological parents	3 [28, 30, 34]	3 (8.3)
Socioeconomic group	2 [29, 32]	2 (5.6)
Parents' low education	1 [34]	1 (2.8)
Maternal low education	3 [28, 30, 31]	3 (8.3)
Maternal age at 1st pregnancy before age 20	1 [29]	1 (2.8)

^aDelinquency, aggression, non-aggressive norms violations, lying, staying out at night

^bADHD: attention deficit hyperactivity disorder

^cODD: oppositional defiant disorder

increased the risk of ESI (boys: OR 3.46 95% CI 1.98–6.05, girls: OR 2.19 95% CI 1.17–4.10) [30], (boys: RR 1.65 95% CI 1.05–2.59, girls: RR 1.12 95% CI 0.68–1.85) [33]; for boys, having a diagnosis of conduct disorder was associated with ESI (OR 4.1 95% CI 1.22–14) [29]. In contrast, among the five studies that examined depressive symptoms, only two reported statistical significance for ESI: for boys, internalizing behaviors problems, such as depression, increased the risk at ages 8 (OR 2.03 95% CI 1.29–3.21) and 10 (OR 2.68 95% CI 1.69–4.24) ; for adolescents who reported strong parental disapproval of sex, having more depressive symptoms was also a risk factor for ESI (OR 1.72 95% CI 1.27–2.33) [31].

Family Risk Factors

Family characteristics also had important associations with ESI (22.2%), e.g., parental substance use and family attachment (11.1%, each).

Parental Substance Use

Among adolescents who reported ESI, there was a higher prevalence of mothers (31.3%) and fathers (47.0%) who smoked during pregnancy ($p < .001$) [30]. For instance, a greater risk of ESI was found among youth whose parents smoked daily (boys: RR 1.15 95% CI 0.74–1.78; girls: RR 1.70 95% CI 1.05–2.74) [33]. Parental alcohol problems were also associated with ESI for both genders (boys: RR 1.71 95% CI 1.13–2.60, girls: RR 1.23 95% CI 0.78–1.93) .

Family Attachment

Among adolescents who described that their parents strongly disapproved of sex, the lack of parental monitoring of television programming was associated with sexual initiation within one year (OR 1.35 95% CI 1.01–1.81) [31] (Table 3).

Social and Environment Risk Factors

More than a quarter of studies (30.6%) found associations between social and environmental factors and ESI. The majority of these studies included academic factors (school achievement, educational aspirations, being in trouble at school) (16.7%), followed by watching television (5.6%), suffering physical violence in an intimate relationship, peers' substance use and not having interests outside the home (2.8% each). Low achievement at school was also associated with a greater risk of ESI for both genders [29, 31, 33]. Low educational aspirations , plans to leave school early, and being in trouble at school were also predictors of ESI. Furthermore, spending time viewing television

programs with high sexual content appeared to be associated with ESI (boys: $B = 0.38$, Wald = 7.07, $p = .024$; girls: $B = 0.15$, Wald = 6.90, $p = .009$) . Another study found that adolescents who spent two or more hours per day viewing television were more likely to initiate sex within one year (OR 1.35 95% CI 1.01–1.79). Among adolescents who described their parents as strongly disapproving of sex, the likelihood of initiating sex within one year was higher among those who watched television for two or more hours per day (OR 1.72 95% CI 1.24–2.40)[34].

Socio-Demographic Risk Factors

From the seven studies, we identified eight sociodemographic risk factors for ESI (38.9%). They included: living environment, maternal education (8.3% each), age, socioeconomic group (5.6% each), ethnicity, gender, both parents' education and, maternal age at first pregnancy (2.8% each). Being male (vs. female) [32], older [31,] and Black were associated with ESI. Not living with both biological parents [28, 30, 34] and having low or middle [29] socioeconomic status were also predictors of ESI. Additionally, low parental education , low maternal education , and mother's age at first pregnancy before age 20 were identified as risk factors for ESI. For one study no measured sociodemographic variables were associated with ESI [33].

