



Published in final edited form as:

J Youth Adolesc. 2010 October ; 39(10): 1211–1225. doi:10.1007/s10964-010-9521-x.

Early Adolescent Sexual Initiation and Physical/Psychological Symptoms: A Comparative Analysis of Five Nations

Aubrey Spriggs Madkour,

Department of Community Health Sciences, Tulane University School of Public Health & Tropical Medicine, New Orleans, LA, USA, aspriggs@tulane.edu

Tilda Farhat,

Prevention Research Branch, Division of Epidemiology, Statistics, and Prevention Research, Eunice Kennedy Shriver National Institute of Child Health and Human Development, Bethesda, MD, USA

Carolyn Tucker Halpern,

Department of Maternal and Child Health & Carolina Population Center, University of North Carolina at Chapel Hill, Chapel Hill, NC, USA

Emmanuelle Godeau, and

UMR Inserm U558, University Paul Sabatier Toulouse and Service médical du Rectorat de l'académie de Toulouse, Toulouse, France

Saoirse Nic Gabhainn

Health Promotion Research Centre, School of Health Sciences, National University of Ireland Galway, Galway, Ireland

Abstract

Although most people in developed countries experience sexual initiation during adolescence, little is known about inter-country variability in the psychosocial correlates of early initiation. Population-based samples of 15-year-olds ($n = 6,111$, 52% female) who participated in the Health Behaviors in School-Aged Children Study (Finland, Scotland, France and Poland, 1997/1998) or the National Longitudinal Study of Adolescent Health (United States, 1996) self-reported sexual intercourse experience and physical (headaches, trouble sleeping) or psychological (unhappiness, loneliness, sadness, moodiness) symptoms. Analyses were conducted stratified by gender. Sexual initiation prevalence and symptoms scores varied significantly across nations. In adjusted models, sexual initiation was not related to symptoms among boys in any nation, but significantly positively related to symptoms among girls in Poland and the US. Results support variability by gender and nation in the relationship between adolescents' sexual initiation and physical/psychological symptoms. Empirically investigating specific features of national contexts that generate these differences should be explored further.

Keywords

Sexual behavior; Adolescent; Gender differences; Depressive symptoms; Cross-national

Introduction

The vast majority of people in the contemporary US experience sexual debut sometime during adolescence and prior to marriage (Halpern et al. 2006). Despite this statistical normality, the characterization of adolescent sexual initiation as problematic in the US is largely accepted. Concern about unintended pregnancy and sexually transmitted infections (STIs), which are more likely with younger ages at debut (Edgardh 2000; O'Donnell et al. 2001), is one rationale for characterizing adolescent debut as a problem behavior. Purported negative mental health effects of premarital adolescent sexual debut have been cited in abstinence-only sex education policy as a rationale for treating adolescent sexual activity as an age-inappropriate, developmentally-risky behavior (Maternal and Child Health Bureau 2002). Cross-national comparative studies, however, demonstrate that some potential consequences and correlates of adolescent sexual activity vary across developed nations. For example, European nations and the US differ greatly in adolescent birth and STI rates, despite similar overall levels of sexual activity (Darroch et al. 2001). Other studies, comparing the US to European nations (i.e., the Netherlands, Germany and France), find great variability in parental attitudes about adolescent sexuality, with European parents being less likely to forbid sexual activity and more likely to speak openly with their adolescents about sexuality (Berne and Huberman 1998; Schalet 2004). Although 58% of adults in a 24-nation survey reported believing that sexual initiation before age 16 was “always wrong,” such attitudes varied widely across nations (i.e., from a low of 27% in East Germany to a high of 84% in Ireland) (Widmer et al. 1998). Given this cross-national variability in cultural norms around adolescent sexual activity, it is possible that the health and developmental implications of initiation vary as well.

Timing of Sexual Initiation

Prevalence and National Comparisons—Most people in developed nations experience sexual initiation sometime during adolescence. In the US, over 90% of young adults in 2001 reported sexual debut during adolescence and prior to marriage (Halpern et al. 2006). In the early 1990s, the majority of young adults (ages 20–25) surveyed in eleven European nations reported experiencing sexual initiation during adolescence. For males, the prevalence of sexual initiation before age 20 ranged from 73% in the Netherlands to 88% in Iceland; for females, the low was in Portugal at 51% and the high in Denmark at 90% (Hubert et al. 1998). Sexual debut in adolescence became more prevalent during the latter half of the twentieth century. For example, while only 26% of 55–64 year olds participating in the US 2002 National Survey of Family Growth reported initiating sexual intercourse premaritally and prior to age 18, 54% of 15–24 year old participants reported adolescent premarital initiation (Finer 2007). Similar trends—declining median age at first intercourse—have also been observed across many European nations (Teitler 2002).

Early Sexual Initiation—Although most people in contemporary developed nations experience sexual initiation sometime during adolescence, the relative timing during adolescence varies by country. In the US, 40.8% of tenth-graders (usually 15-years-old) reported ever having sexual intercourse in 2001 (Brener et al. 2006). A survey conducted in the same year in 32 nations found the prevalence of ever having sexual intercourse among 15-year-olds varied from a low of 15% in Poland to a high of 75% in Greenland (Ross et al. 2004). How one defines “early” sexual intercourse, however, is not clear. Whether “early” debut should be defined according to the statistical distribution of age at first intercourse within the country of residence, or whether early should be defined by a developmentally driven health standard that reflects adverse consequences to the individual stemming from physical and/or emotional immaturity, has not been adequately examined in the literature. In the US, sexual debut before age 16 is generally considered early, based on both the

statistical distribution and positive associations with sexually transmitted infections, unintentional pregnancy, and psychological and social problems (Darroch et al. 2001; O'Donnell et al. 2001; Spriggs and Halpern 2008a, b). This definition of early (debut before age 16) has also been used in studies of French adolescents (Godeau et al. 2008), Swedish adolescents (Magnusson 1998), Finnish adolescents (Lavikainen et al. 2009), and British adolescents (Wellings et al. 2001). In this article we will define early sexual debut as debut before age 16, with the recognition that this definition may not be ideal.

Demographic Predictors of Earlier Sexual Initiation—Within countries, a number of individual and family characteristics have been associated with earlier sexual debut. Perhaps because adolescent sexual initiation is more culturally accepted in European nations than the US (see next paragraph), more research exists on predictors of sexual initiation in the latter context. In the US, race has been found to be strongly related to timing of sexual initiation, with African American teenagers on average experiencing earlier sexual debut than their White and Hispanic peers (Browning et al. 2004). Family structures other than two biologic parents have been associated with earlier sexual initiation among girls in the US, France, Scotland and Sweden, and among boys in Scotland (Billy et al. 1994; Godeau et al. 2008; Magnusson 2001; Wight et al. 2006). Although in some nations timing of sexual initiation between boys and girls is roughly similar, boys in others report earlier initiation (Currie et al. 2000; Hubert et al. 1998). Finally, family socioeconomic status has been negatively related to earlier sexual initiation in the US (Lammers et al. 2000). Although we were unable to find literature exploring this relationship in European nations, socioeconomic status has been negatively associated with teenage childbearing in European nations (Singh et al. 2001). (The Singh, Darroch and Frost study examined socioeconomic status as it related to sexual debut before age 20, not early sexual debut.) Such similarities across studies support common demographic correlates of earlier adolescent sexual initiation across developed nations.

National Contexts and Adolescent Sexual Health—As noted above, some cross-national differences in adolescent sexual health have been noted in prior studies; potential reasons for such differences have also been explored using qualitative methods. In studies utilizing both in-depth interviewing techniques and case study methods, parents in the Netherlands, France and Germany were found to be more open to discussing and more accepting of adolescent sexual relationships compared to parents in the US; furthermore, initiation of sexual behavior was less disruptive to family dynamics in European nations than in the US (Berne and Huberman 1998; Schalet 2004). Researchers have also found substantial differences across nations in approaches to formal sex education. European nations tend to integrate comprehensive sex education across multiple class subjects and include information about positive aspects of sexuality mixed with messages of responsibility and ethics, whereas US educational institutions are more focused on sexual risk and a strong proscription against any sexual behavior (Berne and Huberman 1998). Another difference is that the studied European nations have had multiple, long-standing media campaigns promoting safer sexual behavior, while no such nationwide campaigns have taken place in the US (Berne and Huberman 1998). Finally, the availability and accessibility of reproductive health services for adolescents were found to vary across countries, with European nations offering more adolescent-friendly programs than the US (Berne and Huberman 1998). All of these differences have been proposed as explanations for cross-national variability in sexual health outcomes (Berne and Huberman 1998; Darroch et al. 2001; Ingham and Partridge 2002); they potentially could also produce differences in other health and developmental implications of early sexual debut.

