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Parents' Support and Knowledge of Their Daughters' Lives, and Females' Early Sexual Initiation In Nine European Countries

CONTEXT: *Associations between early sexual initiation and parental support and knowledge have not been uniformly tested in multiple European population-based samples. Understanding such associations is important in efforts to discourage females' early sex.*

METHODS: *Data were compiled for 7,466 females aged 14–16 who participated in the 2005–2006 Health Behaviors in School-Aged Children survey in nine countries (Austria, Finland, Greece, Hungary, Iceland, Lithuania, Romania, Spain and Ukraine). Univariate, bivariate and multivariable analyses were run with standard error corrections and weights to assess how sexual initiation before age 16 was related to maternal and paternal support and knowledge of daily activities.*

RESULTS: *Prevalence of early sexual initiation ranged from 7% (in Romania) to 35% (in Iceland). In bivariate analyses, maternal and paternal support were significantly negatively related to adolescent females' early sexual initiation in most countries. In models with demographic controls, parental support was negatively associated with early sexual initiation (odds ratio, 0.8 for maternal and 0.7 for paternal). After parental knowledge was added, early sexual initiation was no longer associated with parental support, but was negatively associated with maternal and paternal knowledge (0.7 for each). These patterns held across countries.*

CONCLUSIONS: *Parental knowledge largely explained negative associations between parental support and early initiation, suggesting either that knowledge is more important than support or that knowledge mediates the association between support and early sex.*

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Early sexual initiation is recognized as a potential threat to adolescent females' sexual and reproductive health. Immaturity of the cervix in early adolescence increases susceptibility to STDs.[1] Further, females who initiate sex early are less likely than those who delay initiation to use condoms or other contraceptive methods,[2] increasing their risk for teenage pregnancy. The risk of STDs and teenage pregnancy can affect both males and females who begin having sex at young ages. In contexts where females' early sexual behavior is considered unacceptable, those who initiate sex early may suffer additional psychological and social consequences, such as depression and negative peer interactions.[3–6] Thus, delaying sexual initiation until late adolescence or early adulthood is an important goal for females' sexual and reproductive health.

Parents play an important role in promoting behaviors that benefit adolescent sexual health, including delayed sex. A review of predominantly U.S. studies supports the association between delayed sex and three aspects of parenting: monitoring behavior, communicating clearly and positively, and providing emotional bonding and support.[7] Although parental monitoring has traditionally been conceptualized as what parents do—track and conduct surveillance[8–10]—most studies relating monitoring to adolescent sexual behavior measure this construct by what parents know about their adolescents' daily activities.[8–10] Other studies have found that this knowledge is usually derived from adolescent disclosure, rather than parental surveillance and tracking.[8–10] The potentially protective relationship between parental knowledge and adolescent sexual risk-taking is one of the most consistent in the literature.[7] Adolescent-parent communication, both generally and as related to sexuality, also has been assessed in relation to adolescent risk-taking. Findings for this construct, which has been conceptualized in terms of quality, tenor (e.g., open versus conflict-oriented) and quantity, have been less consistent.[7] Support and emotional bonding have most often been measured in terms of parental closeness (e.g., warmth, caring, attachment to family). This aspect of parenting can affect adolescents' sexual initiation, because attachment to "conventional persons" (defined by problem behavior theory as parents, teachers or clergy[11]), who presumably value later sexual initiation, increases the potential social and relational costs of deviating from socially acceptable behavior by having sex early.[12] Alternatively, attachment theory suggests that parental support may undergird interpersonal skills that aid the development of healthy peer and romantic relationships,[13] which in turn may deter sexual risk-taking. Parental bonding and support may lay a foundation for

clear communication and adolescents' disclosure of their activities and feelings.

Cross-national analyses have documented the fundamental salience of parental support to adolescent development and behavior, as indicated by pervasive associations between such support and adolescents' social competence, mental health and antisocial behavior across time, culture and analytic method.[14,15] This broad evidence is consistent with classic, long-standing theories about the profound importance of attachment in child development.[16–18] Further, cross-national work indicates that adolescents agree about the behaviors that constitute supportive parenting.[19]