We intended to conduct a meta-analysis of studies with comparable risk factors, but were unable to do so due to differences in risk factors, study populations, and definitions of ESI across the included studies.

Discussion

The goal of this review was to improve our understanding of the links between risk factors and ESI among adolescents worldwide. The exposures most often examined in the included articles were: overall mental health, adolescent and parental substance use, family attachment, school achievement and educational aspirations, living environment, and parents' education. Risk factors with strong associations with ESI were: adolescent and parental substance use, conduct problems, no religious beliefs, family attachment, school achievement, not living with both biological parents, and low maternal education. The relationship of ESI and attitudes, parental substance use, and academic environment exposures were found to be consistent within the literature. Findings associated with both age at menarche and depressive symptoms were less consistent. This systematic review, which covers research from 1999 to 2020, contributes to the field by updating and providing a comprehensive assessment of risk factors for ESI. Across ESI outcomes, the relation

with sexual behavior in a broader context needs to be more adequately considered.

We identified that having self-efficacy to negotiate delayed sex was inversely associated with ESI [32]. In the same way, other studies have reported that low self-efficacy to negotiate delayed sex reflects adolescents' poor communication skills [35], which may reduce condom use [36]. Comparing two data waves of the National Survey of School Health (PeNSE) in Brazil, condom use at last sex intercourse among students aged 13–15 years decreased between 2012 and 2015, from 75.3% [37] to 66.2% [38]. Moreover, data from the National Longitudinal Study of Adolescent Health (Add Health) in the United States showed that adolescents with lower self-efficacy for condom use had more non-romantic sexual partners [39].

Our findings also suggest that, overall, substance use both in adolescents [29, 33] as well as in their parents, even during pregnancy [30], were predictors of ESI. These findings are supported by several studies [5, 40, 41]. Additionally, substance use has been identified as a factor that increases conduct problems [42, 43]. Considering that risky behaviors tend to occur together [44], implementation of prevention programs that addresses more than one outcome is critical.

This review suggests that some aspects of the school environment, such as achievement, aspirations, plans to leave school, and being in trouble at school are likely to influence adolescent ESI [29, 31, 33]. This result is supported by previous research that found that not skipping school and staying out of trouble were protective against ESI [45]. Literature suggest that students who do not feel connected to school are more likely to engage in maladaptive risk behaviors [46], and that adolescents' perceptions of the respect they receive and inclusion in school are essential for feeling connected in this environment [47]. A possible explanation could be that school facilitates strong social bonds among adolescents, their peers, and teachers to boost positive behaviors. Indeed, evidence suggests that adolescents avoid behaviors that are not valued by others who they respect in school [48].

Two studies indicated television viewing as a risk factor for ESI among adolescents [31, 34]. Since most mass media (press, radio and television) programs explore sexualization and do not provide accurate information about sex [49], mass media consumption among adolescents should be carefully examined. In fact, one study found that the risks of ESI were accurately discussed in only 10% of the sexual content on television programs that are popular among adolescents [32]. Previous research on adolescents' TV watching habits identified that those who viewed more sexual content were more likely to initiate sexual coital and noncoital activities [50]. Taking into account that adolescents' daily lives have changed since the novel coronavirus (COVID-19) disease [51] became a pandemic [52], it is crucial to more

closely consider the health impacts of mass media consumption among adolescents. On this topic, a study found that confinement imposed by COVID-19 led to up to 4 h/day of increased media exposure among children and adolescents [53]. Exposure to sexual media in television and movies contributes to the development of a range of beliefs and sexual attitudes in adolescents, such as self-objectification, body shame, decreased sexual assertiveness, coercive sex victimization, normalization of attempted/completed rape [54], and involvement in dysfunctional or violent romantic relationships [55]. Indeed, we identified physical violence in intimate relationships as a risk factor for ESI [56].