Adolescent Physical and Psychological Symptoms

Prevalence, National Comparisons, and Demographic Differences—In this article, when we refer to symptoms, we are discussing negative physical or psychological complaints. Physical and psychological symptoms among adolescents are important indicators of health problems. In addition to being related to physical and emotional discomfort, such symptoms are associated with problematic functioning in both interpersonal relationships and school settings (Garber et al. 1991; Taylor et al. 1996; Rauste-von Wright and von Wright 1992). Further, the co-occurrence of multiple symptoms may indicate a somatization disorder. The experience of physical symptoms is associated with social and cultural context (Gureje et al. 1997), and symptom loads have been found to vary across countries. In one study of 27 European and North American nations, the prevalence of experiencing five or more symptoms weekly (including headache, stomach ache, backache, feeling low, bad temper, nervousness, difficulties in getting to sleep, dizziness, loneliness, tired in the morning, feeling left out of things, and feeling helpless) among 11, 13 and 15-year-olds varied from 11% (Austria) to 38% (US) for boys and from 20% (Austria) to 49% (US) for girls (Due et al. 2005). Researchers also have found that adolescents living in Eastern European and Balkan nations report more such health complaints than adolescents in other European regions, although symptoms were higher in the US than in European nations (Holstein et al. 2009). Within countries, girls usually report higher symptom levels than boys; however, the level of gender disparities varies across nations (Haugland et al. 2001; Rhee et al. 2005). Other individual and family factors positively associated with symptom loads include low socioeconomic status (Holstein et al. 2009; Ravens-Sieberer et al. 2009) and non-intact family structure (Aro et al. 1987). These findings suggest individual, interpersonal and wider contextual forces all influence adolescents' experiences of symptoms across national settings.

Symptoms and Sexual Initiation—As noted above, the purported negative physical and mental health effects of adolescent sexual debut were cited as one rationale for recent US abstinence-only sex education policy (Maternal and Child Health Bureau 2002); further, numerous empirical studies have linked earlier sexual initiation to symptoms in the US. For girls, longitudinal studies support a bi-directional relationship, where depressive symptomatology (including both emotional and somatic complaints) is related to an increased risk of subsequent debut, and early debut is also related to an increase in depressive symptoms controlling for baseline symptom levels (Longmore et al. 2004; Meier 2007; Spriggs and Halpern 2008a). A similar relationship has not been found for boys in the US. Few studies have explored this relationship outside the US context. In one exception, utilizing data from convenience samples of college women in the US and Sweden, a researcher found that US women retrospectively reported greater negative affective responses to first premarital intercourse compared to Swedish women (Schwartz 1993). Given this dearth of knowledge, further exploration of the relationship between early sexual debut and symptoms outside the US context is warranted. Doing so may help elucidate whether early adolescent sexual debut is fundamentally linked to physical and/or emotional health, regardless of context, or whether aspects of cultural norms or social structures influence these relationships. In this article, our objective was to assess the cross-national consistency of the relationship between early adolescent sexual initiation and physical/psychological symptoms.

Hypotheses

We apply two theoretical perspectives to our investigation: Problem Behavior Theory (PBT) and Feminist Theory. Both emphasize the importance of sociocultural norms. Problem Behavior Theory posits that early initiation of developmental transitions will evoke negative

or control reactions from the environment when the transition violates socially defined norms for the timing of transitions (Jessor and Jessor 1977). Feminist theory includes the premise that adolescent sexuality is socially constructed (Bay-Cheng et al. 2006), and also incorporates the long-standing drive reduction model of adolescent sexuality. This model indicates that the sexual motivation awakened by the hormonal changes of puberty results in a hypersexuality that warrants adult intervention and control (Bay-Cheng 2003). Culturally determined sexual scripts cast boys as the active initiators and girls as the passive gatekeepers, contributing to sexual double standards wherein the negative psychosocial consequences of sexual activity are harsher for girls than boys. According to PBT, and consistent with Feminist Theory, a specific behavior is only problematic to the extent that the society in which the adolescent is embedded defines it as such (Bay-Cheng et al. 2006; Jessor and Jessor 1977). Therefore, associations between sexual initiation and negative physical and psychological symptoms may vary based on the degree to which countries differ in their cultural acceptance of adolescent sexual behavior. Alternatively, if there are negative sequelae of early sexual initiation, such as depressive symptoms, which are due primarily to physical and/or emotional immaturity, early sexual initiation may be consistently problematic in some domains, regardless of cultural context or gender roles.

Empirical findings in the US and Canada offer support for both PBT and a Feminist perspective. Research has found that, after sexual debut, adolescents experience an increase in problem-focused interactions with parents, a decreased feeling of belongingness at school, and decreased participation in religious activities (Ream 2006; Ream and Savin-Williams 2005). Such consequences could account for depressive symptom increases observed after sexual debut (Meier 2007; Spriggs and Halpern 2008a). Further, control reactions to sexual intercourse initiation are greater for females—female adolescents are subject to more negative social sanctions after debut than males, including pejorative labeling by peers and problem-focused parental interactions (Shoveller et al. 2004; Tolman 2002). Findings from Add Health also indicate that characteristics of sexual behavior such as numbers of sexual partners are associated with differential peer acceptance for boys and girls, as indicated by a network measure of peer acceptance (Kreager and Staff 2009). A similar report is available for Scottish males and females, ages 15–20, who “expected men to have more sexual partners, and viewed men who had multiple sex partners during the course of a year more positively than their female counterparts” (Sheeran and Spears 1996). However, other analyses suggest more egalitarian sexual standards in Finland in the 1990s (Haavio-Mannila and Kontula 2003). Empirical findings across studies suggest that there may be negative psychosocial and health correlates of early sexual initiation, though the overall magnitude of these associations and gender differences may be variable across nations.

Given the theory and findings described above, our *first hypothesis* is that sexual initiation will be positively associated with negative physical and psychological symptoms. Our *second hypothesis* is that positive associations between adolescent sexual initiation and negative physical/psychological symptoms will be greater for female than for male adolescents. In terms of cross-national variability, differences between nations in sexual double standards suggest there may be variability in associations between sexual initiation and negative physical/psychological symptoms across nations. However, given that we are studying relatively early sexual initiation, cultural disapproval may be more uniform, and thus a consistent relationship between sexual initiation and negative symptoms may emerge across nations. Given both these possibilities, we have no a priori hypotheses regarding cross-national variability in the relationship between sexual initiation and physical/psychological symptoms.

Methods

Data

Analyses draw upon data from the U.S. National Longitudinal Study of Adolescent Health (Add Health, 1996) and the Health Behavior in School-Aged Children (HBSC, 1997–1998) study conducted in 28 primarily European countries in collaboration with the World Health Organization Regional Office for Europe. Add Health was designed to examine the determinants of health and health-related behaviors of US adolescents in grades 7–12 during the 1994–1995 school year. The primary sampling units were schools; in the secondary sampling stage, a representative core sample and several special samples (e.g., siblings, adolescents with disabilities, etc.) of adolescents were selected for in-home interviews (Harris et al. 2003). Sensitive content (e.g., sexual behavior questions) were self-administered via A-CASI. Over 21,000 respondents completed in-home interviews in 1995 (Wave I), of whom almost 15,000 were re-interviewed at Wave II in 1996 (88% of those eligible) (Chantala et al. 2004). Only data from Wave II were included in the present analysis, as Wave II corresponded most closely to the 1997/1998 data collection period for HBSC.