Nevertheless, an understanding of how parental support may relate to adolescent females' sexual risk-taking in contexts outside the United States is not well developed. Some authors have proposed that because sexual behavior norms vary across countries, so, too, do conceptions of risky sexual behavior; consequently, the relationship between parental support and specific behaviors may vary.[20] For example, variation across countries in adults' acceptance of teenage sexual behavior[21–23] or the commonness of sexual initiation by age 16[24] may be related to differences in how parental support is associated with adolescents' age at first sex. One study, which used convenience samples of Hungarian, Slovenian, Dutch and Swiss adolescents, found that parental support was negatively associated with an index of risky sexual behaviors (including early initiation), although the strength of this association varied across countries.[20] Another study,[25] conducted in the Netherlands, found a negative association between parental support and early initiation; the associations in this study became nonsignificant, however, after parental knowledge was added to multivariable models. Thus, parental knowledge may be more important than parental support or may mediate the relationship between support and adolescent behavior.[25]

The purpose of this study is to extend prior research by examining whether perceived maternal and paternal support is related to adolescent females' early sexual initiation across nine European countries. We focus on parental support because of its likely foundational importance to other aspects of parent-teenager relationships. This study uses representative population-based data sources, rather than convenience samples, and adds countries that have not been previously studied. We expected that perceived parental support would be negatively associated with females' early sexual initiation, and that parental knowledge would reduce the strength of this association. Our second hypothesis, which we based on a comparative study,[20] was that parental support would be more strongly associated with females' early sexual initiation in countries where early sex was less common and thus less normative.

METHODS

Data

Our analyses use data from the 2005–2006 Health Behavior in School-Aged Children (HBSC) study, conducted in 41 countries primarily in Europe, in collaboration with the World Health Organization Regional Office for Europe.[24] This is the most recent version of HBSC data available. The questionnaire includes items about adolescents' health (e.g., self-perceived health, life satisfaction, perceived symptoms and weight), behaviors (e.g., sexual behavior, substance use, diet, physical activity, sedentary behavior, violence and bullying) and social context (e.g., family, peer and school relationships). Socioeconomic and demographic information is also collected.

In each country, cluster sampling, with classes as the primary sampling units, was used to select a nationally representative sample of students around the ages of 11, 13 and 15 years. The recommended sample size was approximately 1,500 students for each age-group. Data collection occurred during the academic year; students completed anonymous written surveys within classrooms.

HBSC follows a strict international protocol for data collection to ensure maximum comparability across countries. Questionnaires are translated from English to each country's official language, and then back-translated to English to minimize translation errors or misinterpretation. Surveys from all countries are sent to a data coordinating center (in Norway), which is responsible for data cleaning, checking for inconsistencies and, more generally, combining all data into one usable international data set. More than 205,000 students were included in the 2005–2006 international HBSC data set. Each participating country obtained approval from the relevant ethics review board or an equivalent regulatory body to conduct the survey. Our secondary analysis was deemed exempt from review by the Tulane University biomedical institutional review board.

The present analysis is limited to the nine European countries that had data on sexual behavior and from an optional module that explored parental support (Austria, Finland, Greece, Hungary, Iceland, Lithuania, Romania, Spain and Ukraine). These countries belong to all of the major regions in Europe, as defined by the United Nations, and vary in terms of culture, religion, economic systems, adolescent access to sexual health services and adolescent sexual behavior.[26] While some countries are rather liberal toward adolescent sexual behavior (Finland, Iceland and, in some autonomous communities, Spain), others are not, because of the influence either of religion (Austria, Greece and Lithuania) or of political conservatism (Hungary, Romania and Ukraine).[27] In 2001, the proportion of 15-year-old females who reported ever having had sex ranged from 10% (in Greece) to 33% (in Finland—Table 1).[28] At the time of the survey, all countries were classified as high- or upper-middle–income, except Ukraine, which was lower-middle–income.[29] Birthrates among 15–19-year-olds also varied widely across countries, from 8.6 per 1,000 (in Finland) to 38.5 per 1,000 (in Romania).[30] The proportion of the population reporting that religion was important to them was lowest in Finland and Lithuania (14% each) and highest in Romania (51%).[31]

Measures

•***Early sexual initiation.*** The outcome variable was first intercourse. It was based on respondents' age at data collection,* whether they reported ever having had sexual intercourse and their reported age at first intercourse. Respondents were asked, "Have you ever had sexual intercourse? Sometimes this is called 'making love,' 'having sex,' or 'going all the way'" and "At what age did you first have sexual intercourse?" The oldest age that would be considered for early intercourse was 15, which is the age used by other European studies of early sexual initiation.[32–35]