Our findings show that being male was associated with ESI. Gender differences may be due to the fact that masculinity among boys encourages earlier age of sexual initiation [36]. Low maternal education also played a role in ESI. Because maternal age at pregnancy was expected to correlate with maternal education, this may reflect lower socioeconomic status [57]. Our review also found that not living with both biological parents was a risk factor for ESI. One possible interpretation is that this type of living arrangement can introduce an unstable family dynamic for the adolescent. This is in line with another prior study that found that adolescents living with two parents had more stable lives and better subjective well-being compared to those living with one parent [58].

Strengths and Limitations

Strengths of this study include the longitudinal nature of the studies included in the review that has enabled us to explore a wide range of exposures collected earlier in life, before initiation of sexual intercourse. Our review operates from a multi-dimensional model, composed of four integrative dimensions – individual, family, social and environmental, and sociodemographic – in which to classify available findings.

Our findings should be considered while taking into account some limitations. First, the cutoff age for ESI was not the same across studies. Second, studies varied widely in terms of sample size and sampling strategies. Third, participants were lost to follow-up for a wide range of reasons: adolescents not present in school during the data collection, parents' refusal for their children to participate or to answer specific sexuality questions, and an increased number of follow-up visits that were not planned in the original study design. Last, all studies were conducted in high-income countries. Given sociodemographic exposures may impact family dynamic in many ways, future research should also be conducted in low- and middle-income countries.

Implications

The findings of our review highlight several implications for intervention, research, and policy. In terms of interventions, given our findings about the role of self-efficacy in shaping ESI and other risk behaviors, preventive interventions should focus on assertiveness, especially where there are issues related to gender differences, such as gender norms, sexual coercion and intimate partner violence [59]. Further, given our finding about co-occurring risk behaviors, programs targeting ESI among adolescents should consider integrating outcomes related to substance use, violence, and other outcomes. For instance, Life Skills Training, Positive Action, the All Star Program and Project PATHS are programs that target multiple outcomes [60–63]. Third, programs should consider reaching adolescents in the environments where they are likely to have the most impact. Our review suggests that school-based and peer interventions are likely to improve sexual health outcomes among this population, given the influence of schools and peer dynamics on ESI across studies. Similarly, our findings about the role of the media suggest a need for improvements in mass media programming targeted toward adolescents, as well as alternative options for adolescents to engage in during leisure time altogether. Additionally, parents need to be included in the prevention processes in order to be aware of how to monitor risky situations, manage their communication with adolescents, as well as how to understand the importance of adolescents' participation in health research.

In terms of policy, policymakers should encourage the development of evidence-based sexual behavior prevention interventions to improve health literacy among adolescents. Health literacy has been defined as the degree to which people can obtain, manage and understand health information and make proper health decisions. Prioritization of health literacy is a policy issue at the intersection of the fields of health and education [64]. Considering this approach, it is important that policies and programs address the following: substance use, improving adolescent knowledge and increasing their risk perception [65]; decision-making, to increase the ability of adolescents to make healthy decisions [48]; self-efficacy, to support their confidence in decisions made [66]; mental health, to help youth recognize and express healthy emotions and seek help when needed [67]; educational aspirations, to understand the adolescents' life perspectives and to improve their connectedness with peers and adults at school [68]; and media exposure, to alert adolescents of the risks and limitations of mass media consumption and stimulate them to critically assess the content exhibited [69].

Our review provides critical insight into risk factors for ESI across settings and studies. However, there are still

research gaps. For example, given our findings about adolescents' vulnerability to sexual risk behaviors, further research on other associated public health issues, such as substance use and school attachment (achievement, aspirations, connectedness) are needed. Future research should also pay close attention to how sociodemographic characteristics are included and measured, to elucidate demographic differences in risk factors and tailor programs appropriately.

Conclusion

This systematic review of cohort studies identified a range of risk factors between adolescent health behaviors, considering their life circumstances, and ESI. Although only seven studies were identified, the results provide an integrated picture of the relationship between risk factors and ESI in the available literature. Given that public health issues are generally multifactorial and their consequences have societal impacts, we believe that it is critical to implement and evaluate sexual behavior prevention programs with a more global approach to health behavior, tackling social and environmental factors simultaneously.