Health Behavior in School-Aged Children was designed to examine the health and health behaviors of adolescents across national contexts (Currie et al. 2000). Schools were the primary sampling units in HBSC; children aged 11, 13, and 15 years were the target for the international study. Anonymous surveys were conducted by pen-and-paper within classrooms. Strict adherence to the data collection protocols was required for inclusion in the international dataset. Over 120,000 students were included in the 1997–1998 international HBSC dataset.

All Add Health procedures and forms were reviewed and approved by the University of North Carolina at Chapel Hill School of Public Health IRB. For HBSC, each participating country obtained approval to conduct the survey from the relevant ethics review board or an equivalent regulatory body. The present secondary analysis was deemed exempt from IRB review by the University of North Carolina at Chapel Hill Public Health-Nursing IRB, as well as the Tulane University IRB.

Measures

Comparisons of question and response wording between Add Health and HBSC, as well as recoding approaches, are provided in Table 1. There are some differences in the way questions are phrased, which will warrant caution in the interpretation of results; however, the level of similarity in content allows comparison.

Sexual Initiation—This measure, our main predictor variable, is based on a question asking whether the respondent ever had sexual intercourse. Because the analysis sample was limited to respondents in their 15th year (detailed below), an affirmative response to this question indicates relatively early sexual debut timing by Western European and US standards (Darroch et al. 2001; Spriggs and Halpern 2008a, b).

Physical and Psychological Symptoms—An index of items assessing physical and psychological symptoms is our main predictor variable. Symptoms are assessed with six items included in both Add Health and HBSC: general happiness (reverse coded), feeling low/sad, feeling lonely, feeling moody or irritable, frequency of headaches, and difficulty sleeping. We include both physical and psychological symptoms because physical symptoms (headaches, sleep disturbance, appetite disturbance, etc.) commonly co-occur with depressive symptoms (Saluja et al. 2004), and are included on depression screening

instruments such as the Center for Epidemiological Studies Depression Scale (CES-D) (Goodyer 1996). Reports of physical symptoms also predict later depressive episodes (van Lang et al. 2007). All items were assessed on ordinal scales with four or five levels; we recoded response options to be similar across surveys (see Table 1). Because categorical variables violate assumptions of traditional factor analysis/principal components analysis, we conducted polychoric principal components analysis (Kolenikov and Angeles 2004) both to assess the appropriateness of including the items in a single index, and to generate the summary score (loadings on first factor used as item weights). As seen in Table 2, eigenvalues suggest a single factor solution is reasonable; further, items' factor loadings across country and gender groups are substantively similar. Scores range from -1.93 to 4.27 , with higher scores representing a higher level of physical/psychological symptoms.

Individual and Family Demographics—*Living arrangement* (with both biologic parents/stepfamily/ single parent/other) and *family socioeconomic status* (SES) were included as control variables because of their associations with adolescent sexual initiation (Cubbin et al. 2005; Pearson et al. 2006) and depression (Cavanagh 2008; Lemstra et al. 2008). Because comparable measures of family SES are not available across the datasets, a three-category ordinal indicator of parental education (higher of residential mother or father: less than high school or high school diploma or GED/some postsecondary/college graduate or more) was used for Add Health, and the Family Affluence Scale (a four-item family assets scale, converted to a three-level ordinal indicator) was used for the HBSC countries (Currie et al. 2008). We did not include other attitudinal indicators or problem behaviors as controls, because they may act as mediators between sexual behavior and physical/psychological symptoms. *Gender* was included as a potential moderator of the relationship between sexual initiation and symptoms, given past findings of gender differences in associations between sexual behavior and depressive symptoms in the US (Meier 2007; Spriggs and Halpern 2008a). This variable was specified as dichotomous (male/female).

Nation of Residence—*Nation* (US/Finland/Scotland/France/Poland) was also treated as a potential moderator, since we wanted to test cross-country differences in associations between adolescent sexual intercourse and physical/psychological symptoms.

Analytic Sample

We applied a number of sample inclusion criteria. First, as sexual behavior questions were optional in the 1997–1998 HBSC data collection, we limited analyses to the four HBSC countries that included such questions for subpopulations identifiable through the international dataset (Finland, Scotland, France, and Poland). Second, in HBSC, only participants in their 15th year were asked sexual behavior questions; therefore, we limited both the HBSC and Add Health samples to students who were in their 15th year at the time of the survey to maintain age comparability across sample countries. A third sample limitation was implemented due to the different sampling designs across surveys. In Add Health, both a core sample representative of the target population and special selected oversamples (e.g., by race/ethnicity, disability status, sibling status, etc.) were included; therefore weights reflect not only a scalar for population but also adjustments for unequal probability of selection for oversample respondents. In HBSC, oversampling by race/ethnicity or other status was not implemented; therefore samples in HBSC are representative of their country's target population without weights being applied. Because population weights are not available for the HBSC samples, and only the core sample in Add Health is representative of the US population without such weights, we had to limit the US sample to the core sample respondents. Finally, we included only respondents with complete covariate data (92% of those otherwise eligible). As the overall level of missings is $<10\%$, we believe complete case analysis does not bias our results (Rothman and Greenland 1998). Our final

sample sizes are 1,621 for the US (95% of eligibles), 1,340 for Scotland (90% of eligibles), 884 for Finland (82% of eligibles), 994 for France (90% of eligibles), and 1,272 for Poland (98% of eligibles).

Analysis

Analyses were conducted using Stata SE version 10.0. Analyses accounted for complex survey design, including adjustment of standard errors for intraclass correlation within schools. We began analyses by examining the distribution of analytic variables within gender and country strata. Bivariate relationships between the analytic variables were examined using Chi-square and ANOVA analyses. We then implemented multivariable ordinary least squares (OLS) models stratified on gender, regressing physical/psychological symptoms on sexual initiation (no as referent), country (US as referent), living arrangement (two biologic parents as referent), family SES (high SES as referent), and an interaction between country and sexual initiation. Including country fixed effects controlled for unmeasured differences between country contexts (e.g., racial/ethnic and immigrant composition, etc.) (Wooldridge 2005), and permitted significance testing of the between-country differences with the interaction term. Point estimates for ever having engaged in sexual intercourse were interpreted as the adjusted association between sexual initiation and symptoms net of the control factors in the referent country (US). We assessed variability between European nations and the US by examining the statistical significance of the joint Wald test of interaction terms; we applied a high alpha level ($\alpha = 0.2$) for these significance tests, given the low power of tests of interactions (Selvin 2004). If the joint Wald test was non-significant, we concluded that cross-country differences were not supported, and the point estimate in the referent country was valid across settings. If the joint Wald test was statistically significant, we concluded that cross-country differences were supported, and we then generated separate sexual initiation point estimates for each country. Statistical significance of these point estimates then tested the relationship between sexual initiation and symptoms in each country.

Results

Distributions of Demographic Characteristics, Sexual Initiation, and Symptoms

Descriptive characteristics of the analysis sample, by gender and country, are presented in Table 3. Significant differences between countries are observed across all analysis variables. For example, not living with two biologic parents is significantly more common among US boys and girls than among youth from other countries. The prevalence of low socioeconomic status is considerably higher in Poland, and considerably lower in France, than in other countries for both boys and girls. Sexual initiation by age fifteen among boys varies from a low of 17.6% in Finland to a high of 32.7% in Scotland; among girls, early sexual initiation varies from a low of 11.3% in Poland to a high of 37.2% in Scotland. Self-reported physical/psychological symptoms are significantly greater among females compared to males in each nation. For girls, physical/psychological symptoms are the greatest in France, and for boys symptoms are highest in Poland and Finland.