•***Parental support.*** HBSC 2005–2006 included an optional package with four questions assessing respondents' perceptions of parental support, drawn from the 12-item care subscale of the Parental Bonding Instrument.[36] This instrument is often used in contemporary studies of psychopathology; associations between items in this instrument were similar across Australian, Spanish and Dutch samples.[36–38] Two support variables were constructed, one each for mother and father, derived from questions asking how often the parent "helps me as much as I need," "is loving," "understands my problems and worries" and "makes me feel better when I am upset" (Cronbach's alpha, 0.75 for mother, 0.81 for father). Each question was answered on a four-point ordinal scale: "almost always," "sometimes," "never" or "I do not have or see this person." After recoding the last response option as missing,† we conducted a principal components analysis and used item weights on the first principal component to generate a summary score. To aid interpretation, we standardized scores across the sample to have a mean of 0 and a standard deviation of 1; the higher the score, the greater parental support.

•***Parental knowledge.*** Drawing on the prior Dutch study[25] and theory,[7,39] we included adolescent females' reports of parental knowledge as a possible link between parental support and timing of sexual initiation. We derived separate measures for mother and father. Consistent with past European and African studies,[39,40] these measures were based on five questions asking how much the respondent's mother or father knows about "who your friends are," "how you spend your money," "where you are after school," "where you go at night" and "what you do with your free time." This is the core measure used in most studies of parental knowledge.[10] Each question was answered on a four-point ordinal scale: "knows a lot," "knows a little," "doesn't know anything" or "do not have or see this person" (Cronbach's alpha, 0.79 for mother, 0.86 for father). We followed the same analytic steps as we did to assess parental support; the higher score, the greater parental knowledge.

•***Demographic characteristics.*** Age was included as a continuous variable, since the likelihood of sexual initiation increases with age.[41] Family socioeconomic status, which has been inversely related to the likelihood of adolescent females' early sexual initiation,[42,43] was captured by the HBSC Family Affluence Scale. This scale was based on the respondent's reporting of seven assets available in her household (e.g., computers, her own bedroom) and has good reliability and validity.[44] Scores ranged from 0 to 7; affluence was categorized as low (0–3), medium (4–5) or high (6–7), according to published guidelines to be used consistently across countries.[24] Family living arrangement was included because living in a stepfamily or with a single parent, rather than with two biological parents, has been associated with increased odds of early sexual initiation among adolescent females.[43,45] This variable was specified using three categories: living with both biological parents, in a stepfamily or with a single parent. No "other" category was applicable because of sample restrictions described below. Finally, a dummy variable for each respondent's country of residence was included. This allowed for controlling for unmeasured aspects of country contexts that could be associated with early sexual initiation.

TABLE 1. Selected characteristics of countries that participated in the Health Behavior in School-Aged Children study, by European region, 2005–2006

Region and country	% of 15-year-old females who are sexually experienced, 2001	Income, 2006	Births per 1,000 women 15–19, 2006	% of population aged ≥15, for whom religion is very important, 2000
Northern				
Finland	33	High	8.6	14
Iceland	u	High	14.6	19
Lithuania	11	Upper-middle	19.0	14
Western				
Austria	19	High	11.2	20
Southern				
Greece	10	High	12.0	33
Spain	15	High	13.6	19
Eastern				
Hungary	16	Upper-middle	20.1	20
Romania	u	Upper-middle	38.5	51
Ukraine	24	Lower-middle	29.3	22

Notes: Regions are based on United Nations definitions. Sex refers to heterosexual sex. u=unavailable. *Sources:* **Percentage of 15-year-old females who are sexually experienced**—reference 28. **Income**—reference 29. **Births**—reference 31. **Percentage saying religion is very important**—reference 32.

Sample

As indicated above, we limited the analysis to adolescent females who lived in countries whose surveys asked about sexual behavior and parental support and knowledge; of the 104,891 female participants in the 2005–2006 HBSC, 26,174 met this criterion. Only participants in the oldest age-group recruited were asked about sexual behavior;

*If a respondent was younger than 16, reported ever having had intercourse but did not report her age at first intercourse, she was coded as having experienced early intercourse.

†We considered recoding the response "do not have or see this person" as a numerical response, but its relationship with early sexual initiation was not consistent. Additionally, adolescents did not consistently report this option across all items within an index.