Summary

This systematic review provides a comprehensive, assessment of risk factors related to early sexual intercourse among adolescents. We used PRISMA guidelines to review and identify eligible cohort studies published between January 1999 and December 2020. We adapted search strategies for three electronic databases: PubMed, Embase and LILACS. Identified studies were screened for quality and eligibility. In addition to basic study information, we extracted information on study setting, sample size, study design, follow-up, measures and statistical analyses, findings, and limitations. Of 2787 identified studies, seven met our inclusion criteria. The studies examined a range of factors, which were organized into four dimensions – individual, family, social and environmental, and sociodemographic. Risk factors with strong associations for ESI were: adolescent and parental substance use, aggression and conduct disorders, family attachment, school achievement, family living situation, and maternal education. Three studies were birth cohorts, with sample sizes ranging from 273 to 4,808. This review demonstrates the important roles of substance use, family attachment and academic factors in shaping adolescents' sexual behavior. A strength of this review is its focus on longitudinal studies, enabling exploration of exposures collected before initiation of sexual intercourse.

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Declarations

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

References

- WHO - World Health Organization (2016) Growing up unequal: gender and socioeconomic differences. Young people's health and well-being: health behaviour in school aged children (HBSC) study: international report from the 2013/2014 survey. Health pol. Regional Office for Europe, Copenhagen, p 276
- Orihuela CA, Mrug S, Davies S, Elliott MN, Tortolero Emery S, Peskin MF, Reischer S, Schuster MA (2020) Neighborhood Disorder, Family Functioning, and risky sexual behaviors in adolescence. *J Youth Adolesc* 49(5):991–1004. <https://doi.org/10.1007/s10964-020-01211-3>
- Sitnick SL, Brennan LM, Forbes E, Shaw DS (2014) Developmental pathways to sexual risk behavior in high-risk adolescent boys. *Pediatrics* 133(6):1038–1045
- Ramiro L, Windlin B, Reis M, Gabhainn SN, Jovic S, Matos MG et al (2015) Gendered trends in early and very early sex and condom use in European countries from 2002 to 2010. *Eur J Public Health* 25(suppl 2):65–68
- Boisvert I, Boislard MA, Poulin F (2017) Early sexual onset and alcohol use and misuse from adolescence into young adulthood. *J Adolesc Heal* 61(4):514–520
- Osorio A, Lopez-del Burgo C, Carlos S, de Irala J (2017) The sooner, the worse? Association between earlier age of sexual initiation and worse adolescent health and well-being outcomes. *Front Psychol* 8(JUL):1–8
- Crosby R, Geter A, Ricks J, Jones J, Salazar LF (2015) Developmental investigation of age at sexual debut and subsequent sexual risk behaviours: a study of high-risk young black males. *Sex Health* 12(5):390–396
- Shrestha R, Karki P, Copenhagen M (2016) Early sexual debut: a risk factor for STIs/HIV Acquisition among a nationally representative sample of adults in Nepal. *J Community Health* 41(1):70–77
- Connell C, Gilreath T, Hansen N (2009) A multiprocess latent class analysis of the co-occurrence of substance use and sexual risk behavior among adolescents. (Report). *J Stud Alcohol Drugs* 70(6):9439
- Mangweth-Matzek B, Rupp CI, Hausmann A, Kemmler G, Biebl W (2007) Menarche, puberty, and first sexual activities in eating-disordered patients as compared with a psychiatric and a nonpsychiatric control group. *Int J Eat Disord* 40:705–710
- Meier AM (2007) Adolescent first sex and subsequent mental health. *Am J Sociol* 112(6):1811–1847