Sexual Initiation and Symptoms, Boys

As bivariate results are very similar to results from adjusted models (same variables are significant and point estimates change little), we present only results from multivariable models (Table 4). For boys, living in a blended family ($\beta = 0.16$, 95% CI 0.01–0.31) or with a single parent ($\beta = 0.23$, 95% CI 0.10–0.35) and having low socioeconomic status ($\beta = 0.17$, 95% CI 0.07–0.28) are significantly positively associated with physical/psychological symptoms. Further, adolescent boys residing in European nations experienced significantly higher symptom scores than boys residing in the US (Scotland $\beta = 0.38$, Finland $\beta = 0.61$,

France $\beta = 0.59$, Poland $\beta = 0.58$). Because interaction terms are included in the model, the point estimate for ever sexual intercourse should be interpreted as the relationship between ever sexual intercourse and symptoms in the referent country (the US). The point estimate suggests there is not a statistically significant relationship between early sexual initiation and symptoms for boys in the US ($\beta = 0.12$, 95% CI -0.04 to 0.28). The non-significance of the interactions between nation and ever sexual intercourse (overall p -value = 0.269) suggests this relationship does not vary by country.

Sexual Initiation and Symptoms, Girls

Results for multivariable OLS models for girls are also presented in Table 4. As for boys, living in a blended family ($\beta = 0.38$, 95% CI 0.23 – 0.54) or single parent family ($\beta = 0.23$, 95% CI 0.10 – 0.36) and low socioeconomic status ($\beta = 0.21$, 95% CI 0.09 – 0.33) are positively related to physical/psychological symptoms for girls. Also, girls living in European nations reported significantly higher symptoms scores than girls in the US, even after controlling for family structure and socioeconomic status (Scotland $\beta = 0.66$, Finland $\beta = 0.71$, France $\beta = 1.12$, Poland $\beta = 0.92$). The point estimate for ever sexual intercourse supports a statistically significant and positive relationship between ever having sexual intercourse and symptoms for girls in the US—those who have experienced sexual intercourse report a symptoms score which is nearly half a standard deviation higher than girls who have not initiated intercourse ($\beta = 0.48$, 95% CI 0.30 – 0.66). The joint statistical significance of interaction terms (at an alpha level of 0.20) supports cross-national variability in this association (overall p -value 0.120). Figure 1 presents point estimates for ever sexual intercourse by country. The relationship between ever sexual intercourse is significant and positive in both the US and Poland ($\beta = 0.40$, 95% CI 0.03 – 0.77); however, point estimates are much smaller and non-significant in Scotland, Finland and France.

Discussion

This analysis is the first to examine the relationship between early adolescent sexual initiation and physical/psychological symptoms using quantitative, population-based data from multiple developed nations. Although past research has found differences across developed nations in rates of adolescent STIs and births despite similar levels of sexual activity (Darroch et al. 2001), little is known about cross-national variability in psychosocial correlates of adolescent sexual initiation. The results have implications for people addressing sources of adolescent well-being across these contexts, including those providing sexual education, and for our understanding of determinants of adolescent well-being that vary across nations (e.g., culture, adolescent-serving health systems, and demographic/social context).

Descriptive results support substantial variability between countries in the symptoms and prevalence of early sexual initiation for both boys and girls. This finding is consistent with past research which has found substantial variations in health behaviors (including early sexual debut) and health status of youth across developed nations (Darroch et al. 2001; Scheidt et al. 2000). Such results suggest further research is warranted in the source of these differences across countries, such as potential national-level socioeconomic, health systems, cultural or public policy influences.

We also found that early sexual initiation was significantly positively related to negative physical/psychological symptoms only within two countries (the US and Poland) and only for girls. This provides only weak support for Problem Behavior Theory, specifically our hypothesis of a positive relationship between early sexual initiation and negative symptoms, but stronger evidence in support of Feminist Theory, specifically our hypothesis that these relationships would be stronger for females than males. The finding that these associations

vary across nations suggests there potentially are national level factors that vary in their influence of adolescents' experience of sexual debut. Given the cross-sectional nature of this study, this could mean cross-national differences in how symptoms influence early sexual onset, how early sexual onset influences symptoms, or a combination of the two. Past studies have found large differences across countries in reproductive health services for adolescents, approaches to adolescent sex education, public information campaigns, and public opinion about the appropriateness of adolescent sexual activity (Berne and Huberman 1998; Widmer et al. 1998). Qualitative studies also have found parent detachment following sexual initiation to be greater in the US than in the Netherlands, France and Germany (Berne and Huberman 1998; Schalet 2004). It is possible that one or more of these factors explains observed differences across countries. Further research is warranted testing these mediating mechanisms and the temporal ordering of symptoms and sexual debut across countries.

That the relationship between early sexual initiation and symptoms was found only for girls in the US and Poland is consistent with past US-based research (Meier 2007; Spriggs and Halpern 2008a), and suggests that cultural norms and social sanctions for early sexual intercourse vary by gender within these national contexts. That these results were also found in Poland, but not in other studied countries, potentially hints that some aspect(s) of national contexts could also influence gender disparities in sexual initiation experiences. Such protective factors in Scotland, France, and Finland may include more positive orientations toward sexuality generally, coupled with more gender equitable approaches to healthy sexuality (Bay-Cheng 2003; Bay-Cheng et al. 2006; Berne and Huberman 1998; Schalet 2004) and maybe reduced influences of religion on social norms. Further research is warranted on the sources of these national differences in gender disparities.

This study benefits from the large, population-based samples of adolescents available across a number of nations, and from the relative similarity of questions asked across these surveys. However, results should be interpreted with knowledge of the study's limitations. First, the datasets used do not provide any direct measurements of perceptions of cultural norms toward adolescent sexuality; therefore we are unable to directly test our hypothesized mechanism for cross-country differences. Future studies using data that do include such measures should be pursued. Second, some variation was present in the question and response wording across Add Health and HBSC, such as in the time frame referent for symptoms questions and the measurement of family socioeconomic status. As such, estimates of between-country differences, especially between the US and other countries, may reflect such survey inconsistencies. Third, we used cross-sectional data; therefore, the temporal ordering of early sexual initiation and physical/psychological symptoms could not be determined. In past US-based studies, there has been mixed evidence regarding the temporal ordering of these health statuses (Longmore et al. 2004; Spriggs and Halpern 2008a); therefore, if cross-country longitudinal data sets become available, testing the consistency of the directionality of this relationship will be worth exploring. Fourth, the data were collected between 11 and 14 years prior to this analysis, which may raise concerns that the results are not applicable to present day. Although these covariations could change across historical time, we believe this would only occur with major cultural change in one or more countries since data collection. Without concrete evidence that this has happened, we argue that our results are valid and contribute new and valuable knowledge of adolescent development. However, further investigation of historical trends across countries in the interrelationships of these indicators will be an important next step. Fifth, the variable we use to operationalize sexual initiation has a number of limitations. Although in Add Health penis-in-vagina sex is specified, a similar definition is not presented in HBSC, leaving the meaning open to interpretation by adolescents. Further, the question in both surveys does not distinguish between consensual and non-consensual intercourse, nor do they ask about the sex of the partner, which most likely are differentially related to the studied outcome (Cecil

and Matson 2005; Ueno 2005). If cross-national population-based datasets become available in the future that capture these distinctions in the experience of sexual initiation, they should be used to test the robustness of our findings. Finally, we were unable to include some key control variables, such as immigrant status and ethnicity, which may confound the relationship between early sexual initiation and physical/ psychological symptoms. Such information is available in Add Health but not in HBSC. If other data sources become available that include these covariates, testing the robustness of our findings to their inclusion would be worthwhile.

In this study, we found that early sexual initiation was related to physical/psychological symptoms only among girls in the US and Poland. Such findings have important implications for the understanding of adolescent sexual development. Results suggest that early sexual initiation may not necessarily be related to adolescent maladjustment in all national contexts, and that where sexual initiation is related to maladjustment, girls are more affected than boys. Further research is warranted exploring the possible mechanisms of this relationship, specifically aspects of national contexts that could create variability in the relationship between sexual initiation and maladjustment for girls (e.g., sociocultural norms). In settings where these associations with ill-health are not observed, lessons may be learned regarding strategies to protect the well-being of adolescents who experience early sexual initiation.