TABLE 2. Selected characteristics of adolescent females, by European region and country

Characteristic	All (N=7,466)	North			West	South		East		
		Finland (N=830)	Iceland (N=867)	Lithuania (N=859)	Austria (N=744)	Greece (N=662)	Spain (N=1,229)	Hungary (N=552)	Romania (N=810)	Ukraine (N=913)
PERCENTAGES										
Family affluence***										
Low	29.4	13.4	2.1	39.7	14.7	30.1	15.0	37.1	50.5	63.8
Medium	42.7	49.8	28.8	46.2	50.1	46.1	46.6	42.6	40.5	33.5
High	27.9	36.9	69.1	14.1	35.2	23.9	38.4	20.3	9.0	2.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Living arrangement***										
Two biological parents	73.5	70.0	72.7	69.7	73.8	85.1	85.7	72.6	64.6	68.7
Stepfamily	8.3	14.0	12.3	10.6	8.7	1.7	3.5	9.4	3.6	9.3
Single parent	18.2	16.1	15.0	19.7	17.5	13.3	10.8	17.9	31.9	22.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Early sexual initiation***,†	18.9	29.2	34.7	9.4	24.9	13.7	15.1	20.5	7.2	14.7
MEANS										
Age***	15.6 (0.36)	15.8 (0.30)	15.6 (0.28)	15.7 (0.35)	15.2 (0.29)	15.6 (0.26)	15.6 (0.42)	15.5 (0.25)	15.5 (0.33)	15.7 (0.35)
Maternal support***,‡	0.0 (1.0)	–0.2 (1.0)	0.1 (1.0)	–0.3 (1.0)	0.0 (1.0)	–0.1 (0.9)	0.0 (1.3)	0.2 (0.8)	0.2 (0.9)	0.2 (0.9)
Paternal support***,§	0.0 (1.0)	–0.1 (0.9)	0.2 (0.9)	–0.4 (1.1)	–0.1 (1.0)	–0.2 (0.9)	0.1 (1.3)	0.1 (0.7)	0.2 (1.0)	–0.1 (0.9)
Maternal knowledge***,‡	0.0 (1.0)	–0.2 (1.0)	0.1 (1.0)	–0.2 (1.0)	–0.2 (1.0)	0.2 (0.7)	0.2 (1.1)	0.3 (0.7)	0.1 (1.0)	–0.3 (1.1)
Paternal knowledge***,§	0.0 (1.0)	–0.1 (0.9)	0.0 (1.0)	–0.5 (1.0)	–0.2 (1.0)	0.1 (0.8)	0.2 (1.2)	0.5 (0.7)	0.1 (1.0)	–0.2 (1.0)

***p<.001. †Early sexual initiation is defined as first sex before age 16. ‡Based on females living with their biological mother (N=7,210). §Based on females living with their biological father (N=5,642). *Notes:* All analyses were weighted with standard error corrections. Figures in parentheses are standard deviations. Percentages may not sum to 100.0 because of rounding. Significance levels are from chi-square analyses or analysis of variance tests for differences between countries. Regions are based on United Nations definitions.

therefore, only the 8,495 females in this age category (range, 14.6–16.5 years) were included. We further restricted the sample to the 8,161 respondents who were living with at least one biological parent, because levels of missing data on nonresidential parents would likely be high. Finally, only students with complete covariate data were included; this restriction yielded an overall sample of 7,466 adolescents, of whom 1,824 lived with their biological mother only, 256 lived with their biological father only, and 5,386 lived with both biological parents. The level of missing data was 0% for age and family structure; 1% for family affluence and maternal support; 2% for maternal knowledge, paternal knowledge and paternal support; and 6% for sexual initiation. Compared with participants excluded because of missing data, those included in the complete case samples were significantly more likely to report high family affluence (28% vs. 24% for those living with their mother, 31% vs. 25% for those living with their father) but were similar with respect to living arrangement and age.

Analysis

All analyses were conducted in Stata 10.1 with standard error corrections for clustering within classrooms and schools. Because one country (Spain) had a sample nearly twice the size of those in other countries, individual weights were constructed (specified as a country's target sample size divided by its actual sample size) to equalize sample sizes across countries. Analyses began with an examination of variable distributions (frequencies and means) in the overall sample; distributions were statistically compared across countries using chi-square analyses and analyses of variance.

In crude logistic regression models stratified by parent gender* and country of residence, we examined the unadjusted relationship between parental support and females' early sexual initiation, and the relationship between parental knowledge and females' early sexual initiation. We also examined these variables' correlations with one another, using pairwise Pearson correlations.