- Vasilenko SA, Lefkowitz ES, Welsh DP (2014) Is sexual behavior healthy for adolescents? A conceptual framework for research on adolescent sexual behavior and physical, mental, and social health. *New Dir Child Adolesc Dev* 144:3–19
- Gonçalves H, Gonçalves Soares AL, Bierhals IO, Machado AKF, Fernandes MP, Hirschmann R et al (2017) Age of sexual initiation and depression in adolescents: data from the 1993 Pelotas (Brazil) Birth Cohort. *J Affect Disord* 221:259–266
- Kim D-S, Kim H-S (2010) Early initiation of alcohol drinking, cigarette smoking, and sexual intercourse linked to suicidal ideation and attempts: findings from the 2006 Korean Youth Risk Behavior Survey. *Yonsei Med J* 51(1):18–26
- CDC - Centers for Disease Control and Prevention (2018) Youth risk behavior surveillance-United States, 2017. *Cent Dis Control Prev* 67:1–180
- Sedgh G, Finer LB, Bankole A, Eilers MA, Singh S (2015) Adolescent pregnancy, birth, and abortion rates across countries: levels and recent trends. *J Adolesc Heal* 56(2):223–230
- Timmermans M, Van Lier PAC, Koot HM (2008) Which forms of child/adolescent externalizing behaviors account for late adolescent risky sexual behavior and substance use? *J Child Psychol Psychiatry Allied Discip* 49(4):386–394
- Vagi KJ, Rothman EF, Latzman NE, Tharp AT, Hall DM, Breiding MJ (2013) Beyond correlates: a review of risk and protective factors for adolescent dating violence perpetration. *J Youth Adolesc* 42(4):633–649
- Sieving RE, Oliphant JA, Blum RW (2002) Adolescent sexual behavior and sexual health. *Pediatr Rev* 23(12):407–416
- Cservenka A, Herting MM, Seghete KLM, Hudson KA, Nagel BJ (2013) High and low sensation seeking adolescents show distinct patterns of brain activity during reward processing. *NeuroImage* 66:184–193
- Luciana M, Collins PF (2012) Incentive motivation, cognitive control, and the adolescent brain: is it time for a paradigm shift? *Child dev perspect* 6(4):392–3994
- Peltzer K (2010) Early sexual debut and associated factors among in-school adolescents in eight african countries. *Acta Paediatr Int J Paediatr* 99(8):1242–1247
- Espada JP, Escribano S, Orgilés M, Morales A, Guillén-Riquelme A (2015) Sexual risk behaviors increasing among adolescents over time: comparison of two cohorts in Spain. *AIDS Care* 27(6):783–788
- Heywood W, Patrick K, Smith AMA, Pitts MK (2015) Associations between early first sexual intercourse and later sexual and reproductive outcomes: a systematic review of population-based data. *Arch Sex Behav* 44(3):531–69. <https://doi.org/10.1007/s10508-014-0374-3>
- Moher D, Liberati A, Tetzlaff J, Altman DG, PRISMA Group (2009) Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Ann Intern Med* 151(4):264–269
- Rethlefsen ML, Kirtley S, Waffenschmidt S, Ayala AP, Moher D, Page MJ et al (2021) PRISMA-S: an extension to the PRISMA statement for reporting literature searches in systematic reviews. *Syst Rev* 10(1):39. <https://doi.org/10.1186/s13643-020-01542-z>
- Wells G, Shea B, O'Connell D, Peterson J, Welch V, Losos M et al (2009) The Newcastle-Ottawa scale (NOS) for assessing the quality of nonrandomised studies in meta-analyses. http://www.ohri.ca/programs/clinical_epidemiology/oxford. Accessed 1 Feb 2009
- Marino JL, Skinner SR, Doherty DA, Rosenthal SL, Cooper Robbins SC, Cannon J et al (2013) Age at menarche and age at first sexual intercourse: a prospective cohort study. *Pediatrics* 132(6):1028–1036
- Paul C, Fitzjohn J, Herbison P, Dickson N (2000) The determinants of sexual intercourse before age 16. *J Adolesc Heal* 27(2):136–147
- Skinner SR, Robinson M, Smith MA, Robbins SCC, Mattes E, Cannon J et al (2015) Childhood behavior problems and age at first sexual intercourse: a prospective birth cohort study. *Pediatrics* 135(2):255–263
- Ashby SL, Arcari CM, Edmonson MB (2006) Television viewing and risk of sexual initiation by young adolescents. *Arch Pediatr Adolesc Med* 160(4):375–380