Acknowledgments

This research uses data from Add Health, a program project designed by J. Richard Udry, Peter S. Bearman, and Kathleen Mullan Harris, and funded by a grant P01-HD31921 from the Eunice Kennedy Shriver National Institute of Child Health and Human Development, with cooperative funding from 17 other agencies. Special acknowledgment is due Ronald R. Rindfuss and Barbara Entwisle for assistance in the original design. Persons interested in obtaining data files from Add Health should contact Add Health, Carolina Population Center, 123 W. Franklin Street, Chapel Hill, NC 27516-2524 (addhealth@unc.edu). No direct support was received from grant P01-HD31921 for this analysis. HBSC is an international study carried out in collaboration with WHO/EURO. The international coordinator of the 2005–2006 study was Candace Currie, University of Edinburgh, Scotland; and the data bank manager was Oddrun Samdal, University of Bergen, Norway. Data from the following countries were included in the present study (principal investigators are given in parentheses): Finland (Jorma Tynjälä), France (Emmanuelle Godeau), Poland (Joanna Mazur), Scotland (Candace Currie). Dr. Madkour's time on this project was partially supported by the Carolina Population Center, NICHD NRSA pre-doctoral traineeship, grant number NIH-NICHD T32-HD07168. An earlier version of this manuscript was presented at the 2009 Meeting of the International Union for the Scientific Study of Population.

References

- Aro H, Paronen O, Aro S. Psychosomatic symptoms among 14–16 year old Finnish adolescents. *Social Psychiatry and Psychiatric Epidemiology* 1987;22(3):171–176.
- Bay-Cheng LY. The trouble of teen sex: The construction of adolescent sexuality through school-based sexuality education. *Sex Education* 2003;3(1):61–74.
- Bay-Cheng, LY.; Burnette, MM.; McAnulty, RD. Sex and sexuality, Vol 1: Sexuality today: Trends and controversies. Westport, CT, USA: Praeger Publishers/Greenwood Publishing Group; 2006. The social construction of sexuality: Religion, medicine, media, schools, and families; p. 203-228.
- Berne, L.; Huberman, B. European approaches to adolescent sexual behavior and responsibility. Washington, DC: Advocates for Youth; 1998.
- Billy JO, Brewster KL, Grady WR. Contextual effects on the sexual behavior of adolescent women. *Journal of Marriage and the Family* 1994;56(2):387–404.
- Brener N, Kann L, Lowry R, Wechsler H, Romero L. Trends in HIV-related risk behaviors among high school students—United States, 1991–2005. *Morbidity and Mortality Weekly Report* 2006;55(31):851–854. [PubMed: 16902396]
- Browning CR, Leventhal T, Brooks-Gunn J. Neighborhood context and racial differences in early adolescent sexual activity. *Demography* 2004;41(4):697–720. [PubMed: 15622950]

- Cavanagh SE. Family structure history and adolescent adjustment. *Journal of Family Issues* 2008;29(7):944–980.
- Cecil H, Matson SC. Differences in psychological health and family dysfunction by sexual victimization type in a clinical sample of African American adolescent women. *Journal of Sex Research* 2005;42(3):203–214. [PubMed: 19817034]
- Chantala, K.; Kalsbeek, WD.; Andraca, E. Non-response in wave III of the add health study. Chapel Hill, NC: Carolina Population Center; 2004.
- Cubbin C, Santelli J, Brindis CD, Braveman P. Neighborhood context and sexual behaviors among adolescents: Findings from the national longitudinal study of adolescent health. *Perspectives on Sexual and Reproductive Health* 2005;37(3):125–134. [PubMed: 16150660]
- Currie, C.; Hurrelmann, K.; Settertobulte, W.; Smith, R.; Todd, J. Health behaviour in school-aged children A WHO Cross-National Study (HBSC) international report. Copenhagen, Denmark: WHO Regional Office for Europe; 2000.
- Currie C, Molcho M, Boyce W, Holstein B, Torsheim T, Richter M. Researching health inequalities in adolescents: The development of the HBSC Family Affluence Scale. *Social Science and Medicine* 2008;66(6):1429–1436. [PubMed: 18179852]
- Darroch, JE.; Frost, JJ.; Singh, S. Teenage sexual and reproductive behavior in developed countries: Can more progress be made?. New York: The Alan Guttmacher Institute; 2001.
- Due P, Holstein BE, Lynch J, Diderichsen F, Gabhain SN, Scheidt P, et al. Bullying and symptoms among school-aged children: International comparative cross sectional study in 28 countries. *European Journal of Public Health* 2005;15(2):128–132. [PubMed: 15755782]
- Edgarth K. Sexual behaviour and early coitarche in a national sample of 17 year old Swedish girls. *Sexually Transmitted Infections* 2000;76(2):98–102. [PubMed: 10858710]
- Finer LB. Trends in premarital sex i the United States, 1954–2003. *Public Health Reports* 2007;122:73–78. [PubMed: 17236611]
- Garber J, Walker LS, Zeman J. Somatization symptoms in a community sample of children and adolescents: Further validation of the Children’s Somatization Inventory. *Psychological Assessment: A Journal of Consulting and Clinical Psychology* 1991;3(4):588–595.
- Godeau E, Vignes C, Duclos M, Navarro F, Cayla F, Grandjean H. Factors associated with early sexual initiation in girls: French data from the international survey Health Behaviour in School-aged Children (HBSC)/WHO. *Gynécologie, Obstétrique & Fertilité* 2008;36(2):176–182.
- Goodyer IM. Physical symptoms and depressive disorders in childhood and adolescence. *Journal of Psychosomatic Research* 1996;41(5):405–408. [PubMed: 9032704]
- Gureje OM, Simon GE, Ustun TB, Goldberg DP. Somatization in cross-cultural perspective: A World Health Organization study in primary care. *American Journal of Psychiatry* 1997;154(7):989–995. [PubMed: 9210751]
- Halpern CT, Waller MW, Spriggs A, Hallfors DD. Adolescent predictors of emerging adult sexual patterns. *Journal of Adolescent Health* 2006;39(6):e1–e10. [PubMed: 17116527]
- Harris, KM.; Florey, F.; Tabor, J.; Bearman, PS.; Jones, J.; Udry, JR. The national longitudinal study of adolescent health. 2003. Research design [WWW document], from <http://www.cpc.unc.edu/projects/addhealth/design>
- Haugland S, Wold B, Stevenson J, Aaroe LE, Woynarowska B. Subjective health complaints in adolescence. A cross-national comparison of prevalence and dimensionality. *European Journal of Public Health* 2001;11(1):4–10. [PubMed: 11276570]
- Holstein B, Currie C, Boyce W, Damsgaard M, Gobina I, Kökönyi G, et al. Socio-economic inequality in multiple health complaints among adolescents: International comparative study in 37 countries. *International Journal of Public Health* 2009;54:260–270. [PubMed: 19639254]
- Hubert, M.; Bajos, N.; Sandfort, T. Sexual behaviour and HIV/AIDS in Europe: Comparisons of national surveys. London: UCL Press; 1998.
- Ingham, R.; Partridge, R. A review of sexual health policies and trends in the USA, Australia and New Zealand: A report for the Health Education Board Scotland. Edinburgh: Health Education Board Scotland; 2002.
- Jessor, R.; Jessor, SL. Problem behavior and psychosocial development: A longitudinal study of youth. New York, NY: Academic Press; 1977.