Using separate multivariable logistic models for each parent, we tested the relationship between parental support and early sexual initiation after controlling for age, family affluence, family structure and country fixed effects. Models were implemented in three steps. In the first step, we statistically tested between-country differences in the magnitude of the association between parental support and early sexual initiation. All variables and interaction terms were entered simultaneously; Austria was arbitrarily chosen as the referent. Postestimation Wald tests, with Bonferroni adjustments, were then conducted to estimate the joint significance of all interaction terms (the null hypothesis was no differences across all countries) and the significance of comparisons between every pair of countries (the null hypothesis was no difference between

*Paternal and maternal variables were not modeled together for a number of reasons. Sample restrictions would have limited us to females who were living with both biological parents, and that restriction could have caused sample selection biases. Because patterns of associations vary for maternal versus paternal support with adolescent outcomes,[14] examining these constructs separately is appropriate.

any two countries). In Stata, Bonferroni adjustments were made by multiplying each individual test's p value by the total number of tests.[46] Given that the initial set of interactions in the model tests only for country differences in comparison to Austria, the Wald test was necessary to determine which countries were significantly different from each other. In our second step, we dropped all interaction terms because of the Wald test results, and thus tested the relationship between support and early sexual initiation without control variables.

In the last part of our analyses, we added parental knowledge to the multivariable model. If the point estimate for parental support changed by 10% or more or became nonsignificant, we utilized Sobel mediation tests to further probe the possible mediation relationship.[47,48] Examination of correlation matrices and variance inflation factors indicated no problems with multicollinearity between independent variables.

RESULTS

Descriptive and Bivariate

Respondents' average age was 15.6 years (Table 2). Three in 10 adolescent females reported high family affluence, and four in 10 reported medium affluence. The majority (74%) reported living with both biological parents. One in five females reported having experienced early sexual initiation. By definition, parental support and parental knowledge variables had an overall mean of 0 (and standard deviation of 1) across countries.

For all variables, significant differences in prevalence or means were noted across countries. Particularly noteworthy were substantial differences in high family affluence (e.g., 69% in Iceland vs. 3% in Ukraine) and early sexual initiation (e.g., 7% in Romania vs. 35% in Iceland). The prevalence of early sex was generally much higher in northern and western European countries (25–35%) than in the south and east (7–20%). Average maternal support scores ranged from 0.3 standard deviations below the overall mean in Lithuania to 0.2 standard deviations above the overall mean in Hungary, Romania and Ukraine. Mean paternal support scores ranged from 0.4 standard deviations below the overall mean in Lithuania to 0.2 standard deviations above it in Iceland and Romania. Maternal knowledge was lowest in Ukraine (–0.3) and highest in Hungary (0.3); paternal knowledge was lowest in Lithuania (–0.5) and highest in Hungary (0.5).

In bivariate analyses, in each country, support from either mother or father was negatively associated with adolescent females' early sexual initiation (Table 3). Differences between countries in the magnitude of these associations were not statistically significant. Also, maternal and paternal knowledge were negatively associated with adolescent females' early sexual initiation in all countries, and differences between countries in the magnitude of these associations did not demonstrate statistical significance.

Support and knowledge were also associated with each other across countries for each parent (Table 4, page 172). Associations between variables were stronger for fathers (coefficients, 0.5–0.7) than for mothers (0.4–0.6).

Multivariable

In multivariable analyses (Table 5, page 173), among adolescent females living with their mothers, the odds of early sexual initiation increased with age (odds ratio, 1.4) and were elevated for those living either in a stepfamily (2.1) or with a single parent (1.8). Affluence appeared to be unassociated with early sexual initiation. The statistical significance of country fixed effects indicated considerable variability between Austria and some other countries in the prevalence of females' early sexual initiation, even after demographic characteristics and maternal support were taken into account. For example, the adjusted odds of early sexual initiation were 53% lower in Greece than in Austria.