32. Mathews C, Aarø LE, Flisher AJ, Mukoma W, Wubs AG, Schaalma H (2009) Predictors of early first sexual intercourse among adolescents in Cape Town, South Africa. *Health Educ Res* 24(1):1–10
33. Pedersen W, Samuelsen S, Wichstrom L (2003) Intercourse debut age- problem behaviour or romantic appeal. *J Sex Res* 40(4):333–345
34. Price MN, Hyde JS (2009) When two isn't better than one: predictors of early sexual activity in Adolescence using a cumulative risk model. *J Youth Adolesc* 38(8):1059–1071
35. Mastro S, Zimmer-Gembeck MJ (2015) Let's talk openly about sex: sexual communication, self-esteem and efficacy as correlates of sexual well-being. *Eur J Dev Psychol* 12(5):579–598
36. Gonçalves H, Machado EC, Soares ALG, Camargo-Figuera FA, Seering LM, Mesenburg MA et al (2015) Início da vida sexual entre adolescentes (10 a 14 anos) e comportamentos em saúde TT - sexual initiation among adolescents (10 to 14 years old) and health behaviors. *Rev bras epidemiol* 18(1):25–41
37. Instituto Brasileiro de Geografia e Estatística IBGE. Pesquisa Nacional de Saúde do Escolar (2013) 259 p
38. Instituto Brasileiro de Geografia e Estatística IBGE. Pesquisa Nacional de Saúde do Escolar. Rio de Janeiro: Ministério da Saúde, com apoio do Ministério da Educação Inclui (2016) ; 132 p
39. Chen ACC, Thompson EA, Morrison-Beedy D (2010) Multi-system influences on adolescent risky sexual behavior. *Res Nurs Heal* 33(6):512–527
40. de Looze M, van den Eijnden R, Verdurmen J, Vermeulen-Smit E, Schulten I, Vollebergh W et al (2012) Parenting practices and adolescent risk behavior: rules on smoking and drinking also predict cannabis use and early sexual debut. *Prev Sci* 13(6):594–604
41. Li S, Huang H, Xu G, Cai Y, Huang F, Ye X (2013) Substance use, risky sexual behaviors, and their associations in a chinese sample of senior high school students. *BMC Public Health* 13(1):7–9
42. Demissie Z, Jones SE, Clayton HB, King BA (2017) Adolescent risk behaviors and use of electronic vapor products and cigarettes. *Pediatrics* 139(2):e20162921
43. Sarver DE, McCart MR, Sheidow AJ, Letourneau EJ (2014) ADHD and risky sexual behavior in adolescents: conduct problems and substance use as mediators of risk. *J Child Psychol Psychiatry Allied Discip* 55(12):1345–1353
44. Jackson C, Sweeting H, Haw S (2012) Clustering of substance use and sexual risk behaviour in adolescence: analysis of two cohort studies. *BMJ Open* 2(1):1–10
45. Aspy CB, Vesely SK, Oman RF, Tolma E, Rodine S, Marshall L et al (2012) School-related assets and youth risk behaviors: Alcohol consumption and sexual activity. *J Sch Health* 82(1):3–10
46. Zimmer-Gembeck MJ, Helfand M (2008) Ten years of longitudinal research on U.S. adolescent sexual behavior: developmental correlates of sexual intercourse, and the importance of age, gender and ethnic background. *Dev Rev* 28(2):153–224
47. Langille DB, Asbridge M, Azagba S, Flowerdew G, Rasic D, Cragg A (2014) Sex differences in associations of school connectedness with adolescent sexual risk-taking in Nova Scotia, Canada. *J Sch Health* 84(6):387–395
48. Catalano RF, Haggerty KP, Oesterle S, Fleming CB, Hawkins JD (2004) Findings from the social development research group. *J Sch Health* 74(7):252–261
49. Wright PJ (2011) Mass media effects on youth sexual behavior assessing the claim for causality. *Ann Int Commun Assoc* 35(1):343–385