- Kolenikov, S.; Angeles, G. CPC/MEASURE working paper. 2004. The use of discrete data in principal component analysis with applications to socio-economic indices.
- Kreager DA, Staff J. The sexual double standard and adolescent peer acceptance. *Social Psychology Quarterly* 2009;72(2):143–164.
- Lammers C, Ireland M, Resnick M, Blum R. Influences on adolescents' decision to postpone onset of sexual intercourse: A survival analysis of virginity among youths aged 13 to 18 years. *Journal of Adolescent Health* 2000;26(1):42–48. [PubMed: 10638717]
- Lavikainen HM, Lintonen T, Kosunen E. Sexual behavior and drinking style among teenagers: A population-based study in Finland. *Health Promotion International* 2009;24(2):108–119. [PubMed: 19304992]
- Lemstra M, Neudorf C, D'Arcy C, Kunst A, Warren LM, Bennett NR. A systematic review of depressed mood and anxiety by SES in youth aged 10–15 years. *Canadian Journal of Public Health-Revue Canadienne De Sante Publique* 2008;99(2):125–129. [PubMed: 18457287]
- Longmore MA, Manning WD, Giordano PC, Rudolph JL. Self-esteem, depressive symptoms, and adolescents' sexual onset. *Social Psychology Quarterly* 2004;67(3):279–295.
- Magnusson C. A follow-up study of adolescent girls with early sexual debut in combination with gynecological problems. *Journal of Psychosomatic Obstetrics and Gynaecology* 1998;19(2):70–83. [PubMed: 9638600]
- Magnusson C. Adolescent girls' sexual attitudes and opposite-sex relations in 1970 and in 1996. *Journal of Adolescent Health* 2001;28(3):242–252. [PubMed: 11226848]
- Maternal and Child Health Bureau. Section 510 abstinence education grant program. 2002. Retrieved November 2, 2009, from <ftp://ftp.hrsa.gov/mchb/abstinence/statefs.pdf>
- Meier AM. Adolescent first sex and subsequent mental health. *American Journal of Sociology* 2007;112(6):1811–1847.
- O'Donnell BL, O'Donnell CR, Stueve A. Early sexual initiation and subsequent sex-related risks among urban minority youth: The reach for health study. *Family Planning Perspectives* 2001;33(6):268–275. [PubMed: 11804436]
- Pearson J, Muller C, Frisco ML. Parental involvement, family structure, and adolescent sexual decision making. *Sociological Perspectives* 2006;49(1):67–90.
- Rauste-von Wright M, von Wright J. Habitual somatic discomfort in a representative sample of adolescents. *Journal of Psychosomatic Research* 1992;36(4):383–390. [PubMed: 1593513]
- Ravens-Sieberer U, Torsheim T, Hetland J, Vollebergh W, Cavallo F, Jericek H, et al. Subjective health, symptom load and quality of life of children and adolescents in Europe. *International Journal of Public Health* 2009;54:151–159. [PubMed: 19639258]
- Ream GL. Reciprocal effects between the perceived environment and heterosexual intercourse among adolescents. *Journal of Youth and Adolescence* 2006;35(5):771–785.
- Ream GL, Savin-Williams RC. Reciprocal associations between adolescent sexual activity and quality of youth-parent interactions. *Journal of Family Psychology* 2005;19(2):171–179. [PubMed: 15982092]
- Rhee H, Miles MS, Halpern CT, Holditch-Davis D. Prevalence of recurrent physical symptoms in U.S. adolescents. *Pediatric Nursing* 2005;31(4):314–350. [PubMed: 16229130]
- Ross, J.; Godeau, E.; Dias, S. Sexual health. In: Currie, C.; Roberts, CM.; Antony, Smith, R.; Settertobulte, WS.; Oddrun; Rasmussen, VB., editors. *Young people's health in context. Health Behaviour in School-aged Children (HBSC) study: International report from the 2001/2002 survey*. Geneva: World Health Organization; 2004. p. 153-160.
- Rothman, K.; Greenland, S. *Modern epidemiology*. 2nd ed.. Philadelphia, PA: Lipincott Williams & Williams; 1998.
- Saluja G, Iachan R, Scheidt PC, Overpeck MD, Sun W, Giedd JN. Prevalence of and risk factors for depressive symptoms among young adolescents. *Archives of Pediatrics and Adolescent Medicine* 2004;158(8):760–765. [PubMed: 15289248]
- Schalet A. Must we fear adolescent sexuality? *Medscape General Medicine* 2004;6(4):44. [PubMed: 15775871]

- Scheidt, P.; Overpeck, MD.; Wyatt, W.; Aszmann, A. Adolescents' general health and wellbeing. In: Currie, C.; Hurrelmann, K.; Settertobulte, W.; Smith, R.; Todd, J., editors. Health and health behaviour among young people. Geneva: WHO; 2000.
- Schwartz IM. Affective reactions of American and Swedish women to their first premarital coitus: A cross-cultural comparison. *Journal of Sex Research* 1993;30(1):18–26.
- Selvin, S. Statistical analysis of epidemiologic data. New York: Oxford University Press; 2004.
- Sheeran P, Spears R. Religiosity, gender, and the double standard. *Journal of Psychology* 1996;130(1): 23. [PubMed: 8618212]
- Shoveller JA, Johnson JL, Langille DB, Mitchell T. Socio-cultural influences on young people's sexual development. *Social Science and Medicine* 2004;59(3):473–487. [PubMed: 15144759]
- Singh S, Darroch JE, Frost JJ. Socioeconomic disadvantage and adolescent women's sexual and reproductive behavior: The case of five developed countries. *Family Planning Perspectives* 2001;33(6):251–258. 289. [PubMed: 11804434]
- Spriggs AL, Halpern CT. Sexual debut timing and depressive symptoms in emerging adulthood. *Journal of Youth and Adolescence* 2008a;37(9):1085–1096. [PubMed: 19802319]
- Spriggs AL, Halpern CT. Timing of sexual debut and initiation of postsecondary education in early adulthood. *Perspectives on Sexual and Reproductive Health* 2008b;40(3):152–161. [PubMed: 18803797]
- Taylor DC, Szatmari P, Boyle MH, Offord DR. Somatization and the vocabulary of everyday bodily experiences and concerns: A community study of adolescents. *Journal of American Academy of Child & Adolescent Psychiatry* 1996;35(4):491–499.
- Teitler JO. Trends in youth sexual initiation and fertility in developed countries: 1960–1995. *Annals of the American Academy of Political and Social Science* 2002;580:134–152.
- Tolman, DL. Dilemmas of desire: Teenage girls talk about sexuality. Cambridge, MA: Harvard University Press; 2002.
- Ueno K. Sexual orientation and psychological distress in adolescence. Examining interpersonal stressors and social support processes. *Social Psychology Quarterly* 2005;68(3):258–277.
- van Lang NDJ, Ferdinand RF, Verhulst FC. Predictors of future depression in early and late adolescence. *Journal of Affective Disorders* 2007;97(1–3):137–144. [PubMed: 16837054]
- Wellings K, Nanchahal K, Macdowall W, McManus S, Erens B, Mercer CH, et al. Sexual behaviour in Britain: Early heterosexual experience. *The Lancet* 2001;358(9296):1843–1850.
- Widmer ED, Treas J, Newcomb R. Attitudes toward nonmarital sex in 24 countries. *Journal of Sex Research* 1998;35(4):349–358.
- Wight D, Williamson L, Henderson M. Parental influences on young people's sexual behaviour: A longitudinal analysis. *Journal of Adolescence* 2006;29(4):473–494. [PubMed: 16213580]
- Wooldridge, J. Introductory econometrics: A modern approach. 3rd ed.. Mason, OH: South-Western College Publishing; 2005.

Biographies

Aubrey Spriggs Madkour is an Assistant Professor in the Department of Community Health Sciences at the Tulane School of Public Health and Tropical Medicine. She received her Ph.D. in Maternal and Child Health from the University of North Carolina at Chapel Hill. Her research focuses on social/contextual determinants of adolescent health behaviors, particularly sexual behaviors and partner violence; the longitudinal course of these behaviors; and the effects of these behaviors for adult adjustment and well-being.

Tilda Farhat is a Post-doctoral Fellow in the Prevention Research Branch of the Eunice Kennedy Shriver National Institute of Child Health and Human Development. She received her Ph.D. in Health Behavior and Health Education from the University of North Carolina at Chapel Hill. Her research focuses on the etiology and prevention of health-risk behaviors among adolescents and young adults, and on social and environmental influences on these behaviors.

Carolyn Tucker Halpern is an Associate Professor of Maternal and Child Health at the University of North Carolina at Chapel Hill. She received her Ph.D. in Developmental Psychology from the University of Houston. Her research centers on adolescent and young adult health, with an emphasis on healthy sexual development, gender issues, and intimate partner violence. She is the Deputy Director for Wave IV of the National Longitudinal Study of Adolescent Health.