We tested whether associations between maternal support and females' early sexual initiation were similar across countries. After Bonferroni adjustments of p values, none of the country interactions with maternal support was significant, suggesting that the relationship between maternal support and early sexual initiation was similar

TABLE 3. Odds ratios (and 95% confidence intervals) from logistic regression analyses examining associations between parental support or knowledge and adolescent females' likelihood of early sexual initiation, by European region and country

Characteristic	North			West	South		East		
	Finland	Iceland	Lithuania	Austria	Greece	Spain	Hungary	Romania	Ukraine
Maternal support†	0.85* (0.71–0.98)	0.78*** (0.68–0.88)	0.66*** (0.52–0.80)	0.73*** (0.60–0.86)	1.02 (0.80–1.23)	0.74*** (0.63–0.85)	0.85 (0.65–1.04)	0.68* (0.47–0.90)	0.74** (0.59–0.90)
Maternal knowledge†	0.73*** (0.62–0.84)	0.67*** (0.57–0.76)	0.73** (0.59–0.88)	0.73** (0.59–0.86)	0.59*** (0.44–0.75)	0.61*** (0.50–0.72)	0.63*** (0.50–0.78)	0.63*** (0.47–0.79)	0.63*** (0.53–0.73)
Paternal support‡	0.74** (0.59–0.89)	0.72** (0.59–0.84)	0.62** (0.42–0.81)	0.74** (0.61–0.88)	0.70** (0.53–0.88)	0.81* (0.67–0.95)	0.70** (0.52–0.88)	0.66** (0.46–0.86)	0.81 (0.61–1.02)
Paternal knowledge‡	0.65*** (0.52–0.78)	0.71*** (0.59–0.84)	0.57** (0.37–0.76)	0.79* (0.65–0.93)	0.45*** (0.34–0.57)	0.62*** (0.50–0.74)	0.65** (0.47–0.84)	0.67* (0.45–0.88)	0.63*** (0.46–0.80)

*p<.05. **p<.01. ***p<.001. †Based on females living with their biological mother. ‡Based on females living with their biological father. *Notes:* Results are from separate bivariate models for each country. Odds ratios reflect differences per standard deviation increase in support or knowledge. Regions are based on United Nations definitions.

TABLE 4. Coefficients from analyses assessing correlations between parental support and knowledge, by European region and country

Region and country	Maternal†	Paternal‡
North		
Finland	0.46***	0.50***
Iceland	0.48***	0.57***
Lithuania	0.42***	0.60***
West		
Austria	0.57***	0.65***
South		
Greece	0.38***	0.56***
Spain	0.47***	0.60***
East		
Hungary	0.51***	0.54***
Romania	0.50***	0.54***
Ukraine	0.50***	0.57***

***p<.001.†Based on females living with their biological mother.‡Based on males living with their biological father. *Note:* Regions are based on United Nations definitions.

between Austria and other countries. A global Wald test of these interactions plus other country comparisons (available on request) yielded no statistically significant differences, suggesting overall similar relationships between maternal support and early sexual initiation across all countries.

Given these findings, interaction terms were dropped in the second model; the single estimate for maternal support indicated that after individual and family characteristics were controlled for, maternal support was negatively associated with adolescent females' early sexual initiation across countries (odds ratio, 0.8). Results for control variables and country fixed effects were similar to those in model 1.

In the third model, we added the maternal knowledge score. After this addition, the odds ratio for maternal support became larger and statistically nonsignificant. Further, the association between maternal knowledge and adolescent females' early sexual initiation was significant and strong (odds ratio, 0.7). A Sobel mediation test with values adjusted for the dichotomous outcome was consistent with the hypothesis that maternal knowledge mediates the relationship between maternal support and early initiation (Sobel statistic, –9.55; standard error, 0.0014).

Similar results were observed among adolescent females living with their fathers. Statistically significant differences did not exist between countries in the association between paternal support and adolescent females' early sexual initiation (results from pairwise comparisons and global Wald test available on request). Across countries, paternal support was negatively associated with early sexual initiation after individual and family characteristics were controlled for (odds ratio, 0.7). However, after paternal knowledge was added, the association between paternal support and adolescent females' early sexual initiation became smaller and nonsignificant, while the association between paternal knowledge and adolescent females' early sexual initiation was significant and strong (0.7). A Sobel test was consistent with the hypothesis that paternal knowledge mediates the relationship between paternal support and adolescent females' early initiation (Sobel statistic, –6.98; standard error, 0.0039).

DISCUSSION

The first major finding in the present study was the significant variability across European countries in the early initiation of first sex among adolescent females. Both similarities and differences were observed within regions. As past research has also found,[49] the highest prevalence of early sexual initiation was found in northern and western European countries (although Lithuania, defined by the United Nations as northern European, had a very low prevalence). In multivariable models, significant between-country differences in the odds of early sexual initiation persisted even after we controlled for family affluence and family living arrangements. Further research into the reasons for these intercountry differences is warranted.