50. Kunkel D, Eyal K, Donnerstein E, Farrar KM, Biely E, Rideout V (2007) Sexual socialization messages on entertainment television: comparing content trends 1997–2002. *Media Psychol* 9(3):595–622
51. Collins RL, Elliott MN, Berry SH, Kanouse DE, Kunkel D, Hunter SB et al (2004) Watching sex on television predicts adolescent initiation of sexual behavior. *Pediatrics* 114(3):e280–e289
52. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y et al (2020) Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet* 395(10223):497–506
53. WHO WHO. COVID-19 Weekly Epidemiological Update. 2020;(November):1;4
54. Pietrobelli A, Pecoraro L, Ferruzzi A, Heo M, Zoller T, Antoniazzi F et al (2020) HHS Public Access 28(8):1382–1385
55. Ybarra ML, Strasburger VC, Mitchell KJ (2014) Sexual media exposure, sexual behavior, and sexual violence victimization in adolescence. *Clin Pediatr (Phila)* 53(13):1239–1247
56. Ward LM (2016) Media and sexualization: state of empirical research, 1995–2015. *J Sex Res* 53(4–5):560–577
57. Upchurch DM, Mason WM, Kusunoki Y, Kriechbaum MJ (2004) Social and behavioral determinants of self-reported STD among adolescents. *Perspect Sex Reprod Health* 36(6):276–287
58. Dinisman T, Montserrat C, Casas F (2012) The subjective well-being of spanish adolescents: variations according to different living arrangements. *Child Youth Serv Rev* 34(12):2374–2380
59. Wood S, Rogow D (2015) Can Sexuality Education Advance Gender Equality and Strengthen Education Overall? Learning from Nigeria's Family Life and HIV Education Program. New York Int Women's Heal Coalit
60. Griffin KW, Botvin GJ, Nichols TR (2006) Effects of a school-based drug abuse prevention program for adolescents on HIV risk behavior in young adulthood. *Prev Sci* 7:103–112
61. Beets MW, Flay BR, Vuchinich S, Snyder FJ, Acock A, Li K-K et al (2009) Use of a social and character development program to prevent substance use, violent behaviors, and sexual activity among elementary-school students in Hawaii. *Am J Public Health* 99(8):1438–1445
62. McNeal RB, Hansen WB, Harrington NG, Giles SM (2004) How all stars works: an examination of program effects on mediating variables. *Heal Educ Behav* 31(2):165–178
63. Shek DTL, Yu L (2012) Longitudinal impact of the project PATHS on adolescent risk behavior: what happened after five years? *Sci World J* 2012:316029
64. Parker RM, Ratzan SC, Lurie N (2003) Health literacy: a policy challenge for advancing high-quality health care. *Health Aff* 22(4):147–153
65. Grevenstein D, Nagy E, Kroeninger-Jungaberle H (2015) Development of risk perception and substance use of Tobacco, alcohol and cannabis among adolescents and emerging adults: evidence of directional influences. *Subst Use Misuse* 50(3):376–386
66. Albert D, Steinberg L (2011) Judgment and decision making in adolescence. *J Res Adolesc* 21(1):211–224
67. Valois RF, Zullig KJ, Kammermann SK, Kershner S (2013) Relationships between adolescent sexual risk behaviors and emotional self-efficacy. *Am J Sex Educ* 8(1–2):36–55
68. Attygalle UR, Perera H, Jayamanne BDW (2017) Mental health literacy in adolescents: ability to recognise problems, helpful interventions and outcomes. *Child Adolesc Psychiatry Ment Health* 11(1):1–8
69. Fleary SA, Joseph P, Pappagianopoulos JE (2018) Adolescent health literacy and health behaviors: a systematic review. *J Adolesc* 62(November 2017):116–127

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