Emmanuelle Godeau is a Public Health Medical Doctor working for the French Ministry of Education and Institut National de la Santé et de la Recherche Médicale. She received her Ph.D. in social anthropology from the Ecole des Hautes Etudes en Science Sociales (School of High Studies in Social Sciences), Paris. She also received her MD from the Medical Faculty of Toulouse Purpan, Toulouse, France. Her current domains of research are adolescent health, risk behaviors and integrative schooling. She has been the Principal Investigator for HBSC France since 2002.

Saoirse Nic Gabhainn is a Health Psychologist and Head of Health Promotion in the School of Health Sciences at the National University of Ireland, Galway. She received her Ph.D. in psychology from the Faculty of Pure Science, University of Nottingham, England. Her research focuses on youth health and well-being, and health promoting environments for children and adolescents. She has been Principal Investigator for HBSC Ireland since 1994.

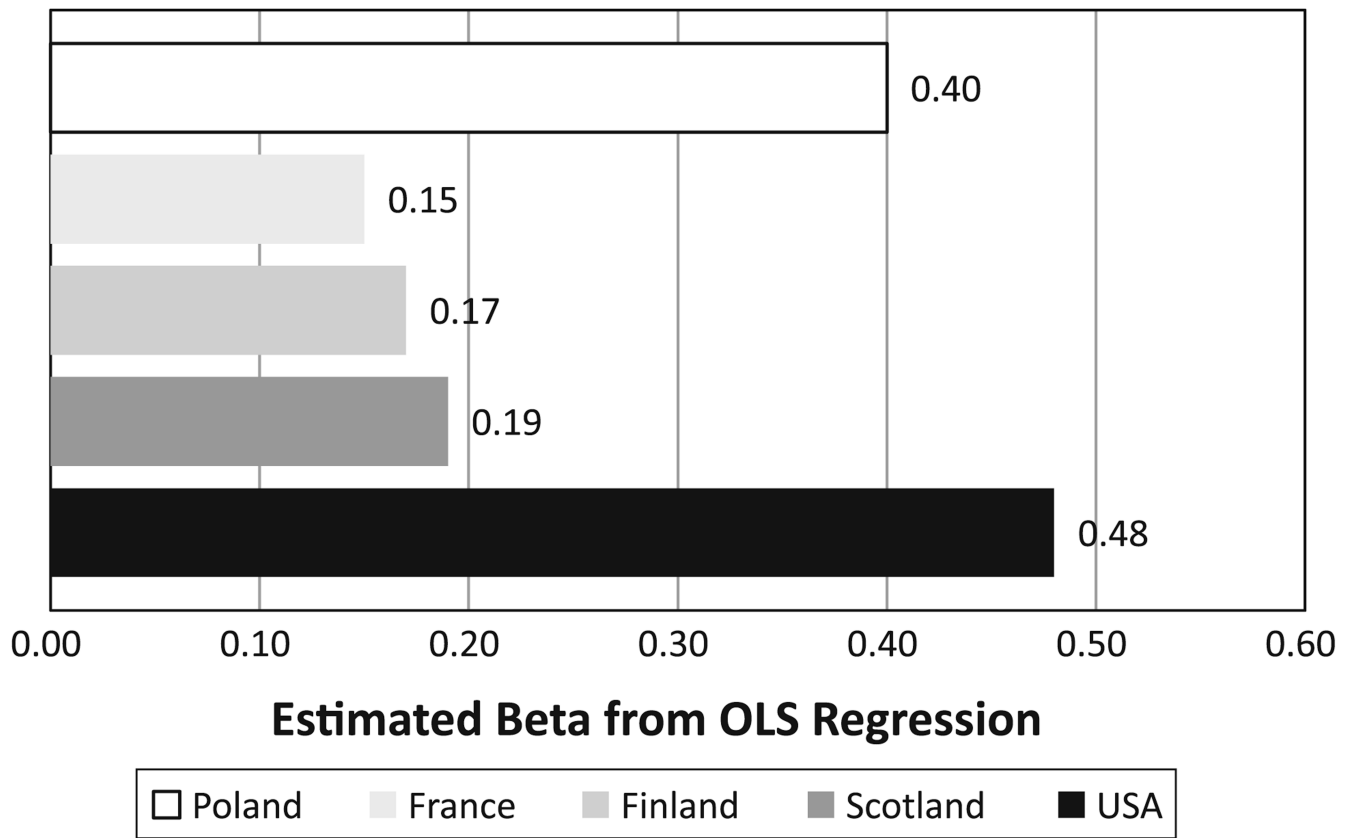


Fig. 1. Ever sexual intercourse and physical/psychological symptoms: female multivariable model results. Model controls for family structure, family SES, and country fixed effects. § $p < 0.20$, † $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 1

Variable renaming and response recodes for Add Health and HBSC survey items

HBSC 1997/1998	Recode	Add health 1996	Recode
<i>Sexual intercourse</i>			
Have you ever had sexual intercourse?		Have you ever had sexual intercourse?	
1 = Yes	0 = No	1 = Yes	0 = No
0 = No	1 = Yes	0 = No	1 = Yes
<i>Physical/psychological symptoms</i>			
In general, how do you feel about your life at present?		How often, in the past seven days, did you feel happy?	
1 = Very happy	0 = Very happy (1)	0 = Never or rarely	0 = Most or all of the time (3)
2 = Quite happy	1 = Quite happy (2)	1 = Sometimes	1 = A lot of the time (2)
3 = Not very happy	2 = Not very happy (3)	2 = A lot of the time	2 = Sometimes (1)
4 = Not happy at all	3 = Not happy at all (4)	3 = Most or all of the time	3 = Never or rarely (0)
In the past 6 months, how often have you had the following: feeling low?		How often, in the past seven days, did you feel sad?	
1 = About every day	0 = Never or rarely (5)	0 = Never or rarely	0 = Never or rarely (0)
2 ≥ Once a week	1 = Sometimes (3,4)	1 = Sometimes	1 = Sometimes (1)
3 = About every week	2 = A lot of the time (2)	2 = A lot of the time	2 = A lot of the time (2)
4 = About every month	3 = Most/all of time (1)	3 = Most or all of the time	3 = Most or all of the time (3)
5 = Rarely or never			
Do you ever feel lonely?		How often, in the past seven days, did you feel lonely?	
4 = No	0 = Never (4)	0 = Never/rarely	0 = Never/rarely (0)
3 = Yes, sometimes	1 = Sometimes (3)	1 = Sometimes	1 = Sometimes (1)
2 = Yes, rather often	2 = A lot of the time (2)	2 = A lot of the time	2 = A lot of the time (2)
1 = Yes, very often	3 = Most/all of time (1)	3 = Most/all of the time	3 = Most/all of the time (3)
In the last 6 months, how often had you had the following: irritability / bad temper?		In the past 12 months, how often have you been moody?	
1 = About every day	0 = Rarely or never (4,5)	0 = Never	0 = Rarely or Never (0,1)
2 ≥ Once a week	1 = Once a week (3)	1 = A few times	1 = Once a week (2)
3 = About every week	2 ≥ Once a week (2,1)	2 = About once a week	2 ≥ Once a week (3,4)
4 = About every month		3 = Almost every day	
5 = Rarely or never		4 = Every day	
In the last 6 months, how often had you had the following: headache?		In the past 12 months, how often have you had headaches?	
1 = About every day	0 = Rarely or never (4,5)	0 = Never	0 = Rarely or Never (0,1)
2 ≥ Once a week	1 = Once a week (3)	1 = Just a few times	1 = Once a week (2)
3 = About every week	2 ≥ Once a week (2,1)	2 = About once a week	2 ≥ Once a week (3,4)
4 = About every month		3 = Almost every day	

HBSC 1997/1998	Recode	Add health 1996	Recode
5 = Rarely or never		4 = Every day	
In the last 6 months, how often had you had the following: trouble sleeping?		In the past 12 months, how often have you had trouble falling asleep or staying asleep?	
1 = About every day	0 = Rarely or never (4,5)	0 = Never	0 = Rarely or Never (0,1)
2 ≥ Once a week	1 = Once a week (3)	1 = Just a few times	1 = Once a week (2)
3 = About every week	2 ≥ Once a week (2,1)	2 = About once a week	2 ≥ Once a week (3,4)
4 = About every month		3 = Almost every day	
5 = Rarely or never		4 = Every day	