The second major finding was the consistency across countries in the negative relationship between parental support and adolescent females' early sexual initiation. This was unexpected, given earlier findings[20] and the variability in the prevalence of early sexual initiation across countries, which points to different norms and values. Discrepant findings between the previous study and the current analysis may reflect differences in the examined countries; the previous study's use of a risky sexual behavior index, in contrast to our examination of early sexual initiation only; or differences in variables included in models (e.g., parental closeness was included in the earlier study, but not in ours). Nevertheless, this finding may suggest that the commonness of adolescent females' sexual initiation before age 16 is an imperfect indicator of parents' disapproval of it, and that this disapproval is uniform across countries. Parental support, to the extent that it enables a positive sense of self through secure attachment, lays the foundation for self-assurance in relationships with intimate partners.[1,13] Such self-assurance may translate to increased ability to negotiate for delayed sex.

The third major finding was that negative associations between parental support and adolescent females' early sexual initiation became nonsignificant once parental knowledge was added. The significant Sobel test was consistent with a mediation relationship. Thus, one potential explanation of our findings is that parental support produces greater parental knowledge of adolescent females' lives, which in turn leads to decreased odds of females' early sex. However, because our data were cross-sectional, we could not discern the temporal ordering of parental support, parental knowledge and early sexual initiation. Thus, it is also possible that parental knowledge is a stronger correlate of later sexual initiation than is parental support. The distinction between conclusions is important for public health practice. One suggests that

TABLE 5. Odds ratios from logistic regression analyses examining associations between selected characteristics and adolescent females' likelihood of early sexual initiation

Characteristic	Model 1†	Model 2	Model 3	Model 4†	Model 5	Model 6
Age	1.44 (1.17–1.78)**	1.44 (1.17–1.77)**	1.46 (1.18–1.80)**	1.46 (1.13–1.89)	1.47 (1.13–1.89)*	1.47 (1.13–1.90)†
Family affluence						
Low	1.12 (0.93–1.34)	1.13 (0.94–1.35)	1.12 (0.93–1.34)	1.17 (0.95–1.43)	1.18 (0.96–1.45)	1.14 (0.92–1.40)
Medium (ref)	1.00	1.00	1.00	1.00	1.00	1.00
High	0.94 (0.80–1.09)	0.94 (0.81–1.10)	0.95 (0.81–1.11)	0.93 (0.77–1.11)	0.93 (0.78–1.11)	0.92 (0.76–1.10)
Living arrangement						
Two biological parents (ref)	1.00	1.00	1.00	1.00	1.00	1.00
Stepfamily	2.13 (1.75–2.61)***	2.14 (1.75–2.61)***	2.15 (1.76–2.64)***	3.18 (1.83–5.55)***	3.21 (1.84–5.62)***	3.68 (1.03–6.68)***
Single parent	1.76 (1.48–2.11)***	1.75 (1.47–2.09)***	1.75 (1.46–2.09)***	1.99 (1.32–3.00)*	1.99 (1.32–2.99)*	2.29 (1.52–3.45)**
Maternal support	0.72 (0.60–0.86)**	0.80 (0.75–0.85)***	0.95 (0.88–1.02)	na	na	na
Maternal knowledge	na	na	0.69 (0.65–0.75)***	na	na	na
Paternal support	na	na	na	0.75 (0.63–0.90)*	0.74 (0.68–0.79)***	0.90 (0.82–1.00)
Paternal knowledge	na	na	na	na	na	0.69 (0.62–0.76)***
Country fixed effects						
Austria (ref)	1.00	1.00	1.00	1.00	1.00	1.00
Finland	0.97 (0.71–1.33)	0.94 (0.70–1.27)	0.95 (0.71–1.28)	0.86 (0.60–1.21)	0.86 (0.61–1.19)	0.90 (0.64–1.26)
Greece	0.47 (0.32–0.68)***	0.44 (0.31–0.64)***	0.52 (0.36–0.75)**	0.40 (0.27–0.59)***	0.40 (0.28–0.59)***	0.47 (0.32–0.69)**
Hungary	0.71 (0.51–1.00)	0.71 (0.50–0.99)	0.82 (0.58–1.15)	0.75 (0.52–1.10)	0.75 (0.52–1.09)	0.97 (0.66–1.42)
Iceland	1.50 (1.10–2.04)	1.48 (1.09–2.00)*	1.60 (1.18–2.16)*	1.75 (1.25–2.45)*	1.76 (1.26–2.44)*	1.82 (1.31–2.54)**
Lithuania	0.21 (0.14–0.32)***	0.23 (0.16–0.33)***	0.24 (0.17–0.34)***	0.18 (0.11–0.30)***	0.20 (0.13–0.31)***	0.20 (0.13–0.30)***
Romania	0.18 (0.12–0.27)***	0.18 (0.13–0.26)***	0.19 (0.13–0.28)***	0.18 (0.12–0.29)***	0.19 (0.12–0.29)***	0.20 (0.13–0.31)***
Spain	0.52 (0.38–0.72)**	0.52 (0.38–0.71)***	0.61 (0.44–0.83)*	0.50 (0.36–0.70)***	0.50 (0.36–0.69)***	0.57 (0.41–0.80)*
Ukraine	0.42 (0.29–0.60)***	0.41 (0.29–0.58)***	0.38 (0.27–0.54)***	0.33 (0.23–0.49)***	0.33 (0.23–0.49)***	0.32 (0.22–0.47)***
Interactions						
Austria (ref)	1.00	na	na	1.00	na	na
Finland x support	1.17 (0.92–1.48)	na	na	0.99 (0.76–1.30)	na	na
Greece x support	1.43 (1.09–1.88)	na	na	0.94 (0.70–1.27)	na	na
Hungary x support	1.21 (0.91–1.61)	na	na	0.96 (0.70–1.32)	na	na
Iceland x support	1.11 (0.89–1.40)	na	na	0.97 (0.75–1.25)	na	na
Lithuania x support	0.95 (0.72–1.25)	na	na	0.84 (0.58–1.22)	na	na
Romania x support	0.97 (0.68–1.39)	na	na	0.89 (0.62–1.27)	na	na
Spain x support	1.05 (0.83–1.33)	na	na	1.09 (0.84–1.40)	na	na
Ukraine x support	1.07 (0.81–1.41)	na	na	1.06 (0.77–1.45)	na	na