Table 2

Principal components analysis results: physical/psychological symptoms index

	Males					Females				
	United States	Scotland	Finland	France	Poland	United States	Scotland	Finland	France	Poland
Correlation with score generated with PCA over pooled sample ^a	0.95	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Eigenvalues	2.53	2.81	2.73	2.65	3.00	2.9	2.96	2.79	2.88	3.06
	1.19	1.04	1.05	1.08	0.94	1.01	0.93	1.03	1.00	0.93
	0.73	0.73	0.72	0.67	0.64	0.70	0.69	0.71	0.67	0.66
	0.68	0.59	0.58	0.63	0.61	0.60	0.56	0.59	0.6	0.55
	0.53	0.55	0.52	0.51	0.53	0.49	0.51	0.52	0.51	0.48
	0.34	0.29	0.39	0.46	0.28	0.30	0.36	0.37	0.34	0.32
Scoring coefficients										
Life satisfaction										
Very happy	-0.33	-0.42	-0.51	-0.37	-0.43	-0.4	-0.57	-0.52	-0.47	-0.58
Quite happy	0.08	0.13	0.04	0.15	0.05	0.09	0.03	0.07	0.07	-0.05
Not very happy	0.40	0.58	0.51	0.50	0.45	0.48	0.55	0.59	0.51	0.41
Not happy at all	0.73	0.87	0.81	0.77	0.73	0.88	0.97	0.95	0.90	0.80
Feeling sad										
Never/rarely	-0.29	-0.25	-0.4	-0.38	-0.32	-0.43	-0.47	-0.56	-0.6	-0.46
Sometimes	0.47	0.48	0.25	0.25	0.33	0.22	0.14	0.10	-0.01	0.11
A lot of the time	0.98	0.79	0.67	0.63	0.69	0.71	0.58	0.60	0.44	0.47
Most/all of the time	1.33	1.08	0.96	0.94	1.00	1.08	0.95	0.97	0.84	0.82
Feel lonely										
Never/rarely	-0.21	-0.29	-0.37	-0.36	-0.46	-0.29	-0.46	-0.52	-0.51	-0.66
Sometimes	0.50	0.24	0.17	0.20	0.09	0.33	0.04	0.03	-0.01	-0.10
A lot of the time	0.84	0.59	0.52	0.54	0.53	0.73	0.45	0.48	0.38	0.33
Most/all of the time	1.15	0.86	0.77	0.86	0.81	1.08	0.77	0.78	0.70	0.67
Feel moody										
Rarely/never	-0.20	-0.30	-0.36	-0.33	-0.31	-0.32	-0.31	-0.43	-0.39	-0.40
Once a week	0.44	0.20	0.17	0.15	0.21	0.20	0.18	0.04	0.02	0.06
>Once a week	0.86	0.58	0.62	0.54	0.61	0.62	0.55	0.49	0.42	0.49

	Males					Females				
	United States	Scotland	Finland	France	Poland	United States	Scotland	Finland	France	Poland
Headaches										
Rarely/never	-0.08	-0.15	-0.15	-0.13	-0.13	-0.16	-0.24	-0.25	-0.27	-0.25
Once a week	0.33	0.25	0.26	0.29	0.33	0.21	0.08	0.14	0.16	0.15
Once a week	0.57	0.48	0.52	0.52	0.57	0.48	0.34	0.45	0.49	0.45
Trouble sleeping										
Rarely/never	-0.13	-0.17	-0.21	-0.22	-0.14	-0.18	-0.22	-0.21	-0.32	-0.16
Once a week	0.43	0.29	0.28	0.18	0.36	0.33	0.20	0.25	0.05	0.24
>Once a week	0.73	0.56	0.60	0.46	0.60	0.65	0.50	0.56	0.39	0.47

Polychoric principal components analysis (PCA). Unlike in traditional PCA, scoring coefficients are allowed to vary across levels within a variable

^aPearson's correlation coefficient

Table 3

Demographic characteristics, ever sexual intercourse, and physical/psychological symptoms among 15-year-olds: prevalence and means by gender and country

	Boys (n = 2,943)					Girls (n = 3,168)						
	United States (n = 760)	Scotland (n = 624)	Finland (n = 410)	France (n = 461)	Poland (n = 688)	p-Value ^a	United States (n = 861)	Scotland (n = 716)	Finland (n = 474)	France (n = 533)	Poland (n = 584)	p-Value ^a
<i>Prevalence (%)</i>												
Family composition												
Two biologic parents	58.2	76.8	73.2	74.8	86.1	<.001	56.6	70.4	70.5	78.2	86.1	<.001
Stepfamily	17.9	6.6	10	9.1	2.9		15.7	9.6	9.7	8.4	4.5	
Single parent	21.7	14.4	15.6	14.8	10.8		26.5	18.6	19.4	12	8.7	
Other	2.2	2.2	1.2	1.3	0.3		3.3	1.4	0.4	1.3	0.7	
Family SES												
Low	41.8	50.5	48.5	33	63.9	<.001	44	51.4	56.5	38.3	73.1	<.001
Medium	20.7	28.7	30	29.9	26.6		21.3	30.9	30.2	29.1	20.6	
High	37.5	20.8	21.5	37.1	9.5		34.7	17.7	13.3	32.7	6.3	
Ever sexual intercourse	30.7	32.7	17.6	30.4	28.3	<.001	30.7	37.2	26.6	20.6	11.3	<.001
<i>Means (SE)</i>												
Physical/psychological symptoms (range, 1.93-4.27)	-0.79 (0.04)	-0.45 (0.05)	-0.18 (0.06)	-0.27 (0.06)	-0.18 (0.05)	<.001	-0.23 (0.04)	0.33 (0.05)	0.35 (0.06)	0.70 (0.06)	0.56 (0.06)	<.001

^aChi-square or ANOVA test for differences between countries within gender

Table 4

Adjusted association between ever sexual intercourse and physical/psychological symptoms: by gender

	Physical/psychological symptoms			
	Boys (n = 2,943)		Girls (n = 3,168)	
	Est. β (95% CI)^a	p-value^b	Est. β (95% CI)^a	p-Value^b
Family composition				
Two biologic parents	Ref.	0.047	Ref.	<.001
Stepfamily	0.16 (0.01–0.31)		0.38 (0.23–0.54)	
Single parent	0.23 (0.10–0.35)		0.23 (0.10–0.36)	
Other	0.32 (–0.10 to 0.73)		0.31 (–0.03 to 0.66)	
Family SES				
Low	0.17 (0.07–0.28)	0.002	0.21 (0.09–0.33)	<.001
Medium	0.03 (–0.08 to 0.14)		0.07 (–0.07 to 0.20)	
High	Ref.		Ref.	
Ever sexual intercourse	0.12 (–0.04 to 0.28)	0.148	0.48 (0.30–0.66)	<.001
Country				
United States	Ref.	<.001	Ref.	<.001
Scotland	0.38 (0.24–0.52)		0.66 (0.50–0.82)	
Finland	0.61 (0.46–0.76)		0.71 (0.54–0.87)	
France	0.59 (0.44–0.75)		1.12 (0.96–1.29)	
Poland	0.58 (0.44–0.72)		0.92 (0.76–1.08)	
Interactions				
Ever sex \times Scotland	–0.10 (–0.36 to 0.16)	0.269	–0.29 (–0.56 to –0.01)	0.120
Ever sex \times Finland	0.15 (–0.16 to 0.47)		–0.31 (–0.61 to –0.01)	
Ever sex \times France	–0.10 (–0.41 to 0.20)		–0.33 (–0.68 to 0.01)	
Ever sex \times Poland	0.18 (–0.09 to 0.45)		–0.08 (–0.49 to 0.34)	
Model fit				
R^2	0.06		0.09	
F (df)	(14, 2928) 14.35	<.001	(14, 3153) 24.81	<.001

^aEstimated beta coefficient from OLS regression^bp-Value for joint test of significance with robust standard errors