*p<.05. **p<.01. ***p<.001. †In global Wald test of all pairwise comparisons, p>.10. *Notes:* All reported p values are Bonferroni-adjusted. ref=reference group. na=not applicable.

parental support is an important strategy by which parents may gain knowledge of their adolescent daughters' lives, and thus help to reduce the risk of early initiation. The other suggests that parental support is superfluous, and that parents should concentrate on gaining knowledge. Future research in Europe should directly assess the relative importance of perceived parental support, active parental surveillance and voluntary adolescent disclosure within longitudinal designs that facilitate identification of causal processes.

Limitations

The study's cross-sectional design limits conclusions about causality and mediation. U.S. studies have confirmed that changes in relationships with parents may both precede and follow adolescents' sexual initiation: Worsening relationships with parents potentially predict initiation, but relationships may worsen subsequent to initiation.[50] Future studies using longitudinal designs should be undertaken to confirm and deepen the understanding of this study's results. Another limitation was our inability to include a variable measuring parental sexual communication because of its absence from the HBSC survey. Although a general question was asked about ease of communication, this measure has had no relationship to early sexual debut in European countries.[43] Future studies should build upon ours by including a measure of parent-child sexual communication, since an association has been found between this construct and delayed sex.[7,40] Also, although we believed that perceived parental support could enhance the enactment of parental values against early initiation, we were unable to test this assumption because we had no direct measures of parental values. Future European studies with alternate data sources may explore this proposition.

Because we limited our sample to adolescent females living with at least one biological parent, we could not generalize results to adolescents living apart from their parents. Parental support may be more important with a nonresidential parent, and future studies should investigate this possibility. In addition, the item querying sexual initiation does not specify type of contact (e.g., vaginal, oral or anal)

or whether the experience was consensual; therefore, participants may have had variable interpretations of this question. Finally, by using a complete case analysis, we excluded 9% of otherwise eligible participants. Although this is a relatively small proportion, included females demonstrated some positive selection on family affluence that may have biased our results.

Conclusion

Our findings underscore the cross-national importance of understanding associations between early sexual initiation and multiple facets of parent-adolescent relationships, and the mechanisms underlying those associations. Further study is needed to examine the temporal ordering of parental support, parental knowledge and adolescents' sexual behavior. Findings from such research could yield significant implications for public health practice by helping programs to emphasize aspects of parenting that may assist adolescents in protecting their sexual and reproductive health.

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